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Amateur Radio

CQ

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Results of the 1985 CQ WW DX CW Contest

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

...pacesetter in Amateur radio

All New Compact HF!

"DX-citing!"

TS-440S Compact high performance HF transceiver with general coverage receiver

Kenwood's advanced digital know-how brings Amateurs world-wide "big-rig" performance in a compact package. We call it "Digital DX-citement"—that special feeling you get every time you turn the power on!

- **Covers All Amateur bands**
  General coverage receiver tunes from 100 kHz—30 MHz. Easily modified for HF MARS operation.
- **Direct keyboard entry of frequency**
- **All modes built-in**
  USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.
- **Built-in automatic antenna tuner (optional)**
  Covers 80-10 meters.
- **VS-1 voice synthesizer (optional)**
- **Superior receiver dynamic range**
  Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m)
- **100% duty cycle transmitter**
  Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)

- **Adjustable dial torque**
- **100 memory channels**
  Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**
  Subtone is memorized when TU-8 is installed.
- **Superb interference reduction**
  IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.
- **MC-42S UP/DOWN mic. included**
- **Computer interface port**
- **5 IF filter functions**
- **Dual SSB IF filtering**
  A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.
- **VOX, full or semi break-in CW; AMTOR compatible.**

Optional accessories:

- AT-440 internal auto. antenna tuner (80 m—10 m)
- AT-250 external auto. tuner (160 m—10 m)
- AT-130 compact mobile antenna tuner (160 m—10 m)
- IF-232C/IC-10 level translator and modem IC kit
- PS-50 heavy duty power supply
- PS-430/PS-30 DC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- YK-88C/88CN 500 Hz/270 Hz CW filters
- YK-88S-88SN 2.4 kHz/1.8 kHz SSB filters
- MC-60A/80/85 desk microphones
- MC-55 (8P) mobile microphone
- HS-4/5/6/7 headphones
- SP-40/50 mobile speakers
- MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount
- TL-922A 2 kw PEP linear amplifier
- SM-220 station monitor
- VS-1 voice synthesizer
- SW-100A/200A/2000 SWR/power meters
- TU-8 CTCSS tone unit
- PG-2C extra DC cable.

Kenwood takes you from HF to OSCAR!

25th Anniversary

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Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

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NEW

Listen Up!

R-5000

High performance receiver

***THE* high performance receiver is here from the leader in communications technology—the Kenwood R-5000. This all-band, all mode receiver has superior interference reduction circuits, and has been designed with the highest performance standards in mind. Listen to foreign music, news, and commentary. Tune in local police, fire, aircraft, weather, and other public service channels with the VC-20 VHF converter. All this excitement and more is yours with a Kenwood receiver!**

- **Covers 100 kHz-30 MHz in 30 bands, with additional coverage from 108-174 MHz (with VC-20 converter installed).**
- **Superior dynamic range.** Exclusive Kenwood DynaMix™ system ensures an honest 102 dB dynamic range. (14 MHz, 500 Hz bandwidth, 50 kHz spacing.)

- **100 memory channels.** Store mode, frequency, antenna selection.
- **Choice of either high or low impedance antenna connections.**
- **Extremely stable, dual digital VFOs.** Accurate to ±10 ppm over a wide temperature range.
- **Kenwood's superb interference reduction.** Optional filters further enhance selectivity. Dual noise blankers built-in.
- **Direct keyboard frequency entry.**
- **Versatile programmable scanning, with center-stop tuning.**
- **Voice synthesizer option.**
- **Computer control option.**
- **Kenwood non-volatile operating system.** Lithium battery backs up memories; all functions remain intact even after lithium cell expires.
- **Power supply built-in.** Optional DCK-2 allows DC operation.
- **Selectable AGC, RF attenuator, record and headphone jacks, dual 24-hour clocks with timer, muting terminals, 120/220/240 VAC operation.**

Optional Accessories:

• VC-20 VHF converter for 108-174 MHz operation • YK-88A 1.6 kHz AM filter • YK-88S 2.4 kHz SSB filter • YK-88SN 1.8 kHz narrow SSB filter • YK-88C 500 Hz CW filter • YK-88CN 270 Hz narrow filter • DCK-2 DC power cable • HS-5, HS-6, HS-7 headphones • MB-430 mobile bracket • SP-430 external speaker • VS-1/VS-2 voice synthesizer • IF-232C/IC-10 computer interface.

More information on the R-5000 and R-2000 is available from Authorized Kenwood Dealers.

R-2000 150 kHz-30 MHz in 30 bands • All modes • Digital VFOs tune in 50 Hz, 500 Hz, or 5 kHz steps • 10 memory channels • Programmable scanning • Dual 24-hour digital clocks, with timer • 3 built-in IF filters (CW filter optional) • All mode squelch, noise blanker, RF attenuator, AGC switch, S meter • 100/120/220/240 VAC operation • Record, phone jacks • Muting terminals • VC-10 optional VHF converter (108-174 MHz)

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

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NEW Compact 45 W 2 m

45 Affordable Watts!

TM-201B/401B

Super-compact mobile transceivers

The TM-201B boasts a powerful 45 watts output, easy-to-operate front panel controls, and ultra-compact size. The GaAsFET receiver front end provides high sensitivity and wide dynamic range. Receive and transmit characteristics are tailored for minimum distortion and excellent audio quality. Both the TM-201B and the TM-401B are supplied with a high-quality external speaker, 16-key DTMF microphone and mounting bracket.

- 45 watt output, with HI/LO power switch (TM-401B has 25 watts output.)5 W low.
- Dual digital VFOs
  TM-201B covers 142-149 MHz, includes certain MARS and CAP frequencies
  TM-401B covers 440-450 MHz
- 5 memories plus "COM" channel, with lithium battery back-up

- Programmable, multi-function scanning
- High quality external speaker supplied
- Audible beeper confirms operation

Optional accessories:

- PS-430 power supply
- TU-3 or TU-3A two frequency tone encoder
- FC-10 frequency controller
- MC-55 (8-pin) mobile microphone
- SP-40 compact mobile speaker
- SP-50 deluxe mobile speaker
- SW-100A/B SWR/power meters
- SW-200A/B SWR/power meters
- SWT-1 2 m antenna tuner
- SWT-2 70 cm antenna tuner
- PG-2K extra DC cable
- PG-3A DC line noise filter
- MB-201 extra mobile bracket

Optional FC-10 frequency controller

Convenient control keys for frequency UP/DOWN, MHz shift, VFO A/B, and MR (memory recall or change memory channel).

More information on the TM-201B/401B is available from authorized dealers.

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TM-401B is similar to the TM-201B, but covers 440-450 MHz and is 25 watts.
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Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.

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The Radio Amateur's Journal

ON THE COVER: It's contest time again. Our cover depicts a CW contestant hard at work. Check the 1985 results in this issue to see just how hard some of these ops worked. Photo by Larry Mulvehill, WB2ZPI.

OCTOBER 1986 **VOL. 42, NO. 10**

FEATURES

DEPARTMENTS

Zero Bias

AN EDITORIAL

Somewhere out there is a company that thinks up categories of interest to include in questionnaires on warranty cards packed with new merchandise. No, I'm not talking about amateur radio gear. I'm talking about home appliances, sporting goods, and things like that. The company would like you to supply some demographic information on your family, your income and education, the number of children living at that household, etc. Some might call it prying and others might think of it as market research. The last few items I purchased all had such cards, and the backs of these cards listed about 100 pastimes, hobbies, or interests. The purchaser was supposed to check the boxes next to these various areas of interest to indicate what he likes to do in his spare time. I guess they want to see what kind of person buys their product, whether there are any patterns, and what else this person buys. The list of things on cards that I've seen is quite long and varied, and in fact, some of the things listed look interesting in themselves.

Well, to get to the point, the only thing that came remotely close to amateur radio on those lists was CB. The CB boom, fad, or whatever you want to call it has been over for many years now, and the great profusion of literature, magazines, and movies about CB is gathering dust in archives. I'm not saying that CB is gone, but the high visibility of CB and CBers is gone. Even the CB whips on cars have been replaced by mobile telephone antennas—a different form of status. So why CB and not amateur radio? I don't really have a good answer except that in spite of a lot of very good press coverage and TV coverage of amateur radio activities we just don't come across as an interesting enough group. Perhaps we should push for an extra line on these forms that says *other*, where we could write in amateur radio. Anyway, this is just a little pet gripe.

Speaking of pet gripes, about this time of year I start hearing from a few amateurs out there who are "fed up to here" with contests and contesters hogging up the bands every weekend. Since *CQ* really doesn't sponsor 52 contests a year (it only seems that way), we can't take full credit for all that activity. However, the big word is *activity*, whether it's one of our contests or some other group's. With regard to our contests, we recently learned of a data base being formed on one of our events. Looking at one particular band and the entries from that section produced well over 200,000 unique call letters. I can see where some folks may not be able to ragchew, but I have to wonder who's left out there to talk to when it seems that almost everyone out there is working the contest. In a sense, we're grateful that each of these amateurs doesn't send in a log (again, it only seems that way).

Besides creating a tremendous amount of contest fever, the contests also provide the greatest way to work new countries for both established and fledgling DXers. Contests are also a way of honing and sharpening your operating skills. You have to get in and out in a hurry while conveying information. Therefore, we apologize to the few amateurs who may believe they've been inconvenienced during these periods, but we too have been inconvenienced by not having the opportunity to work them.

This month we present the results of the *CQ* World-Wide DX CW Contest for 1985, and the *CQ* World-Wide DX Contest All-Time Records. These are the aiming points for those you'd like to beat this year, plus they are the way to find out exactly who beat you last year and how badly. These results, especially this month, demonstrate that there is merit in CW practice, and it really can be fun and challenging at this level.

As usual, George Jacobs, W3ASK, our Propagation Editor, has prepared a special comprehensive forecast for the contest period to help you out. Remember that we're talking about the whole world taking part in amateur radio's biggest contest, the *CQ* World-Wide DX Contest, so if you just want to hang around and ragchew, you might consider logging some repeater time instead. If you still haven't sent in for logs, please do so quickly and be sure to include an SASE. To be frank about it, it's sometimes hard—almost impossible—to read your handwriting. This year's Phone spectacular takes place the day after United Nations Day and ends on Mother-In-Law's Day, so it's a might auspicious time frame, as they say.

Travels With CQ

Where else would we go in mid-July except to Atlanta to help celebrate the heat-stroke season? As Ed MacMahon says to Johnny Carson, "How hot was it?" It was hotter than it seemed watching the news broadcasts on TV. The area we saw was parched, very hot, and uncomfortable. Therefore, the prospect of an air-conditioned hamfest seemed just the thing. The big, new, air-conditioned convention center is an ideal setting for a hamfest, and it's big enough to hold several other events for the community at the same time. This is the second year for this event to be held at the convention center, and I guess I'm finally getting used to it. The number of exhibitors seemed up, but I'm afraid that the overwhelming heat kept a lot of folks at home next to their air conditioners. The fleamarket once again was located adjacent to the commercial area with plenty to pick and choose. I can't see how anyone went home from this one empty-handed.

Earlier in July we were in Dallas, another hot spot, for their big one. This show was held at a new location, actually in Arlington, and was quite an improvement over last year. The area is more centrally located and apparently easier to get to for Dallas area amateurs. I did get a chance to wear the Armadillo County Sheriff's badge that the Texas DX Society sent me to help publicize the Great Armadillo Run of 1986. The show facilities are part of a new Sheraton hotel which opened this year. I'd give the whole event high marks except for the hotel food, which was far worse than any airline food. I'd heartily recommend going there next year, but eating somewhere else.

We've got about six more shows to do before the end of the year. We'll be at Virginia Beach, San Diego, Radio Expo in Chicago, Houston, Boxborough, and the new one in Las Vegas. Everyone will miss *you* if you don't show up, and most of all you'll miss a great time if you decide to stay home. You owe it to yourself to take part in this aspect of amateur radio, and you owe it to the many folks who work extremely hard to present these events.

Who Replenishes The Well?

The latest issue of *QST* has an editorial that describes the ARRL's plans for a museum and a meeting room. Philosophically, I guess that we all can go along with that idea, until one reads the anticipated cost—$2.7 million. Now this is a lot of money in anyone's book, no matter who is going to pay for it. I am also sure that by the time someone is ready to turn the first shovel full of earth to start the project, the costs will have risen to probably $3.5 million or so.

There is a very big difference between something philosophically a good idea and the needs and demands of real life. One would assume from reading the editorial that the membership (which includes me) will be solicited to dig deep and help pay for the project, as with the headquarters building. At this particular time in amateur radio, and in our ongoing history, reality would say that the same request could be made for funds to reach out and publicize amateur radio. The sums of money now being spent on recruitment and publicity for amateur radio are a miniscule fraction of even $2.7 million, and that money has been hard to come by. Those within the amateur radio industry association, which includes the ARRL, have labored hard on ideas and projects whose total cost would be a small percentage of the sales tax on $2.7 million. To think in terms of what that money could mean for recruitment, publicity, and training of new members is astounding.

To think in terms of a museum at this time is like preparing own's own mausoleum or monument. If we don't reverse the trend, the museum will be a place to go and see what amateur radio *was*. In the not-too-distant future, we as median-age amateurs can take our grandchildren there to see the "dinosaur" remnants of the short ecological life of amateur radio. We have to secure a future in order for the past to have meaning. The idea is good, but the timing is awful. This huge amount of money would be better spent to secure that future—namely more amateurs.

73, Alan, K2EEK

Or This Inexpensive

It Really Shouldn't Be This Easy

Remember just a few years ago, how it took a roomful of equipment just to work RTTY. And if you wanted more than one mode it took a dedicated computer system costing thousands of dollars. The new AEA Pakratts are proving it doesn't take lots of equipment or money to enjoy working all bands in five different modes.

First, A Good Idea

The idea behind the Pakratt is very simple. One controller that does Morse, Baudot, ASCII, AMTOR, and Packet, and works both HF and VHF bands. Of course the decoding, protocol, and signal processing software must be included in the unit, and connection to the computer and transceiver have to be easy. The unit also has to be small and require only 12 volts, so it will work both in the shack and on the road.

Second, Computer Compatible

It doesn't matter what kind of computer you have, we have a Pakratt for you. The PK-64 works with the popular Commodore 64 or 128, and the PK-232 works with any other computer or terminal that has an RS-232 serial port. The PK-64 doesn't require any additional programs. Simply connect to the computer and transceiver and you're on the air. The PK-232 needs a terminal or modem program for your computer. The one you're using with your telephone modem will work just fine.

PAKRATT™ Model PK-64

PAKRATT™ Model PK-232

Third, Performance and Features

The real measure of any data controller is what kind of on-air performance it gives. While the PK-64 and PK-232 use different types of modems, both give excellent performance on VHF. The optional HF modem of the PK-64 uses independent four-pole Chebyshev filters for both Mark and Space tones, and A.M. detection. The HF option can be factory or field installed.

The PK-232 uses an eight-pole bandpass filter followed by a limiter discriminator with automatic threshold correction. The internal modem automatically selects the filter parameters, CW Fc = 800 Hz, BW = 200 Hz; HF Fc = 2210 Hz, BW = 450 Hz; VHF Fc = 1700 Hz, BW = 2600 Hz.

The PK-64 uses on screen indicators to show status, mode, and DCD (Data Carrier Detect) while the PK-232 uses front panel indicators. Both units use discriminator style tuning for HF operation. And that's just the tip of the iceberg. Features like multiple connects on packet, hardware HDLC, CW speed tracking, and other standard AEA software features are included in both the PK-64 and PK-232.

Fourth, AEA Quality and Price

Not many manufacturers like to discuss quality and price at the same time. AEA thinks you want high quality and low price in any product you buy, so that's what you get with the Pakratts. Ask any friend who owns AEA gear about our quality. The people who buy our products are our best salespeople. As for price, the PK-64 costs $219.95, or $319.95 with the HF option. The PK-64A, an enhanced software unit with a longer flexible computer cable, costs $269.95 or $369.95 with the HF option. The PK-232 costs $319.95 with the HF modem included. All prices are Amateur Net and available from your favorite amateur radio dealer. For more information contact your local dealer or AEA.

Prices and specifications subject to change without notice or obligation.

AEA

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Our Readers Say:*

Recognition—We Need It

Editor, *CQ*:

Recognition—certainly one of the key aspects of amateur radio that draws people into the hobby. As human beings we thrive on recognition. The academy awards of amateur radio are presented each month in this and other publications. For the best performance in the *CQ* World-Wide DX Contest, for technical achievement in antenna design, for working all zones (WAZ), for working 100 countries on 5 bands (5BDXCC), and on, and on, and on. We each participate in our own way. Just look around any ham shack and you're sure to find some appropriate "wallpaper."

My personal efforts for the past few years have been to complete WAZ and 5BDXCC. At this stage of the solar cycle I have found myself whiling away operating hours on 80 meters looking for the final 2 zones for WAZ and 5 confirmations needed for 5BDXCC. A few weeks ago I found myself answering a CQ from F2MA. Gee, I need that one on 80. The station came back to me and called me by name. I was shocked. Naturally, he was using a computer. The next day a QSL card was enroute. Within ten days Max sent his card to me. On the back he said: "Many thanks for another nice chat. I often hear you on one band or another . . . ." I thought I'd better not show this to my wife, as she already thinks I spend too much time on the radio.

Each morning at 6:30 a.m., before heading off to work, I trudge down to the shack for 15 minutes with two objectives. The first is to work an elusive new one on 80 meters, and the second is to drain the stuffiness out of my head after a night of dry, artificial heat, which permeates the house. For the past few weeks 80 meters had been dead. This morning, however, as the transceiver sprung to life and the preset memory locked on to 3.800 MHz, I heard activity. Nothing like a pile-up to clear the cobwebs out of the mind and get the adrenaline pumping. I heard a Minnesota station say, "Thanks for the report, Jim." Through the intense static crashes I heard a familiar voice. It was Jim, VK9NS, on Norfolk Island. I had worked Jim on several other bands and had corresponded with him at length over the years. Quickly, I threw the amplifier into stand-by and checked to ensure that the sloper had been selected. I threw in my call several times. Jim was working the midwest. I looked outside and daylight pierced through the mist this rainy spring morning. I thought, tomorrow is another day. I guess the gray-line had moved west. I called twice more and waited for the roar to simmer down. Through the static I heard: "George, long time no hear! Your 5 by 9!" My instantaneous reaction was that he was working another George somewhere west of the Mississippi. Those fears subsided as his ever so recognizable voice continued: "KN3P this is VK9NS." After a short QSO we signed and he continued to work the pileup. Wow, if Jim only knew how he had made my day.

George J. Freed, KN3P
Owings Mills, MD

Three Norths?

Editor, *CQ*:

In perusing the article entitled "Which Way is North?" (May '86 *CQ*), I noticed that Mr. Borchers has implied that all survey maps are true north. Based on my hands-on experience with maps, I have found many exceptions to the use of true north on survey maps.

In the book *Mapping* (University of Chicago Press), Mr. Greenwald points outs that three kinds of north can be encountered in mapping—i.e., true north, magnetic north, and grid north.

Based on my own experience, I have found that *all* local survey maps describing city plots, farmlands, lots, section lines, etc., are based on magnetic north. As explained to me by professional surveyors, this is because the original U.S. Land Survey utilized magnetic readings, and very little correction has been accomplished to date.

When using a map to establish a true north reference point, I would suggest checking with the surveyor responsible for making the map to determine the type of north used as a base. Don't overlook your County Surveyors Office as a source of information.

Richard Buchan, WØTJF
St. Paul, MN

**CQ encourages its readers to send in for publication letters expressing your opinions, ideas, etc. We will print them as space permits, and we reserve the right to choose material as we see fit. Please address all correspondence to "Our Readers Say" care of CQ.*

Talk Power For Peanuts. HL-1K/A Kilowatt Tabletop HF Amplifier

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JA5DQH, NN7S gave everyone VS6.

1985 CQ WORLD-WIDE DX CONTEST C.W. RESULTS

BY BOB COX*, K3EST/6, AND LARRY BROCKMAN, N6AR/4**

"I had never operated in a DX contest before last weekend. Several sources indicated that it might be a good way to pick up some new countries and have some fun, and since I had just added a second monoband vertical on 7 MHz making a phased pair, I decided to give the *CQ* WW DX Contest a shot on the CW weekend. It was amazing how much fun I had, and I worked a lot more QSO's and new countries than I thought I would with QRM and high-powered stations everywhere. I guess at any level it is a thrill to work new ones!" We think Dave, KA1KFC, sums up the enthusiasm and excitement we all feel by entering the *CQ* WW. At first, getting into the big contest sounds intimidating, but once you get your feet wet, you find that yes, you can work just about anyone with 100 watts and a dipole.

All Band

The top scores in the world reflect the enthusiasm shown above. Not only are they all seasoned contesters still excited about the fun and competition, but their scores indicate that they worked just about all the 100 watter's who called them.

A quick glance at the Top Scores box and you will see that 1985 was a little different than competitions of the past. The top five single operator all band stations finished within about 300 K of one another. This result was not left to chance; the operators had all agreed to operate from different regions that would be competitive for top world honors. When the ions finally settled down, Richard Norton, N6AA, operating at EA9IE, had topped the pack of 9Y4VT (Op. OH2BH), PJ2FR (Op. W8ZF), CN8ES (Op. OH2MM), and D44BC (Op. N6TJ). In the USA, John Dorr, K1AR, decided to do it the hard way by setting a new US record at the bottom of the sunspot cycle. In second place was W1KM, who would have pushed John for first place if his 40 meter antenna had not broken. A special mention should be made of the top US non-east-coast score: Gary, WA6VEF (at AI6V), topped all scores west of Pennsylvania. In the QRPp category, YU3BC edged out SP3KEY to become the world QRP champion.

Low Bands

The action on 7 MHz was so good that K1MM and YZ9A on opposite sides of the Atlantic both commented that the band was open 21 hours a day! At least 150 countries were available on 7 MHz, including choice catches such as BY, HS, XU, ZD9, ZC4, and 3A, to name a few. Top world honors go to KP4FI, followed closely by XE2FU (KZ5M op.) and YZ9A (YU3EY), all with over 2000 QSO's. In the US the race was a photofinish with K1OX (KC1F op.) topping K1MM for a new US record. On 3.5 MHz the well-recognized signature of EA2IA set a new European record on the way to the world high score. In the US, W1FV not only set a new 3.5 MHz US record, but also worked more countries than any submitted log (85) in his winning effort over the second-place score of N4RJ. On top band YV3AGT keyed his way to a new world record over HB9AMO. Both stations should be congratulated for confronting totally different band openings to finish at the top. In the US, K5UR not only won but beat KV4FZ's 1976 North American record. If you check out the 160 scores in the results you will see that 71 countries were worked by LZ2CJ and over 90 appeared in the logs received.

High Bands

YX5A led all stations on the "workhorse" band, 20 meters. His 1 meg-plus score topped DK3GI to become the world

*3039 Campbell Place, Davis, CA 95616
**12041 Walker Pond Rd., Winter Garden, FL 32787

The V2A crew. Front, left to right, W8PR, K6GXO, NC8Q, W8OK. Back, left to right, W8RKL, W8ILC, N9AG, WB9CIF, W8WPV, NY5Q.

HSØA—the only Zone 26.

14 MHz champion. In the US, K2VV just edged out K3RV/4 to set a new US record. On 15 meters CX5AO was the world top score beating out CE3DNP. CX5AO led all single band entrants with 1.3 meg points and almost 3,000 QSO's. In the US, K1RM took top honors over K5GO. Ten meters? Hmmm, well, we can remember it, can't we. Remember when 100 contacts on 10 were just a matter of putting in the time? Now the spectrum has been turned upside down with 160 producing much more than 10. The world top score was ZS6P with 288 QSO's. Both ZS6P and runner-up I2ARC had 59 countries. In the US, WA3CGE headed a field of four entrants.

Multi-Operator

Our hats are respectfully off for anyone putting on an expedition for the contest. But if we could take off two hats, we would do so for the hard work and planning shown by multi-expeditions.

V3A, V2A, RF3V, UP7A, ZS3/W6QL, CYØSAB, 8P9AG, and DF8ZH/CT3 all deserve our special thanks. A special mention should be made of RF3V, the world top multi-multi; they carried the whole station of UP1BZZ in trucks, railroad cars, etc., down to UF6. This year the multi-single category competition between V3A and KP4BZ produced some real fireworks. After the dust settled, V3A emerged as the world champion. In the US, K1KI and their multi-lingual crew finished ahead of N3ED for top honors. In the multi-multi category RF3V finished ahead of EA9CE for the world top score, while in the USA the boys at Tuxedo Park, N2AA, put it all together again to beat W3LPL for the U.S. Championship.

New Records

To summarize the new records that were set in the 1985 *CQ* CW, a new world record on 1.8 MHz was set by YV3AGT, almost doubling the existing record. The continent to be on for setting new records was Europe: HB9AMO (1.8), EA2IA (3.5), YZ9A (7), and DK3GI (14) all set new European records. New continental records were also set by K5UR (1.8), KH6CC (1.8), KH6MD (14), and YV3AGT (1.8). In the US, K5UR (1.8), W1FV (3.5), K1OX (7), and

The flying Finns heading out for better propagation: 9Y4VT (OH2BH), CN8ES (OH2MM), and C53AA (OH2BBM).

TOP SCORES

WORLD Single Operator All Band		USA Single Operator All Band	
EA9IE	5,731,360	K1AR	3,397,905
9Y4VT	5,676,536	W1KM	2,713,558
PJ2FR	5,434,550	N2LT	2,703,206
CN8ES	5,422,763	W3GRF	2,634,252
D44BC	5,418,018	N4WW	2,482,248
YV5TK	4,839,410	K3TUP	2,323,376
4V2C	4,281,212	K3ZO	2,157,396
LU8DQ	3,989,814	W3BGN	2,090,889
C53AA	3,447,396	K1EA	2,002,184
K1AR	3,397,905	W2REH	2,000,432

Single Op Single Band 28 MHz		Single Op Single Band 28 MHz	
ZS6P	65,680	WA3CGE	2822
I2ARC	27,600	NU4Y	1764
ZS6TUK	6,510	KQ1V	588
EA7BU	5,106	K4DDB	576
YU3ER	4,032		
WA3CGE	2,822		
21 MHz		**21 MHz**	
CX5AO	1,300,025	K1RM	275,100
CE3DNP	752,496	K5GO	216,500
LU4FDM	561,200	W8UA	170,640
A25/G3HCT	329,360	W6YA	162,946
ZM8OY	314,880	W4NL	162,162
I5MPN	307,195	N4BP	130,758
14 MHz		**14 MHz**	
YX5A	1,065,860	K2VV	655,046
DK3GI	776,860	K3RV/4	634,293
5H3BH	760,784	K2SX	480,340
OH80S	664,116	K1BW	462,594
K2VV	655,046	N5CR	453,870
K3RV/4	634,293	KY2P	402,996
7 MHz		**7 MHz**	
KP4FI	696,864	K1OX	439,632
XE2FU	665,728	K1MM	437,112
YZ9A	637,144	N6QR	366,000
YT3M	472,102	W7EJ	301,645
K1OX	439,632	KA5W	281,936
K1MM	437,112	N6NI	258,825
3.5 MHz		**3.5 MHz**	
EA2IA	258,408	W1FV	197,120
4N1A	200,655	N4RJ	122,451
W1FV	197,120	W6RJ	103,224
VE2HQ	176,180	K8GL	81,911
VG3BMV	172,805	K9RX	58,696
IO3JSS	167,664	K2RR	54,570
1.8 MHz		**1.8 MHz**	
YV3AGT	147,588	K5UR	47,005
HB9AMO	95,201	AA1K/3	24,120
LZ2CJ	81,900	N4PN	21,608
UA9KAA	65,046	N9MM	19,966
G4OBK	63,411	N4SU	15,840
RA9AKM	63,291	NØXA	15,504

Multi-Op Single Transmitter		Multi-Op Single Transmitter	
V3A	5,068,554	K1KI	3,477,100
KP4BZ	4,992,390	N3ED	2,905,875
LZ2KTS	4,252,248	N2RM	2,893,366
KH6XX	4,212,528	K4VX/Ø	2,716,780
UZ9AYA	3,881,148	K3OO	2,530,456
OK5R	3,865,496	KM1C	2,251,770

Multi-Op Multi-Transmitter		Multi-Op Multi-Transmitter	
RF3V	12,666,192	N2AA	8,770,631
EA9CE	9,374,244	W3LPL	7,011,840
N2AA	8,770,631	N5AU	5,374,392
V2A	7,463,449	K2TR	4,853,520
W3LPL	7,011,840	K1RX	4,348,222
UP7A	6,882,560	N3RS	4,030,565

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- Dual digital VFOs
- A complete line of accessories is available

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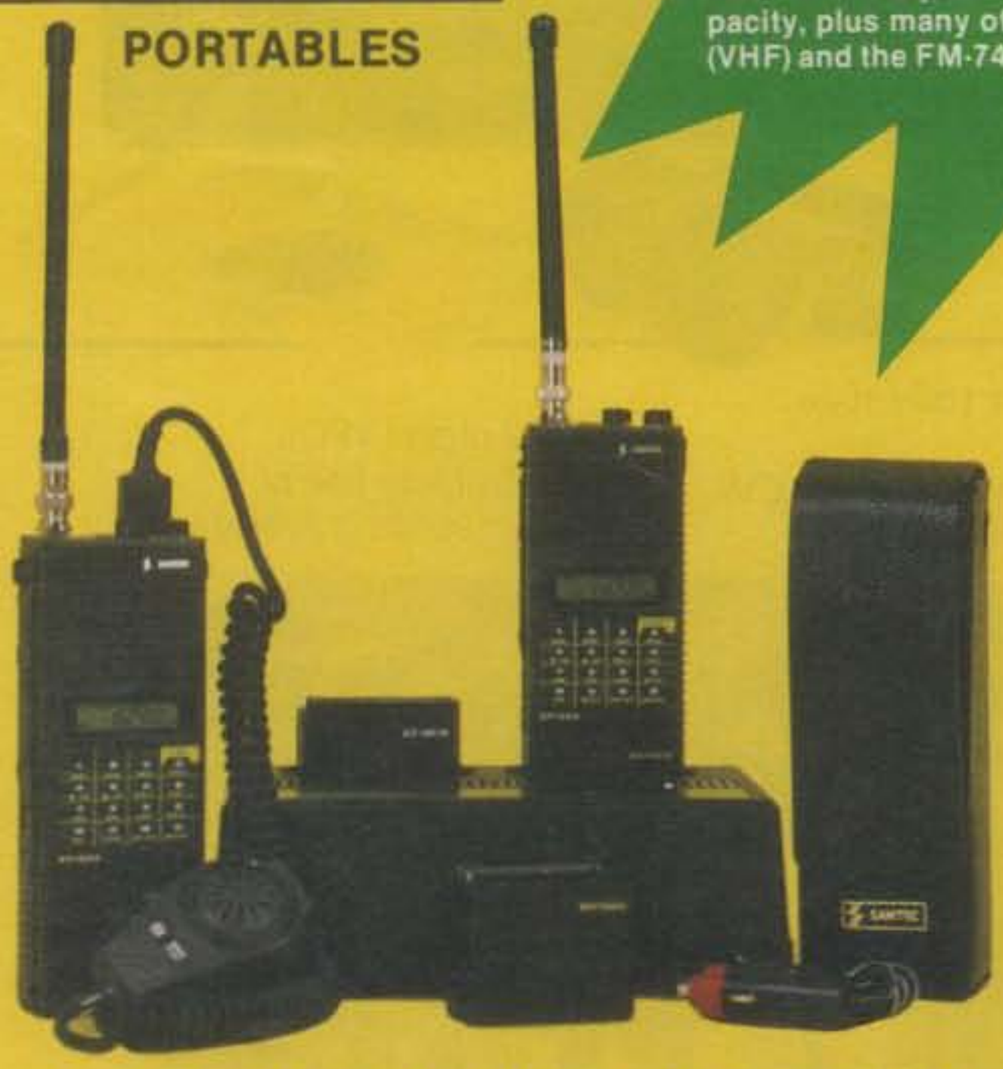

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CW TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND
World
EA9IE (Opr. Richard Norton, N6AA)
Donor: W2AB Memorial
World QRPp
Franc Bogataj, YU3BC
Donor: Gene Walsh, N2AA
World—Most QSO's
4V2C (Opr. John Laney, K4BAI)
Donor: KV4AA Memorial (14,270 KHz Group)
USA
John Dorr, K1AR
Donor: Frankford Radio Club
Canada
David William Dudley, VG3BVD
Donor: Canadian DX Association
Carib./C.A.
Lorne Sydney Libin Karsh, XE1VV
Donor: Peter Munroe, WB1DQC
Europe
Saulius Zalnerauskas, UP2BIM
Donor: Edward Bissell, W3AU
Africa
CN8ES (Opr. Vilho Hiilesmaa, OH2MM)
Donor: Gordon Marshall, W6RR
Asia
RFØFWW (Opr. Alex Tejmurasov, UF6FFF)
Donor: Japan CQ Magazine
Japan
Toshiro Ogino, JI1QPU
Donor: Japan Crazy Contesters Club
Oceania
Satoshi Nakamura, NH6J/KHØ
Donor: Maui Amateur Radio Club
South America
9Y4VT (Opr. Marti Laine, OH2BH)
Donor: Venezuela DX Club—YV5AAZ Memorial

SINGLE OPERATOR, SINGLE BAND
World (21 MHz)
Ariel Vazquez, CX5AO
Donor: North Jersey DX Assn.—W2JT Memorial
World—3.5 MHz
Ignacio Alcorta, EA2IA
Donor: Fred Capossela, K6SSS
World—1.8 MHz
Peter Steelheart Rotter, YV3AGT
Donor: Chip Margelli, K7JA—KP4ES Memorial
USA (14 MHz)
John Yodis, K2VV
Donor: No. Illinois DX Association
Canada (14 MHz)
John Sluymer, VE6OU/3
Donor: Canadian Amateur Radio Federation
Caribbean/Central America (7 MHz)
Ivan Belvis Irizarry, KP4FI
Donor: DX Club of Puerto Rico
Europe (14 MHz)
Roland Mensch, DK3GI
Donor: Southern New England DX Club
Australia—14 MHz
Ditmar Kiesewetter, VK2APK
Donor: Jay Carr, W6FAY
Japan—21 MHz
Yoshifumi Kotaki, JI1CBF
Donor: DX Family Foundation

MULTI-OPERATOR
SINGLE TRANSMITTER
World
V3A (KØRWL, W3UM, W6OUL, and WØJLC)
Donor: Anthony Susen, W3AOH
U.S.A.
K1KI (K1KI, K1TO, and W1OD)
Donor: Douglas Zwiebel, KR2Q

MULTI-OPERATOR
MULTI-TRANSMITTER
World
RF3V (UP2BBF, UP2BCO, UP2BCT, UP2BCV, UP2BCW, UP2BEL, UP2BFE, UP2BFN, UP2BGF, UP2BJK, UP2BM, UP2BNC, UP2BNO, UP2BNY, UP2BMQ, UP2BOA, UP2BOC, UP2BOQ, UP2BOS, UP2BW, UP2NK, UP2DM, UP2OO, UP2OU, UP2QA, UP3BA, UP3BB, UP3BO, UP3BQ, UP3BP, UP3BU, UP3BX, RP2BIH, RP2BGK, UP2-038-346)
Donor: Hazard Reeves, K2GL
U.S.A.
N2AA (K2BQ, K2GL, K2NG, K2SS, K2TT, K2TW, K2UR, K3EST, K5NA, KA2MXO, KC2X, KR2J, KR2Q, KU2M, KU2Q, N2WT, WB2BHC)
Donor: James Rafferty, N6RJ
Europe
UP7A (UP2BAW, UP2BIG, UP2BIL, UP2BN, UP2BZ, UP2CY, UP2PAJ, UA3-132-071, UM8-036-145, UA3-142-303, UA4-094-440)
Donor: OH-DX-Ring—OH2AM
CONTEST EXPEDITIONS
World Single Operator
D44BC (Opr. Jim Neiger, N6TJ)
Donor: Yankee Clipper Contest Club
World Multi-Operator
V2A (K6GXO, N9AG, NC8Q, NY5Q, V2ACW, W8ILC, W8OK, W8PR, WB9ICF)
Donor: Bill Schneider, K2TT
SPECIAL SINGLE OPERATOR COMBINED SSB/CW
World—All Band
Lothar Wilke, Y24UK
Donor: John Knight, W6YY
World-Single Band
Tine Brajnik, YZ9A
Donor: Yuri Blanarovich, VE3BMV
CLUB
World—SSB/CW
Frankford Radio Club (98,873,103)
Donor: CQ Magazine

YV3AGT set new world 160 record. Must use pyramid power!

K2VV (14) all set new all-time CW records, and as mentioned above, K1AR set an all-time single operator all band US record.

Some Notes

As mentioned last month, this year marked the first time that the People's Republic of China entered a *CQ* worldwide contest. BY4AA, BY8AA, BY5RA, and BY1PK all submitted logs. All together they handed out 4869 QSO's! Congratulations to these club stations and to the interest they have shown.

In another note, HSØA, the official club station of R.A.S.T. and the only HS station on the air, was on all bands except 160. We are sure that we can speak for all amateurs when we say thanks for putting such a rare country on the air. Also thanks to CYØSAB, who braved the winds and desolation of "the graveyard of the Atlantic" to put Sable Island on the air.

Finally, this year first-class Russian amateurs might get permission to operate between 3650–3800 kHz on SSB. This should make contacts easier for everyone.

Remember, if you are missing a certificate for the last few years, K1AR is handling certificates for the *CQ* Contest Committee. John's address is 2 Baldwin Street, Windham, NH 03087, USA.

Hard Work

Finally, thanks to the members of the *CQ* Contest Committee whose hard work and expertise allow for a high standard of reporting. A special thanks to John, K9DX/6; Rick, N6ND; Dave, K2SS; John, K1AR; Ed, N3ED; Fred, AD6C; Jan, N6AW; Glenn, K6NA; Jim, W7EJ; John, KE7V; Gene, N2AA; John, K2VV; Doug, KR2Q; and to our fearless leader, W1WY.

Congratulations to all the entrants and winners.

73, Bob, K3EST/6, and Larry, N6AR/4

W8ZF, holding PJ2FR's card, finished #3 in the world.

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
EA9IE	143/11/41	595/16/60	1115/19/66	1084/29/67	1220/24/71	95/14/34
9Y4VT	209/14/23	336/19/48	1504/26/65	1345/30/72	1233/24/68	19/9/14
PJ2FR	167/11/22	490/19/52	1025/25/74	1325/30/82	1008/24/79	56/14/19
CN8ES	125/10/36	428/15/56	1213/20/68	910/27/70	1319/21/72	108/14/34
D44BC	154/12/28	466/17/49	880/21/58	1201/29/66	1634/25/77	58/12/20
YV5TK	123/14/33	506/21/62	1131/27/76	1043/33/73	610/29/75	31/10/13
4V2C	360/9/23	504/17/48	1485/28/73	1207/28/64	1211/21/57	7/4/5
LU8DQ	2/2/2	66/17/27	411/28/57	1143/35/87	1229/32/99	181/20/43
C53AA	111/9/22	396/17/46	627/23/52	662/25/62	1087/25/71	69/13/28
NH6J/KH0	66/8/7	401/18/22	755/24/41	1179/27/63	1201/30/52	119/5/5

USA TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
K1AR	63/11/32	329/19/69	607/30/89	967/33/97	428/23/72	4/4/4
W1KM	59/13/31	536/19/69	210/26/74	786/30/79	443/25/80	6/4/4
K1EA	44/10/23	158/18/49	295/28/74	655/31/85	455/24/75	10/5/6
N2LT	26/9/14	207/18/51	498/32/85	858/34/87	479/22/84	8/5/5
W2REH	13/7/10	189/18/56	210/30/77	1036/35/90	163/24/77	0/0/0
W3GRF	20/7/15	126/16/63	600/33/89	912/30/95	389/20/69	6/4/3
K3TUP	51/13/28	263/23/69	238/32/76	853/32/83	255/26/79	7/7/5
K3ZO	31/11/21	255/26/71	354/30/74	801/33/82	256/24/63	7/4/5
W3BGN	66/12/32	130/19/53	320/28/79	841/31/76	333/21/64	8/3/5
N4WW	37/12/25	135/21/59	692/30/80	680/32/88	327/28/83	11/8/6

WORLD TOP MULTI-OPERATOR SINGLE TRANSMITTER

V3A	186/13/37	718/27/71	1185/35/88	1180/30/86	1082/27/75	13/9/13
KP4BZ	113/6/15	479/20/50	1362/28/79	1461/31/83	1197/24/85	13/8/13
LZ2KTS	231/17/58	568/26/79	1051/31/94	1183/35/94	317/35/103	41/11/33
KH6XX	112/12/14	364/20/22	1390/32/68	898/34/63	1145/30/59	10/9/9
UZ9AYA	85/10/42	529/22/72	878/31/91	855/35/97	397/27/74	1/1/1
OK5R	171/12/51	807/17/74	939/36/106	827/35/104	402/32/76	32/9/32

USA TOP MULTI-OPERATOR SINGLE TRANSMITTER

K1KI	45/11/27	177/21/70	547/33/100	1071/36/111	324/24/94	16/9/14
N3ED	34/13/33	190/20/75	597/34/105	765/35/114	178/27/91	13/9/11
N2RM	33/9/22	131/18/62	455/34/99	890/36/115	356/27/97	12/6/12
K4VX/0	34/14/31	202/26/70	458/35/94	948/33/100	215/27/85	9/7/8
K3OO	49/16/35	134/22/72	460/34/105	758/34/100	217/27/80	8/5/6
KM1C	22/9/19	105/18/58	450/32/88	751/32/92	324/25/89	4/4/4

WORLD TOP MULTI-OPERATOR MULTI-TRANSMITTER

RF3V	750/18/59	1306/22/84	2309/33/106	1400/35/107	1292/34/102	74/15/29
EA9CE	322/9/47	920/18/66	1589/23/78	1670/28/79	1434/30/84	130/13/42
N2AA	187/19/59	439/20/84	1465/36/123	1713/37/122	718/28/104	55/9/18
V2A	678/14/43	686/23/55	1643/34/91	1785/29/81	1394/26/81	23/8/12
W3LPL	120/16/51	340/23/75	1115/36/115	1419/37/117	731/29/110	31/12/19
UP7A	929/20/70	1081/23/68	1740/34/109	1460/34/95	785/36/100	24/5/14

USA TOP MULTI-OPERATOR MULTI-TRANSMITTER

N2AA	187/19/59	439/20/84	1465/36/123	1713/37/122	718/28/104	55/9/18
W3LPL	120/16/51	340/23/75	1115/36/115	1419/37/117	731/29/110	31/12/19
N5AU	122/18/37	384/26/78	1064/36/104	937/37/107	523/30/94	52/15/22
K2TR	140/16/46	250/24/77	855/34/95	1259/34/104	458/26/87	26/11/13
K1RX	78/13/35	417/17/76	446/27/79	1379/35/109	575/26/95	9/6/5
N3RS	12/7/8	361/21/75	779/35/110	883/37/110	467/27/99	16/8/14

USA QRM

Western PA is NOT the East Coast! . . . *K5ZD (Opr. K3TUP).* Told my wife she would have to drive herself to hospital if her "labor" started! . . . *NG2X.* Cracking VS6DO pile on 15 meters long path! . . . *KN2Q.* Five new countries in a row on 40 meters . . . *WA2CNF.* Nice to have China competing; the west coast needs a few more multipliers . . . *N6IC.* Murphy never fails to come through; lost beam rotator about 2 hours before end . . . *W6NKR.* VS6DO was 20 over 9 on 15 meter long path at 10:30 in the morning . . . *N4KE.* A cut finger plus a straight key equals rotten fist; apologies to all . . . *KF4CI.* Kudos to the great ears that heard my QRP . . . *K7SS.* First contest QRP. JA stations and VI3KS long path! . . . *W4OEL.*

"Hydraulic Balun" plus bad WX equals low score! . . . *KT1O.* 160 was superb; 10 weren't! . . . *KA1DWX.* 40 was open to Europe, all except 1400–1700Z! . . . *K1MM.* Felt like the Maytag Repairman going single band 28 MHz! . . . *KQ1V.* Working zones 21, 24, 27, 28 in 20 minutes when 15 meters opened long path . . . *K1RM.* BY4AA answering my CQ on 20 meters! . . . *KY2P.* Checked 28 MHz often—no joy! . . . *KD8WX/3.* Nice to work YO4KRX for number 181 on 160 meters! . . . *AA1K/3.* Can hardly wait for next sunspot minimum! . . . *K1AR.* HS0A on 20 meters over Europe at 0930Z . . . *K3ZO.*

The use of computer logging is nice, but the rule still applies: "Garbage in, garbage out" . . . *W7FGT.* Thanks to Jim at D44BC for the rare DXpedition he made . . . *KA7FEF.* A thrill to work two BY's and 37 zones on 40 . . . *N7RT.* Lots of fun on 80 with just 2 phased wire verticals—cheap and easy! . . . *K8GL.* Finally worked a JA on 160 from Michigan . . . *W8UVZ.* Using only 100 watts on 80 was a challenge . . . *K9UIY.* Opening day of Wisconsin's deer-hunting season cut into my contest time . . . *W9WAQ.* Eighty was never better in the Midwest . . . *KM0L; W0WP.* Had fun, but using a vertical made me vow to have the tower up next time . . . *K0RW.*

This was our first try at multi-multi on CW. Not a bad score for the first time . . . *KS8S.* A very low-budget multi-multi . . . *K1RX.* Last CQ WW from my suburban 1 acre QTH in Crownsville, MD. See you in November from the new 10 acre QTH in Glenwood, MD . . . *W3LPL.* Still a long way to go, but we're making good progress . . . *N3RS.* Sunday A.M. the 20 meter op remarked the rotor was behaving badly—turned out that the tower had fallen over . . . *N6TU.* Wish I'd worked the two BY's heard on 40 meters . . . *K1KI.* 40 meters was wild . . . *N3ED.* Sunspot minimum and my best score ever . . . *K3OO.* 20 new countries on CW . . . *WI4R.* Cndx on 40 and 20 meters to Europe were real tough Friday night . . . *K5KJ.* 80 meters was really hot for us . . . *W6BIP.* BY1PK on 40 was nice . . . *K4VX/0.*

DX QRM

Had a terrific preline into USA/VE on Sunday morning about 0300 until after sunrise (*160 meters—ed.*) . . . *G4OBK.* Amazed to work not one, but two JT stations an hour before the end of 160 meters . . . *G3XTT.* Greatest surprise was contacting USA stations at 1800 GMT on 7 MHz . . . *G3ESF.* Next year we will be on from club station OY6FRA . . . *OY7ML.* Good condx on 40 meters. Will be back with a better antenna . . . *TF3CW.* Had to try it on single band this year . . . *F3JL.* Only operated 30 hours. Getting too old, I guess. But nice propagation on 3.5 MHz . . . *SM2EKM.* It was a thrill to work all those W's on 80 meters during the whole night . . . *HB9CWA.* Tremendous QRN on first night on 160 meters; 30 dB over S9. It was very calm the second night . . . *CT1AOZ.* It is not impossible to work 3.5 MHz barefoot; even HS0A called me! . . . *OZ1FTE.* We made such big antennas for the contest; maybe we win this time . . . *JA3YBF.* 73's to the Contest Committee . . . *UP1BWW.* My first CQ WW Contest . . . *UR2RCJ.* Three new countries on 1.8 MHz and 7 MHz . . . *UR2RHF.* Beautiful contest. I have 7 new countries . . . *RR2RR.* My best record in Contest, 107 QSO's in an hour . . . *RR2RW.* It's impossible to operate without antennas! . . . *UP2PAQ.*

Lots of QRM . . . *CT1YH (ex. CR7LU).* I'm very happy. My TRX (homemade 10 W) is very good for CQ WW DX Contest . . . *SP4GFG.* Dis is mai ferst contest—veri fain—TNX OM . . . *IK3FHL.* I am very happy for this contest that is my first serious contest on CW . . . *I5MPN.* Being called by VS6DO (long path) while running W/K QSO's . . . *I1KN (Opr. W3US).* Very nice competition! I work mny new one for my 5BDXCC and CQ DX Award CW. Problems of TVI have limited my operation . . . *I2KYV.* Firs apparition of Marconi Memorial was beautiful on top band. Hope to be present on next year. TNX . . . *IY4FGM (Opr. I4IKW).* Time of working about 21 hours. (Old man needs his sleep, Hi!) . . . *OE3RE.* We didn't score much this time. We're young and unexperienced. You will hear from us again! . . . *OH6LI.* It was nice to work two almost inaudible stations (U3A and YX5A). Both were new DXCC countries to me . . . *OH8LP.* Power 20 W after power supplies breakdown . . . *OH2BKF.* SWR greater than 3 (water in cable) . . . *OH3NM.*

The heavy autumn winds damaged the rotating system. During the first 24 hours I could beam only the Northern Hemisphere. Sunday the tower got stuck to 285° . . . *OH8OS (Opr. OH6UM).* FB to get some new countries . . . *OH2BYS.* 40 meters incredible! . . . *YU3EA.* Interruptions caused because of TVI. Next year will be operating from Zimbabwe again . . . *YU3CB.* First time on CQ WW single operator. This is the best contest . . . *IO3FIY.* I am glad for this contest. Also got a few new countries—XE, HS, A25 . . . *SP4EEZ.* Many thanks for most of all attractive contest . . . *SP5JTR.* So many stations using high power, when good

propagation on low bands and giving big QRM, HRD good DX but not QSO's. Hi! . . . *SP3HLM*. Fine contest, as usual . . . *OK1ABP*. Thank you for QSO's everybody! See again soon! . . . *HA4XX*. Big pile-up for BY8AA! Nice test! . . . *IK2DVG*. I missed hearing the big signal from W6AM . . . *OH1JT*.

Best propagation in several years . . . *AL7CQ*. Wish I could have known 40 was going to be so good; would have tried for a world class score . . . *KL7RA*. This contest was just as much fun as the first, which was in 1947 . . . *N4RP/C6A*. Working 180 stations in 1 hour . . . *VP2MEV*. First "XQ" prefix in the World-Wide DX Contest . . . *XQ1ADG*. Excellent cndx on 160 meters . . . *HK1AMW*. Biggest thrill: making new friends and running into old ones on the air. Biggest diasppointment: all the multipliers I could hear on 160 meters who couldn't hear my 100 watts . . . *PJ2FR*. This is my first World-Wide Contest . . . *OA4ZV*. Hard to believe, the band was open almost all the weekend . . . *CX5AO*. Big thrill—VS6DO on 80! . . . *YU5TK*. VS6DO called me in the last minutes to give me two new multipliers . . . *YX5A*.

The patience shown my QRP sigs a credit to all ops. Thank you . . . *G4MQC*. First ever QRP CW test. (Not the last!) No Sunday log due to toothache . . . *G4KIU*. Hard job to take part with 2 watts between the big guns! Anyway, a few new ones . . . *OK1DKR*. Problems with 3.5 MHz dipole, SWR depended on rain . . . *DF8ZH/CT3*. Greetings from the Graveyard of the Atlantic . . . *CY0SAB*. Can't wait for the WPX Contest with this rare prefix . . . *DX2F*. Beautiful 80, 40, and 160. Ten poor! . . . *V3A*. All very happy with JA . . . *VE2UMS*. We were on display at the National Museum of Science and Technology in Ottawa . . . *VE3JW*. Always a lesson in propagation. Why do the stations who sign their call after each QSO seem to win every year? . . . *VG3IY*. Everyone got our call mixed up . . . *ZS3/W6QL*. Working Europe and Africa on low frequencies was different than we are used to when operating at home from West Coast . . . *8P9AG*.

Was called twice by XU1SS! . . . *AH8A (Opr. W6OSP)*. My 15-year-old xcvr still works . . . *VK2BQQ*. Operated at Hobbies Exhibition, but a band playing nearby QRMed everyone . . . *VK5GZ/p*. Worked my first 9Y station in 33 years! . . . *VK6AJ*. How does one work through the European barrier on 160 meters to be heard at C53AA? . . . *VK6HD*. Is there really a zone 8 and 9? . . . *NY6M/KH2*. HZ1HZ and 4Z4OZ called me simultaneously; that's a heckuvalot of ZZZZ's. Sending ID after every QSO sure cuts down on dupes . . . *KH6MD (Opr. N6HR)*. Got two new ones on 160 meters . . . *KH6CC*. Stations should try long path on 80 meters; it's open . . . *YB0ARA*. As in previous years, *no* USA on 14 and 21 MHz . . . *YB3ATB (Opr. PA0LOU)*. Worked my former housemate, NH6J/NH0, whom I haven't talked with in eight months . . . *KA7KSY/YB*. My first contest, very comfortable to join . . . *YB4FNN*. I missed EA9CE and CT2FN on 1,831 MHz, too much EU QRM . . . *9M2AX*. Nothing heard or worked on 160 or 10 meters . . . *ZL1AIZ*.

Wish I had a much shorter callsign for my first ever CW contest . . . *WA7CQE/DV2*. License came through day before contest; tossed a dipole into a tree . . . *KD6TB/DU2*. My alarm clock failed to wake me up; I slept well for 5½ hours . . . *NH6J/KH0*. Went swimming when pileups got too deep . . . *ZK1XU (Opr. W7TB)*. 599 32 from Polynesian paradise . . . *ZK1XT (Opr. K5BDX)*. With such a distinctive callsign I thought I'd have no duplicates. You can see how wrong I was . . . *A25/G3HCT*. Thunderstorm and broken rotator crashed my record attempt, but had good fun . . . *ZS6BCR*. I was ready to go all band, but when I heard about D44, CN8, C53, and EA9, I knew I had no chance; I did what was possible on 20 anyway in spite of dead band during the day and night . . . *5H3BH (Opr. SM0AJU)*.

Delighted to get Mexico on 7 MHz for my WAZ . . . *ZC4CZ*. I got 117 zones but no zone 4 on 20 meters. Why? . . . *VS6DO (Opr. JA5TQH)*. 28 MHz propagation was the pits . . . *VE1BNN*. Rig was Heathkit SB-401 with Hallicrafter SX-111; receiver is older than I am . . . *VO2AC*. Worked ZL and VK on 21 MHz, but where were the JA's? . . . *VE3NBE*. CQ contests are tops . . . *VE6OU/3*. My second contest, licensed 8 months . . . *VE3OZB*. Special prefix seemed to be more of a hindrance than a help . . . *VG3KRN*. Seems like all the 20 meter ops were on 160 meters . . . *VE3INQ*. Been chasing China since 1952; both BY1PK and BY4AA called me . . . *VE4IM*. Best conditions ever on 80 meters . . . *VG5RA*. BV2DA was a nice surprise with only one hour to go . . . *VE6CB*.

STATION OPERATORS

Multi-Operator Single Transmitter

AK1L & KA1X, KC1X. **BY1PK:** Tong Xiao-Yong, Yan Pi-Dong, Gong Ke-Lu, Li Guo-Zhen, Yuan Bo, Wang Guo-Xiang. **BY4AA:** Xuru, Hu Song-Qin, Zhou Yu-Hong, Gao Ming, Gu Hu-Ming. **BY5RA:** Lin Shaowen, Dai Jiagi, Hong Zhipim. **BY8AA:** Club. **DF8ZH/CT3** & DF4ZL, DL1RK. **CY0SAB:** AK4L, K2GHV, VE1AIH, VE1YX. **DA1WA:** DJ9CB, DL1AO, DJ1MU, DL9FBB, DJ0LC, DA2DG. **DF0AFZ:** DJ0GN, DL2ZAE, DL3ZI,

HB9AMO, top European 160 score.

DL2ZAM, DK1DO, DL5FQ. **DF4RD** & DK7IT. **DF6WR** & DK5PZ, DK6WJ, DF9PY, DK9WI. **DJ1FC** & DK3BJ, DL8MBS. **DK0MM:** DJ7IK, DJ8WL, DK5CZ, DL4FJ, DL8WR. **DL0ER:** DL2ECW, DL3CU, DJ2LA, DL5EBN, DJ5GN, DF5EN, DK7FP, DL9XY. **DL0IU:** DK8AG, DK7AH, DK8AN, DK6BO, DL2HBX, DL1BHO, DL4AAA, DL4AAE. **DX2F:** KA3DRR/DV2, KK7K/DU2. **EA3VY** & EA3AIR, EA3AVV, EA3DXD, EA3FER, EA3FNN, EA3KU. **F5IN** & F6ARC, F6BEE, F9IE. **GB4DX:** G4BWP, G4DRS, G4EOF, G4GIR, G4JQL. **GJ0AAA:** G3SXW, G3TXF, G3WVG.

HA2KMR: Jozsef, Attila, Gabor, Csaba, Janos, Laszlo. **HA3KNA:** HA3FTA, HA3OV, HA3OU, HA3NS, HA3NU. **HA5KDX:** HA5OM, HA5LN, HA5VJ, HA5FM. **HA5KFZ:** Frigyes, Zoltan, Tibor, Miklos, Laszlo, Gabor. **HA6KNG:** HA6OA, HA6OL, HA6IOB, HA6NG, HA6OI. **HA6KNX:** Jozsef, Gyula, Zsolt, Nandor. **HA7KLG:** HA7MY, HA7LD, Anikoj. **HA7KMP:** Janos, Attila, Tamas, Alexanderosz. **HA8KAX:** Erika, Istuan. **HA8KUC:** HA8VX, HA8GB, HA8GZ, HA8XY, Erici. **HA8KUN:** Janos, Janos, Antul. **HB0CVQ** & HB0CFC, HB0DDY, HB0CWE. **HB9AJ:** HB9AQF, HB9COB, HB9CZF, HB9DZI, HB9COC, HB9BWN, HB9CRP, HB9COF, HB9CJR, HB9CBT, HB90L, HB9CTU, HB9CJJ, HB9CTT, HB9UH, HB9CYK. **HG5A:** HA5MK, HA5UA, HA5GF, HA5WE, HA7SU, HA7RY, & 5 OM's. **HG6N:** HA6ND, HA6NY, HA6ON, HA6NQ, HA6OQ, HA6NF. **HG7B:** HA5UY, HA5KQ, HA5PP, HA5WA, HA7UG, HA7UO. **HG8U:** HA8ZC, HA8UB, HA8XF. **HG9R:** HA9PP, HA9PB, HA9RU, HA9PV, HA9RP, HA9RX. **HS0A:** AH2AK, DL7MAE, G4UAV, KB2A, SM3DYU, WA3SLK. **JA1YAD:** JA1QGC, JA9UFS, JH5GHM, JH5MXM, JH9ADA, JH9AMJ, JO1HJK, JP1DMX, JR6JOE. **JA1YAG:** JH0SPE, JR4EJW. **JA1YBK:** JH0LFE, JL1IEO, JG2CLS, JI2LCF. **JA1YCL:** JL1LNC, JO1GAD. **JA1YFG:** JO1RUR, JP1OGL. **JA2YDC:** JE2EZO, JI2RIQ. **JA2YKD:** M. Kato, K. Murata, M. Murata, N. Taniguchi, Y. Taniguchi. **JA8YAU:** JH5ONJ, JR7COO, JH8DXI, JH8NFQ. **JA8YBY:** JE3XWH, JJ2VXS, JR8DQB. **JE2YRD:** JA1KFX, JA2EZD, JI2KVW, JR4WKV, JH6NBW, JR8CHX. **JS1JRZ:** Club.

K1KI & K1TO, W1OD. **K1XM** & KA1CI, KQ1F. **KM1C** & KB1T, W1PH, WB8BTH. **KY1H** & K1RQ, KB1KE, KB1W. **K2NJ** & K2BK, KQ2O, WA8DSQ. **K3MD** & W2UP. **K3NZ** & KJ3R, KW3W, KU3K. **K3OO** & K3ZUF. **K3SO** & K5PM, KE6EW. **K3WJV** & WA3ZTR. **KB3MM** & N3ARK, WB3FIZ, WB3LFZ. **K4VX/8** & AH2U, K9BGL, KR0Y, KM9P, WB0IUN. **K5RR** & WO4W, K5KJ, WA5CBE. **K6ZM** & AK6T, N6AUV, N6ICV, NB6L. **KI6T** & N6MNB. **K7LXC** & KS7L, W3XY. **K9ZO** & K9MFI, KG9N, KM9L, ND9V, WB9JKI. **KA9P** & N9DMT, WA9AWO, WB9CEJ, WD9IBH. **KJ0G** & K0GAS. **K4TEA/KH6** & K4TKM, KH6DW. **KH6XX** & KH6ND. **KP4BZ:** NP4Z, WC4E. **LA5X:** LA1EE, LA5UF, LA8XM, LA2GV, LA9OI. **LX9BV:** LX1WW, LA4DCA, LX1JP, LX1CF. **LZ1KAZ:** Petkov, Topchev. **LZ1KKI:** Vasilev, Komsalov. **LZ1KKR:** LZ1BE, LZ1BG. **LZ1KRC:** Dinefv, Kostadinov, Pavlov. **LZ1KTM:** Stovan, Stefan, Alexander. **LZ1KTS:** LZ2CC, LZ2DF, LZ2HE, LZ2PO, LZ2E72. **LZ1KVF:** LZ1C-92, LZ1C-94, LZ1C-105. **LZ2KAC:** Radev, Ivanov. **LZ2KMM:** LZ2E33, LZ2OD.

N2PP & W2HPF, WA2EKV. **N2RM:** N3AD, KM3T. **N3ED** & KB2XZ, N2ME, WA2HGM. **N6AW** & W6KP. **N6ND** & K6XT, NI6W, WA6DBC. **N6VR** & AC6T, AD6C, KT3Y, KY6L, N6ADI, NE6I, N8BJQ. **NC7K** & NF7P. **N9WA** & KA9SLM, WD9GYX. **NM0F** & AK0P. **OH2BAH** & OH2BJJ, OH2PQ, OH2BCP, OH2BX, OH2-601. **OH2VY** & OH2JA, OH2BOS, OH2BVI, OH6EI. **OH5AF:** OH6QU, OH2RF, OH3US, OH7JP. **OH6AA:** OH6WI, OH6HM, OH6BI. **OH6AW:** OH6IJ, OH6LK, OH6LD, OH6KJ, OH6FT, OH6IG, OH6VV, OH6RJ, OH6XY. **OH8AV:** OH8DD, OH8NW, OH8PF. **OH9AB:** OH9UW, OH9PH, OH9TD. **OK1KQJ:** OK1BY, OK1AYP. **OK1OAZ:** OK1DDG, OK1DFP, OL1BLN, OK1-20579. **OK1ORA:** OK1AYD, OK1-22310. **OK2KMR:** OK2SSS, OK2BQZ. **OK3KAG:** OK3CDX, OK3ZWA, OK3ZFM. **OK3KGQ:** OK3-2351, OK3ZCD, OK3CLL. **OK3KTD:** OK3CES, OK3TCV,OK3TCF, OK3-27707, OK3-27722. **OK3RJB:** OK3CQD, OK3CQR, OK3TCL, OK3CKW, OK3TCN. **OK3RKA:** OK3TDP, OK3CPC, OK3-27254. **OK5R:** OK1ADM, OK1ADS, OK1ALW, OK1AWZ, OK1DIM, OK1RI. **OK5SSM:** OK1AYE, OK1DRI, OK1FRI, OL4BEV, OK1HAI, OK1HBC. **OK5W:** OK1AEZ, OK1JCW, OK1AII, OK1AXK, OK1JKT, OK1WT, OK1TS, OK1JJB. **PA0KOR** & PA0INA. **PA3DQW** & PA3DGM.

RL8PYL: UL7PAE, UL7PAZ, UL7PCZ, RL7PAV, RL7PHO, RL8PA, RL8PY, UL7-023-500. **RZ1OWA:** Club. **SK2AU:** SM2DQS, SM2BJE, SM2LCI, SM2CDF. **SK5EU:** SM5JBM, SM3JSW, SM5LZM, SM50DQ. **SK6EI:** SM6CMR, SM6LPG, SM6LPF, SM6LJU, SM6MCW, SM6LJP, SM6GOR, SM6JZ. **SK6TW:** SM6AOU, SM6CKU, SM6CPY, SM6DER, SM6DOI, SM6DQO. **SM6DYK** & SM7BUA. **SP1PEA:** SP1CU, SP1NQF. **SP5PBE:** SP5ANJ, SP5ELA, SP5GIQ, SP5JTM. **SP6PAZ:** SP6CYX, SP6HEK, SP6OJE, SP6FJG, SP6DVP. **SP7KTE:** SP7AU, SP7IIT. **SP9KAO:** SP9JBK, SP9JZT, SP9ODD. **UB0SZZ:** UB5SBN, UB5-074-258, UB5-074-285. **UB4DWW:** Club. **UB4IWC:** Al, Ivan, Vlad. **UB4IWN:** UB4IRI, UB5ING, UT5SI. **UB4IWR:** Nick, Tim, Vlad. **UB4IYU:** Club. **UB4LZA:** Nick, Oleg, Vlad, Yuri. **UB4MWA:** UB5MDA, UB5MDD, UB5MOJ. **UB4MWU:** UB5MBM, Mederov, Vihtihskaja, Stein. **UB4MZK:** UB4MZK, UB5MJS, UB5MRE, Ily, Lery, Oleg. **UB4QWE:** Club. **UB4QWW:** RB5QD, RB5QW, UB4QD, UB5QDU, UB5QVV, UB5-064-866. **UB4QXU:** Andrej, Igor, Oleg. **UB4TWQ:** UB5TAU, UB5TCB, UB5TCM. **UB4WZA:** UB5WBY, UB5WCX. **UB4XWB:** UT5QG, UB5-062-240, UB5-062-647, UB5-062-56. **UB4ZWC:** UB5ZF, UB5ZJL, UB5-069-376.

UC1AWC: Alexander, Natalisa, Leonid, Serge. **UC1OWA:** Valentin, Vlad, George. **UD7DWZ:** UD6DCF, UD6GF, UD6-001-5. **UD7DZA:** Club. **UG7GWL:** UW3AA, UG6GAF, UG6LQ, UG6-004-124, UG6-004-127. **UH9AWE:** RH8AD, UH8-191-6. **UI9AWX:** Lew, Serge, Mike. **UI9BWI:** Club. **UL8LWA:** UL7LEN, UL7-026-577. **UL8LWU:** UL7LCH, UL7LDR, UL7-026-515. **UP1BWB:** UP2BLQ, UP2BPY, UP2-038-1232, UP2-038-728. **UP1BWF:** Club. **UP1BWW:** RP2BID, UC2WAO, UP2BAV, UP2BIJ, UP2BKW. **UP1BXA:** Club. **UP1BYW:** UP2BDZ, UP2BEG, UP2BGV. **UP1BZM:** UP3BI, UP2PCI, UP2BDV, UP2BDW, UP2BLU. **UQ1GWW:** RQ2GG, UQ2GLK, UQ2OC, UQ2OI, UQ2PZ, UQ2-037-83, UQ2-037-116. **UQ1GXN:** UQ2GID, UQ2GKA, UQ2GM, UQ2GN. **UQ1GXT:** Club. **UR1RWX:** UR2RJ, UR2QD, UR2RDJ, UR2RHF, UR2RNA, UR2RNJ, UR2RNX, UR2-083-165, UR2-083-167, UR2RRR. **UR1RYY:** UR2QA, UR2RE, UR2RQ, UR2RMR, Neil. **UZ0CWA:** RW0CA,UA0CZ, UA0CCD, UW0CM, UW0CN, UA0-110-297. **UZ0LWO:** RW0LAA, UA0LD, UA0LF, UA0LS. **UZ0LWX:** RA0LDX, UA0LFD,UA0-107-726. **UZ1TWB:** UA1TAE, RA1TAD, UA1TEE. **UZ2FWA:** UA2FF, UA2FJ, UA2FX, UA2FZ, UA2FFQ. **UZ2FWN:** UA2DC, UA2-125-329, UA2-125-902, UA2-125-940.

UZ3AWP: UV3ACX, UA3-170-563, UA3-170-567. **UZ3AXH:** Club. **UZ3AXX:** RA3DUU, UA3AQV, UA3AQW, UA3AQX, UA3DHW, UA3-170-79, UA3-170-108, UA3-170-503. **UZ3AYR:** UA3DQF, UA3-170-481, UA3-170-528. **UZ3AZG:** Club. **UZ3AZM:** UA3DPX, RW3AN, UA3APL. **UZ3DWX:** Club. **UZ3DXW:** UA3-142-1754, UA3-142-1944, UA3-142-1945, UA3-142-1949. **UZ3DZA:** RA3DTD, UA3DIJ, UA3DVS, UA3-142-858. **UZ3DZW:** Club. **UZ3QWM:** UA3QPA, UA3-121-3104, UA3-121-3106. **UZ3QXU:** Mesheryakov, Vladimirov, Falaleev. **UZ3SWW:** UA3SEY, UA3SCH, UA3SET. **UZ3TWT:** Rudolph, Serge, Slava. **UZ3WWW:** Club. **UZ3XWM:** UA3XBY, UA3XCT, UA3XDD. **UZ3XWN:** UA3XEC, UA3XEQ, UA3-127-384. **UZ4FWE:** UA4-148-572, UA4-148-573, UA4-148-599. **UZ4FWO:** UA4FZ, UA4FAO, UA4FDS, UA4FEF, UA4FER, UA4-148-473. **UZ4LWU:** UA4LDE, UA4LDN. **UZ4WWB:** Club. **UZ6LWZ:** UA6-150-1103, UA6-150-1336, UA6LIG, RA6LRT, UA6-150-1060.

UZ9AYA: UA9AKI, UA9QCC, UA9-165-938, UM8NKW, UW9AN, UW9AR. **UZ9CWA:** UA9CG, UA9CR, UA9CFV. **UZ9CYP:** UA9CON, UA9CUA, UA9-154-2105. **UZ9OWD:** Andre, Serge, Serge, Konstantin. **UZ9OWE:** UA9ODP, UA9OGF, UA9-099-234. **UZ9OXI:** UA9-145-205, UA9-145-206, UA9-145-207. **UZ9OXM:** Club. **UZ9SWY:** UA9TS, UA9SA, UA9SHO, UA9SGW, RA9SVT, UA9SGT. **UZ9XWA:** UA9XDM, UA9-090-200, UA9-090-280. **UZ9XWW:** UA9-090-601, UA9-090-622, UA9-090-623. **UZ0AWB:** UA0-103-239, UA0-103-347, UA0-103-390. **UZ0CWO:** UA0CDG, UA0CHG, UA0CGL. **UZ0QWA:** UA0QDL, UA0QEW, UA0QAS, UA0-098-113. **UZ0QWE:** UA0QJ, UA0QG, UA0-098-107. **UZ0QWF:** UA0QGX, UA0QFR, UA0-098-130. **V3A:** K0RWL, W3UM, W6OUL, W0JLC. **VE2UMS:** VE2BHC, VE2BLX, VE2CP, VE2FFE, VE2FKZ. **VE3JW:** VE3JTZ, VE3OWL, Tom. **VE6CSE** & VE6CIZ. **VG3IY:** VE3EDG, VE3IY. **VG4ALO:** VE4ALO, VE4VV. **VO2WL:** K3TM, VE1BJW. **VU2TEC:** VU2HRY, VU2MVX, VU2TOZ.

WB1CNM & N1BUZ. **W2UI** & N3KR. **W3GU** & K3CY. **W4PRO** & AA4NG, KA2IMI, N7FMB, WG4O. **WA4QQV** & WA4QMQ. **WI4R** & KB4HZ. **W5ASP** & K5RVK, N5EA, W5SJS, W5VWN. **W6BIP** & WA6AUE. **WB6FDQ** & AE6H. **WK6V** & KD6YZ, N6BK, N6HAO, N6NW, N6VW, WA6ANL, WB0QPO. **W8GWC** & KD8V, KZ8Y, N8DCJ, WA4MAT, W8GZN, W8JGU, WA8BIN, WA8DXB, WA8RCN. **WD8IXE** & KD8NS, NZ4K. **W9CA** & N9AIB. **W0NA** & W0AR, W0CY, W0YR, W0FHI. **Y33ZL** & Y33VL, Y54OL, Y26IL. **Y45SM** & Y45WM. **YO5KTB:** YO5AXF, YO5CUG. **YT2C:** YU2QS, YU2EU, YU2FE. **YT2R:** YU2MM, YU2MY, YU2OH, YU2DQ, YU2SEV, YU2OG. **YT3T:** YU3BQ, YU3DRW, YU3GO, YU3DE, YU2CBV, YU3IEJ. **YU3AI** & YU3BM, YU3EO. **YU3DFT:** YU3WC, YU3WK. **YU3GHI:** YU3QZ, Mario. **ZS3/W6QL** & W6KG. **4N4C:** YU4EZC,YU4JLM, YU4WCW. **4U1VIC:** NK4N, K7AWD. **8P9AG:** K4UVT/6, K6ZM.

STATION OPERATORS
Multi-Operator Multi-Transmitter

DF0BV: DJ0ND, DJ1US, DK2OY, DL1MAJ, DL4NAC, DL5MAE, DL6RAI. **DL0KF:** DF3LZ, DF6LI, DJ2BV, DJ3UL, DJ4FZ, DJ5AZ, DJ5UZ, DJ6TK, DJ7SW, DJ8FR, DK9AV. **DL0WU:** DJ8SW, DJ8UV, DK5JM, DL1HX, DL2KBM, DL4EBH, DL8EBC. **EA9CE:** EA5BRA, EA7ALG, EA7DS, EA7TL, EA9EO, EA9EU, EA9GK, EA9JG. **JA1YXP:** JH9CAU, JI2DLF, JN1OTG, JN1SBT, JO1BKL, JR0ALC, JR0GUM, JR4HCV. **JA2YKA:** JA4UDP, JA9PPC, JA9SSY, JA9XXS, JE2JCV, JE2VYM, JE7BIZ, JF2DQJ, JF2EZA, JF2PFO, JF2UTL, JG2MTC, JG2VTD, JG3OET, JI2JXR, JJ1BTC, JJ2NJF, JR7OMD. **JA3YBF:** JA9TOZ, JA9UXW, JE3MCC, JE6BXJ, JF3NXN, JF4BME, JG3LZG, JH5BIT, JH9GRM, JN1APL, JR4AGT, JR4IZK, JR8DHE. **JA3YKC:** JE3MAS, JE6LPM, JG3CPF, JG3HJG, JG3HLV, JG3MRT, JG3WDN, JG6VTM, JI3DNR, JI3ERV, JJ3SRU, JK3GRR, JH4RHF, JR4BSM, JR4IMK, JR4PMX, JH5EML, JR5ARQ, JR6NWN. **JA3YUA:** JA3SMA, JI3OYM. **JA7YAA:** JE4KZZ, JE7HLZ, JE7QCQ, JG3EDV, JG3JRM, JG7BLJ, JH0MRP, JH0ORW, JH7CUO, JH7HWR, JJ1MVV, JJ1PEU, JN1VYN, JR7DRV, JR7PGL, Takada, Nishi-Mura. **JA7YFB:** JE7JWB, JF7AAD, JF7GQK, JF7TDN, JH0QNT, JH7XKI, JH7XMO, JN1RON, JR7GYC, JR7JLU, JR7JVO, JR7OEF, JR7RLB, JR7WFH. **JA9YBA:** JA9LNJ, JA9OTX, JA9QWJ, JA9UAD, JA9VBW, JA9VDA, JH0CAZ, JH7UJR. **K1RX** & K1CC, K1VDF, K1WJL, KQ2M, KS1K. **K2TR** & K1DH, K2WR, K2XA, WA2SPL. **K6TQ** & WA6EJL, WA6TBO. **KS8S** & AD8P, K8NZ, KU8E, N8ABL, W8FN, WA8SAE, WM4T.

N2AA & K2BQ, K2GL, K2NG, K2SS, K2TT, K2TW, K2UR, K3EST, K5NA, KA2MXO, KC2X, KR2J, KR2Q, KU2M, KU2Q, WB2BHC, N2WT. **N3LR:** KR3W, KS3D. **N3RS** & N3RD, WA3LRO. **N4ZC** & K2SD, WA8MAZ. **N5AU** & K5MR, K5RX, KM5X, KY5N, N5RZ, N5TR. **N6RO** & AA6AD, K6TMB, N6BV, N6XI, NV6Z, W6RGG, W6SZN, W6XX, W7MAP, WC6I. **N6TU** & K1DG, K6XO, N6BT, N6RZ, W6NV, WA6OCV, WB6DSV, WB6SHD. **NL7G** & KL7PJ, KL7U, KL7Y, NL7CT, NL7G, NL7GP, NL7P, WL7E, WL7Y. **OH7AB:** OH6JW, OH7JR, OH7KA, OH7MA, OH7PF, OH7RS, OH7UE, OH7VR, OH7XI, OH7XM, OH7YF. **OK7AA:** OK3CAW, OK3CEI, OK3CEM, OK3CLA, OK3CQA, OK3CQW, OK3CUM, OK3CUU, OK3EA, OK3JW, OK3LU, OK3LZ, OK3MB, OK3TAO, OK3TFM, OK3TMF, OK3WM, OK3YEC, OK3YX, OL8CPS. **RF3V:** UP2BBF, UP2BCO, UP2BCT, UP2BCV, UP2BCW, UP2BEL, UP2BFE, UP2BFN, UP2BGF, UP2BJK, UP2BM, UP2BNC, UP2BNO, UP2BNY, UP2BMQ, UP2BOA, UP2BOC, UP2BOQ, UP2BOS, UP2BW, UP2NK, UP2DM, UP2OO, UP2OU, UP2QA, UP3BA, UP3BB, UP3BO, UP3BQ, UP3BP, UP3BU, UP3BX, RP2BIH, RP2BGK, UP2-038-346. **UP7A:** UP2BAW, UP2BIG, UP2BIL, UP2BN, UP2BZ, UP2CY, UP2PAJ, UA3-132-071, UM8-036-145, UA3-142-303, UA4-094-440. **V2A:** K6GXO, N9AG, NC8Q, NY5Q, V2ACW, W8ILC, W8OK, W8PR, WB9ICF. **W0AIH/9** & K0FVF, K0TG, KB9S, KN0V, N0ND, W0UC, W5ONL, WA0RBW. **W3GM** & K3GM, K3ND, N2BA, N3VV, W3FV, W3MM, W3RJ. **W3LPL** & AI3M, K3DI, KA1GD, KC8C, N8II, W3FG, WD4AXM. **W3NX** & AD3V. **W6TMD** & AB6R, NC6U, NN6U, NW6S.

SINGLE OP ZONE WINNERS

Zone	Call	Score	Zone	Call	Score
1	AL7CQ	377,195	21	RF0FWW	3,030,030
2	CH1PJ/VG8	136,200	22	VU2AJ	114,777
3	AI6V	1,985,916	23	JT0APE	5,880
4	W0ZV	1,675,080	24	VS6DO	1,534,698
5	K1AR	3,397,905	25	JI1QPU	1,340,808
6	XE2FU	665,728	26	No Entry	
7	HP1XKR	249,227	27	NH6J/KH0	3,334,986
8	4V2C	4,281,212	28	YB0ARA	1,714,405
9	9Y4VT	5,676,536	29	VK6AJ	233,100
10	OA4ZV	940,168	30	VK2BQQ	380,017
11	PT7AA	109,142	31	KH6RS	760,548
12	CE3DNP	752,496	32	AH8A	1,218,400
13	LU8DQ	3,989,814	33	EA9IE	5,731,360
14	DF9ZP	2,164,709	34	No Entry	
15	OH2BH	1,716,972	35	D44BC	5,418,018
16	UB5EC	1,468,310	36	TR8JLD	90,771
17	RW9WA	1,136,770	37	5H3BH	760,784
18	UA9URF	102,816	38	ZS6BZS	492,525
19	UW0LT	793,755	39	3B8DB	154,332
20	ZC4CZ	1,127,648	40	TF3CW	156,728

USA Club Scores

Frankford Radio Club	98,873,103
Yankee Clipper Contest Club	94,556,313
Northern California Contest Club	61,053,342
Potomac Valley Radio Club	36,527,767
Dixie DXer's	34,430,305
Mad River Radio Club	27,540,555
Southern California Contest Club	22,636,404
Over The Hill Contest Club	19,609,502
North Texas Contest Club	17,381,055
Texas DX Society	13,092,718
San Diego DX Club	12,300,547
South East DX Club	8,844,311
Southern California DX Club	8,825,202
Carolina DX Association	8,023,622
Southwest Ohio DX Association	7,463,449
Willamette Valley DX Club	6,547,724
South Florida DX Association	5,020,200
Greater Milwaukee DX Association	4,842,152
Kansas City DX Club	4,752,035
Hoosier Contest Club	4,312,188
Society Midwest Contesters	4,092,286
Rochester DX Association	3,992,187
Eastern Iowa DX Association	3,879,379
Mississippi Valley DX/Contest Club	3,843,076
Northern Ohio DX Association	3,645,725
Grand Mesa Contesters	3,361,165
Meriden Amateur Radio Club	3,087,784
Central Arizona DX Association	2,814,123
Rubber Circle Contest Club	2,737,912
Northern Illinois DX Association	2,545,189
Northern California DX Club	1,701,734
Western Washington DX Club	1,581,373
Fraser Valley DX Club	1,463,926
Colorado Contest Conspiracy	1,132,204
South Jersey DX Group	851,111
North Florida DX Association	795,280
Contest Association of South Texas	781,220
Murphy's Marauders	502,014
Metro DX Club	414,799
Redwood Empire DX Association	412,595
Long Island DX Association	325,766
Ohio Valley Amateur Radio Association	302,727
Arrowhead Amateur Radio Club	257,251
Western PA Amateur Radio Club	182,128
Rip Van Winkle A.R.S.	124,644
Central California DX Club	116,124
Fort Wayne Radio Club	67,766
Eastern Michigan A.R.C.	64,922

DX Club Scores

Bavarian Contest Club	32,315,853
Rhein Ruhr DX Association	22,207,579
Kaunas Polytechnic Institute R.C.	17,056,645
Southern German DX Group	10,468,083
Northern Lithuania DX Group	10,255,648
Sevilla Contest Club	9,524,399
Ontario Contest Club	7,286,045
Riga Radio Club	4,831,904
Alaska DX Association	4,622,316
Pretoria Radio Club	4,127,046
Kiel Canal Activity Group	3,909,040
YU DX Club	3,892,356
Lithuanian Contest Group	3,476,369
Uruguay DX Club	2,882,397
Viimsi Radio Club (UR2)	2,764,647
Mid Beds Contest Association (G)	2,527,470
Lvov Radio Club	1,511,037
Condor DX Group CE	937,240
Danish DX Group	845,196
Tallinn Radio Club	797,965
East Anglian Contest Club	433,014
G.A.C.W. (LU)	261,345
Voroshilovgrad Radio Club	215,399
Kiev Radio Club	169,581
SP DX Club	127,128
Saar-Palz DX Club	106,086

WORLD TOP 10 QRPp
(5w input)
All Band

1.	YU3BC	544,810
2.	SP3KEY	492,900
3.	RB5IJ	267,997
4.	4X6IF	246,019
5.	K3WS	241,345
6.	K7SS	192,700
7.	OK3IAG	148,400
8.	G4ELZ	130,938
9.	UT4UB	106,820
10.	DL9YX	95,064

Team Contesting

1. Downhill Contest Team (EA9IE, 9Y4VT, CN8ES, D44BC, K6NA) 23,593,748
2. Wait Till Next Year Contest Team (W3BGN, N2LT, K4JPD, K4BAI, PJ2FR) 15,511,563

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

CW RESULTS
SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

K1AR	**A**	**3,397,905**	**2398**	**120**	**363**
W1KM	"	**2,713,558**	**2040**	**117**	**337**
K1EA	"	**2,002,184**	**1617**	**116**	**312**
K1IU	"	1,461,473	1292	103	286
K1VR	"	1,427,580	1254	110	286
K5MA/1	"	104,115	225	59	106
W1HUE	"	70,692	187	47	90
W1WY	"	63,474	166	51	98
WA2WIP /1	"	51,858	143	51	83
N4XR/1	"	45,584	113	52	102
K1MEM	"	41,480	108	49	87
K1VSJ	"	25,840	115	29	51
W1FM	"	22,932	94	36	62
AB1U	"	21,097	106	27	46
KT1O	"	15,843	74	34	53
KA1KFC	"	9,896	51	29	42
WA1ZAM	"	7,440	56	15	33
W1AX	"	6,837	49	18	35
W1PLJ	"	5,670	48	16	29
W1OPJ	"	4,646	47	19	27
K2MN/1	"	4,559	35	17	30
KQ1V	28	588	15	6	8
K1RM	**21**	**275,100**	**673**	**30**	**110**
W1BET	"	3,804	38	12	24
K1BW	**14**	**462,594**	**1220**	**34**	**95**
W1YN	"	147,874	473	29	78
WA1FCN	"	117,828	375	29	79
W1GG	"	114,623	469	26	57
WB1DXD	"	47,952	208	26	55
K1OX	**7**	**439,632**	**1055**	**32**	**110**
			(Opr. KC1F)		
K1MM	"	**437,112**	**992**	**37**	**119**
K1TR	"	13,617	100	15	36
W1FV	**3.5**	**197,120**	**603**	**27**	**85**
K2RR/1	"	54,570	228	19	66
N2LT	**A**	**2,703,206**	**2076**	**120**	**326**
W2REH	"	**2,000,432**	**1611**	**114**	**310**
N2MM	"	**1,594,020**	**1494**	**103**	**269**
W2VJN	"	1,498,416	1143	126	330
K2RD	"	856,665	827	102	263
K2OY	"	692,045	808	93	212
			(Opr. N1EE)		
K2SHZ	"	392,445	496	78	207
K2FL	"	328,015	433	86	203
K2QIL	"	243,474	372	73	165
WA2UEC	"	234,976	373	69	155
			(Opr. KA2HMJ)		
W2NC	"	218,940	321	74	172
N2AIF	"	192,691	320	66	167
N2MR	"	180,455	336	64	129
WA2ASQ	"	177,408	336	65	127
KN2Q	"	176,052	326	62	142
W2FTY	"	160,890	310	61	125
WA2CNF	"	144,900	276	72	138
K2FS	"	141,316	246	66	140
N1CQ	"	1,242,712	1322	88	238
			(Opr. KC1Q)		
W1IHN	"	1,072,932	976	99	272
KS1L	"	1,028,608	1094	93	235
AK1A	"	993,580	1141	90	212
K1VUT	"	857,265	913	88	247
W1RR	"	623,964	694	85	234
W1FJ	"	617,516	692	88	229
W1WAI	"	556,010	594	89	249
KA1DWX	"	481,950	550	89	226
W1BIH	"	436,770	453	103	242
W1CWU	"	351,948	455	83	195
AA2Z/1	"	229,680	401	60	138
W1WEF	"	206,029	402	62	117
K1SA	"	187,476	317	46	158
AI3E/1	"	130,942	239	62	137
KA1LZR	"	130,091	298	57	110
N1AU	"	107,616	226	55	122
K2QF	"	132,496	247	67	129
WA2ORX	"	106,377	222	58	119
W2SAW	"	100,320	247	47	93
W2DW	"	100,182	215	61	116
K2JLA	"	96,624	191	64	127
W0VU/2	"	78,848	167	60	116
KW2J	"	67,944	182	57	92
W2KHQ	"	58,464	150	52	92
K2WK	"	57,717	200	27	72
W2RQ	"	50,160	208	36	52
W2PHT	"	45,220	133	43	76
NA2Q	"	44,550	128	51	84
KD2HE	"	20,500	88	31	51
W2KTF	"	13,132	69	25	42
WB2SZY	**21**	**40,180**	**166**	**22**	**60**
K2VV	**14**	**655,046**	**1567**	**35**	**107**
K2SX	"	**480,340**	**1179**	**35**	**105**
KY2P	"	402,996	1089	32	97
K2SG	"	217,392	655	32	80
NG2X	"	147,288	507	28	74
K2MFY	"	111,780	339	31	84
N2DT	**7**	**139,482**	**401**	**31**	**92**
N2KW	"	100,116	282	34	95
NC2V	"	34,142	147	30	56
W2HG	"	27,000	110	28	62
KA2YMZ	3.5	150	36	3	2
W3GRF	**A**	**2,634,252**	**2053**	**110**	**334**
			(Opr. K9DQ)		
K3TUP	"	**2,323,376**	**1667**	**133**	**340**
			(Opr. K5ZD)		
K3ZO	"	**2,157,396**	**1704**	**128**	**316**
W3BGN	"	**2,090,889**	**1698**	**114**	**309**
K3WW	"	1,723,153	1422	113	308
W3XU	"	1,592,032	1546	99	257
KB3TN	"	1,221,966	1243	92	250
K3ZZ	"	1,058,255	1039	101	254
K3NA	"	460,053	562	93	204
KS3F	"	423,793	604	86	171
W3OV	"	372,800	525	72	161
W3NZ	"	342,696	474	80	182
W3AZ	"	313,680	460	74	166
WB3CAC	"	308,672	521	63	145
W3ARK	"	231,633	411	58	149
W3EVW	"	216,558	356	69	158
N2MA/3	"	213,525	373	60	135
N3HW	"	191,564	416	53	113
KQ3F	"	180,600	379	51	121
KD8WX /3	"	90,335	227	46	99
W3SOH	"	75,900	180	56	109
W3QIR	"	66,748	153	52	112
WA3IJZ	"	64,320	189	38	82
K3WGR	"	42,975	123	40	85
N3BNA	"	40,992	149	45	77
N3CW	"	23,632	81	42	70
KC3EK	"	20,202	85	34	57
W3FQE	"	4,690	49	15	20
KA3AOX	"	4,094	43	18	28
WA3IMY	"	3,565	51	9	22
NN3SI	"	2,322	22	10	17
WA3CGE	**28**	**2,822**	**32**	**11**	**23**
WA3VPL	21	1008	17	9	15
KA3NED	**14**	**183,665**	**575**	**31**	**78**
N3DLZ	"	61,194	228	25	69
KX2A/3	7	31,434	35	13	26
N3RL	"	864	14	12	12
AA1K/3	**1.8**	**24,120**	**166**	**16**	**51**
N4WW	**A**	**2,482,248**	**1882**	**131**	**341**
N6AR/4	"	**1,427,533**	**1198**	**120**	**299**
AA4S	"	**1,337,772**	**1197**	**102**	**291**
W3VT/4	"	1,317,120	1117	120	300
N4KG	"	1,015,230	845	126	304
K4JPD	"	1,000,701	1020	104	247
N4RV	"	993,870	868	121	288
N4TO	"	736,038	664	114	283
N4VZ	"	665,496	669	105	246
N6AV/4	"	621,824	645	100	247
K4LTA	"	582,192	705	89	223
N4XM	"	495,170	622	88	205
K4POL	"	486,796	635	70	192
W4BV	"	325,745	417	89	198
W60KX/4	"	229,810	325	76	169
K4FW	"	221,752	377	59	153
N4NX	"	201,600	294	88	164
N4JF	"	178,304	307	78	146
K4LQ	"	176,040	297	71	145
K4PB	"	168,775	290	69	146
N4KE	"	147,712	206	88	168
WB4MAI	"	133,536	231	76	138
K4OD	"	133,118	246	68	134
KN4B	"	115,240	197	75	140
K4FPF	"	113,040	235	59	121
N4MM	"	91,760	212	52	103
WM4Z	"	83,237	194	56	105
KF4CI	"	68,728	185	50	92
W1UA/4	"	67,450	183	51	91
W4YN	"	57,084	154	50	84
W4BFR	"	49,352	144	40	84
W5OG/4	"	47,158	123	56	90
WB4OSN	"	46,050	118	58	92
KG4GR	"	19,552	78	39	55
KV4AM	"	16,826	79	35	59

K4KUZ	"	13,317	69	25	44
KB4FO	"	3,264	30	23	25
W4WJJ	"	1,680	23	12	16
NU4Y	**28**	**1,764**	**62**	**10**	**11**
K4DDB	"	**576**	**30**	**9**	**9**
W4NL	**21**	**162,162**	**469**	**30**	**96**
N4BP	"	130,758	423	30	81
WB4TDH	"	116,702	341	29	89
KC4HN	"	24,026	106	22	60
W4JFL	"	12,032	72	22	42
K3RV/4	**14**	**634,293**	**1444**	**37**	**112**
N4MO	"	227,540	638	34	90
AA4LU	**7**	**176,896**	**483**	**36**	**92**
N4RJ	**3.5**	**122,451**	**378**	**29**	**90**
N4PN	**1.8**	**21,608**	**114**	**20**	**53**
N4SU	"	15,840	104	15	45
N4TX	"	13,847	121	19	42
KG4W	"	9,412	80	16	36
K4XO	"	3,135	43	12	21
K5LP	**A**	**365,300**	**520**	**90**	**170**
N5AW	"	206,164	302	90	169
NI5M	"	102,589	218	66	107
WC5D	"	90,285	179	73	122
K5FUV	"	74,898	164	65	106
N5UA	"	69,836	171	63	95
K5DB	"	60,742	178	41	80
KI3L/5	"	50,850	201	39	51
W5OB	"	25,630	91	46	64
W5RIT	"	5,544	45	23	33
W5EIJ	"	3,619	40	23	24
K5GO	**21**	**216,500**	**623**	**29**	**96**
K5TSQ	"	108,752	344	30	82
KE5CK	"	49,662	203	25	64
N5CR	**14**	**453,870**	**1161**	**36**	**99**
W5FO	"	254,016	719	34	92
AD5Q	"	133,644	446	30	81
KA5W	**7**	**281,936**	**726**	**34**	**100**
K5KLA	"	36,722	153	28	58
W5PWG	**3.5**	**8,418**	**74**	**16**	**30**
N7AIH/5	"	2,700	60	11	14
W5DZF	"	192	10	6	6
K5UR	**1.8**	**47,005**	**219**	**25**	**60**
AI6V	**A**	**1,985,916**	**1912**	**128**	**238**
			(Opr. WA6VEF)		
K6NA	"	**1,345,071**	**1245**	**125**	**254**
N6JL	"	**317,184**	**615**	**73**	**104**
W6JTI	"	272,636	474	82	132
K7LJ/6	"	259,182	406	89	149
N6ZZ	"	234,696	370	84	147
K6DR	"	200,088	431	73	95
W6FSJ	"	197,825	368	74	119
K6HIH	"	162,576	421	64	80
W6BA	"	159,654	314	61	116
W6WB	"	158,620	285	80	126
N6IC	"	151,904	300	75	113
N2UN/6	"	151,848	326	70	101
K6EID	"	135,861	271	72	107
K6ZUR	"	109,836	248	65	97
N6OJ	"	103,840	371	45	65
K6PU	"	103,716	196	80	121
K6JG	"	103,212	220	78	105
ND6G	"	93,132	211	67	89
N6EK	"	91,840	249	57	83
N6NF	"	91,355	218	57	94
W6NKR	"	85,860	192	64	98
N6BFE	"	70,560	211	51	75
KT6V	"	69,870	155	67	103
W6ISQ	"	68,138	155	60	97
W6HT	"	60,074	248	39	59
N6UW	"	57,480	182	53	67
WA6TKT	"	45,310	152	50	65
W6NNV	"	44,044	122	59	84
WB6FCR	"	43,248	150	46	60
W6ABW	"	36,064	141	46	52
W6BZE	"	35,460	136	36	54
N6AN	"	34,932	161	31	51
AA6EE	"	32,591	122	47	62
K9AGL/6	"	31,486	130	39	52
W6BYH	"	29,896	110	45	56
N6OT	"	27,768	131	35	43
W6BVM	"	26,880	101	36	60
W6TVP	"	21,385	88	38	53
N6IBP	"	20,945	113	30	41
N6OM	"	16,768	94	28	36
W6MFC	"	16,340	82	35	41
N6OU	"	15,921	76	39	48
W6HJ	"	11,457	70	27	30
N7JMV /6	"	10,659	73	25	32
N6JM	"	8,848	59	28	28
KC6W	"	5,720	51	20	20
NE6I	"	5,512	41	24	28
W6IFC	"	4,851	38	23	26
AK6T	"	3,542	30	22	24
W6YA	**21**	**162,946**	**546**	**28**	**75**
W6BSY	"	29,704	135	25	54
NJ6P	"	25,984	159	24	40
N6GG	**14**	**206,568**	**635**	**33**	**81**
AA4M/6	"	133,400	475	30	70
W6PU	"	129,770	473	28	67
W6LTA	"	112,579	387	31	72
W6DN	"	73,704	316	31	52
K6MBV	"	17,450	126	20	30
WB6JHC	"	830	29	5	5
N6QR	**7**	**366,000**	**1001**	**36**	**89**
N6NI	"	258,825	743	36	83
N6OC	"	48,144	165	36	66
K5KT/6	"	10,010	102	15	20
W6RJ	**3.5**	**103,224**	**438**	**30**	**58**
WB6JMS	"	6,160	77	13	22
K6DDO	**1.8**	**8,534**	**86**	**13**	**21**
K6SE	"	7,320	88	13	17
K5MM/7	**A**	**738,106**	**931**	**106**	**183**
W7FGT	"	**152,760**	**420**	**55**	**79**
W7AYY	"	151,704	331	66	102
KA7T	"	134,745	265	85	110
KS7T	"	85,059	286	52	65
W7TC	"	54,400	210	50	50
KX7J	"	51,213	156	49	80
N7HJM	"	42,237	135	49	68
W7IIT	"	41,664	157	43	53
W7QN	"	37,248	141	44	53
K7UU	"	36,156	106	61	77
K7RIE	"	33,908	136	42	56
K7WA	"	32,178	130	38	55
W7IEU	"	23,828	149	36	38
KA7FEF	"	21,580	103	42	42
W7GUR	"	16,704	96	30	34
KY7M	"	13,804	76	31	37
KD7H	"	13,566	97	18	33
KR7L	"	3,724	38	19	19
W7IVX	**21**	**115,479**	**442**	**27**	**64**
KE7C	"	68,931	347	24	45
			(Opr. WB7QJV)		
W7YU	"	30,132	136	26	55
W7LVI	"	21,369	147	20	31
N7TT	**14**	**279,660**	**848**	**32**	**86**
KB7G	"	**275,232**	**791**	**33**	**89**
N7RO	"	165,678	571	29	77
KU7Y	"	42,640	188	23	57
K7ABV	"	63,296	263	26	60
W6ALQ /7	"	12,699	92	14	37
KS7P	"	2,923	29	16	21
W7KZK	"	24	4	1	1
W7EJ	**7**	**301,645**	**902**	**34**	**81**
AA7A	"	245,508	679	35	88
N7BG	"	166,284	459	34	90
N7RT	"	136,539	400	37	80
W7TSQ	"	1,428	28	11	10
K9JF/7	**3.5**	**45,056**	**252**	**23**	**41**
KE7V	"	16,952	119	19	33
N7AM	"	10,880	103	17	23
N7RM	"	10,794	102	17	25
W7KKR	"	1,850	34	12	13
KG7D	**1.8**	**6,815**	**118**	**12**	**17**
AI7B	"	6,324	119	13	18
W7AWA	"	3,132	48	11	16
W8LNO	**A**	**556,800**	**659**	**94**	**196**
WD8QBP	"	**446,688**	**548**	**85**	**197**
N8BC	"	258,083	403	68	161
W8RSW	"	169,632	320	57	129
KE8M	"	121,974	254	56	118
N8CXX	"	89,440	194	58	114
W8GOC	"	70,300	178	53	95
WA8YTM	"	69,840	202	37	83
W8EX	"	64,110	150	65	105
W8YGR	"	63,504	149	57	105
K8OQL	"	48,927	128	51	90
K8CV	"	40,959	127	44	79
AD8W	"	30,326	104	46	72
NE8T	"	27,120	96	53	67
N8GMR	"	19,943	92	26	51
K8HF	"	16,985	86	34	45
W8WVU	"	13,851	70	34	47
N8EKS	"	5,152	42	22	34
W8UA	**21**	**170,640**	**502**	**27**	**93**
W8QID	"	62,795	235	27	68
WD8LLD	**14**	**303,674**	**965**	**32**	**77**
WD8AUB	"	228,280	748	30	74
W8UMR	"	44,945	197	25	64
K8IA	**7**	**103,800**	**313**	**33**	**87**
K8WW	"	51,777	190	28	71
WB8MRU	"	14,007	80	22	47
K8GL	**3.5**	**61,911**	**291**	**25**	**76**
KV8Q	"	13,737	105	15	42
AC8W	"	11,180	83	13	39
K8DD	"	8,010	65	12	33
KZ8Y	"	4,294	42	11	27
W8UVZ	**1.8**	**11,058**	**80**	**18**	**39**
N8EA	"	7,785	77	14	31
W9RE	**A**	**1,458,345**	**1287**	**117**	**282**
KV9S	"	**554,400**	**653**	**105**	**210**
N9NS	"	501,072	638	93	193
K9CAN	"	469,965	534	98	225
W9OP	"	401,310	591	72	173
W9GIL	"	250,145	370	80	165
K9UIY	"	233,914	405	76	142
W9VA	"	187,055	323	67	142
W9LNQ	"	147,543	288	70	117
WB9HRO	"	107,625	232	65	110
W9GXR	"	70,851	222	36	77
NE9Z	"	67,716	149	59	112
W9KTP	"	55,857	154	45	84
NG9L	"	36,822	123	43	71
W9PC	"	28,365	112	34	59
K9BQL	"	12,320	68	27	43
K9MDO	"	10,136	65	20	36
W9REC	"	8,174	51	25	36
W9KHH	"	308	9	7	7
K9QVB	**21**	**75,649**	**268**	**28**	**73**
W9XT	"	42,195	181	24	63
W9WAQ	"	21,584	110	23	48
NA9J	"	16,315	98	22	43
K9RHY	**14**	**155,680**	**475**	**33**	**79**
W9OA	"	136,136	466	27	77
K9MMS	"	43,360	193	22	58
KQ9W	"	33,966	160	24	50
WA8YVR /9	**7**	**256,080**	**672**	**35**	**97**
W9YSX	"	93,456	283	33	85
KS9O	"	86,000	343	32	68
N9AW	"	24,273	108	26	61
K9RX	**3.5**	**58,596**	**241**	**25**	**63**
WB9POH	"	41,888	172	24	64
K9RS	"	38,184	170	21	65
KE9U	"	13,702	90	19	43
N9MM	**1.8**	**19,966**	**119**	**19**	**48**
			(Opr. N9NC)		
W9YYG	"	3,616	55	12	20
W0ZV	**A**	**1,675,080**	**1374**	**141**	**282**
W0WP	"	**920,304**	**974**	**96**	**236**
W0HBH	"	473,457	602	96	195
KJ0H	"	421,950	511	94	197
KJ0G	"	244,340	475	78	112
W0IZ	"	209,517	332	72	159
KM0L	"	208,159	355	77	150
K0IYF	"	95,355	215	63	100
W0GOR	"	90,636	204	66	100
W0RXL	"	77,140	214	52	93
KS0T	"	75,336	201	51	95
K0IIR	"	67,482	158	57	106
KM0R	"	66,000	199	52	80
K0TLM	"	38,514	108	56	75
NI0G	"	37,750	116	45	80
KC0Q	"	32,552	112	35	69
W0CW	"	26,264	102	33	65
K0JGH	"	24,420	86	44	66
N0SM	"	23,268	95	29	55
KF0Z	"	18,357	80	33	54
KE0Y	"	18,174	85	30	48
K0ZX	"	11,661	64	28	41
AK0M	"	11,023	60	33	40
NC0O	"	10,575	50	29	46
W0NGB	"	10,120	72	19	36
KA0OMX	"	7,906	48	33	34
K0RW	"	5,104	62	30	28
K0UK	**7**	**48,792**	**294**	**23**	**34**
K0OD	"	41,678	168	29	62
KB0U	"	15,264	78	26	46
K0KX	**3.5**	**27,066**	**132**	**21**	**57**
W0UO	"	25,347	180	19	32
N0XA	**1.8**	**15,504**	**116**	**18**	**33**
			(Opr. AB0X)		
K0CS	"	1,794	32	10	16

ALASKA

NL7DQ	**A**	**133,472**	**635**	**39**	**47**
AL7CQ	**14**	**377,195**	**1706**	**29**	**62**
KL7RA	**7**	**237,690**	**1037**	**32**	**63**
KL7AF	**1.8**	**2,783**	**109**	**5**	**5**

BAHAMAS

N4RP /C6A	**A**	**376,467**	**875**	**64**	**133**

CANADA

VO1MP	**A**	**36,584**	**100**	**37**	**99**
CH1AW	"	6,435	61	20	25
VE1BNN	**28**	**585**	**19**	**8**	**5**
VO1QU	**14**	**120,888**	**566**	**25**	**67**
VG1CYL	"	46,020	290	19	46
VO1KO	**7**	**30,072**	**236**	**15**	**41**
VE2AYU	**A**	**639,912**	**922**	**79**	**194**
VE2FGG	**14**	**53,184**	**510**	**13**	**35**
VO2AC	"	22,372	329	12	22
VE2HQ	**3.5**	**176,180**	**793**	**22**	**70**
VE2DVI	1.8	1,456	47	6	10
VG3BVD	**A**	**1,516,670**	**1990**	**107**	**238**
VE3KP	"	373,048	777	73	138
VE3ST	"	290,832	424	71	178
VG3XN	"	93,912	206	62	120
VE3OMU	"	11,440	80	27	38
VE3MCL	"	5,535	48	13	27
VE2AEJ /3	28	112	8	4	3
VE3NBE	**21**	**80,595**	**398**	**22**	**59**
VE6OU /3	**14**	**433,440**	**1285**	**32**	**94**
VE3OZB	**7**	**89,182**	**483**	**25**	**61**
VG3KRN	"	79,474	462	25	54
VG3BMV	**3.5**	**172,805**	**817**	**22**	**73**
VE3MFA	**1.8**	**33,276**	**340**	**15**	**32**
VE3INQ	"	16,428	218	12	25
VE3OME	"	15,717	242	9	22
VE4IM	**14**	**150,190**	**523**	**32**	**83**
VE4IY	"	14,766	124	18	28
VG5RA	**3.5**	**80,568**	**519**	**22**	**50**
VE6ADK	**A**	**58,536**	**363**	**32**	**30**
VE6CB	**14**	**187,320**	**671**	**31**	**74**
VG6VW	"	10,032	180	11	13
VE7CMN	**A**	**336,384**	**1063**	**65**	**81**
VE7QO	"	240,470	666	56	83
VE7DLM	"	172,484	607	57	67
VE7AV	14	6,386	91	16	15
VG7IG	**3.5**	**126,063**	**826**	**23**	**40**
VE7CC	**1.8**	**6,402**	**141**	**9**	**13**
VE7BS	"	1,020	32	7	8
CH1PJ /VG8	**14**	**136,200**	**810**	**21**	**54**

COSTA RICA

TE7T	**A**	**118,655**	**600**	**38**	**57**

DOMINICAN REPUBLIC

HI8WRE	A	15,872	253	16	15
HI8RPD	21	760	40	5	5
HI8LC	**3.5**	**17,056**	**200**	**12**	**29**

GUATEMALA

TG9NX	1.8	2,996	48	12	16

HAITI

4V2C	**A**	**4,281,212**	**4774**	**107**	**270**
			(Opr. K4BAI)		

HONDURAS

HR1AT	14	17,568	165	16	32

JAMAICA

6Y5HN	**A**	**95,511**	**474**	**36**	**57**

MEXICO

XE1VV	**A**	**588,636**	**1393**	**75**	**122**
XE2MX	"	129,270	515	50	63
XE2GL	**14**	**475,405**	**1714**	**33**	**86**
			(Opr. KN5H)		
XE2FU	**7**	**665,728**	**2201**	**35**	**93**
			(Opr. KZ5M)		
XE2KN	**3.5**	**136,218**	**865**	**21**	**52**
			(Opr. KG5U)		
XE2AAM	**1.8**	**6,992**	**181**	**8**	**11**
			(Opr. N5AF)		

MONTSERRAT

VP2MEV	**A**	**2,514,512**	**3621**	**92**	**216**
			(Opr. AJ6V)		

PANAMA

HP1XKR	**A**	**249,227**	**827**	**47**	**92**

PUERTO RICO

KP4FI	**7**	**696,864**	**2330**	**27**	**92**

AFRICA

BOTSWANA

A25 /G3HCT	**21**	**329,360**	**1202**	**21**	**71**

CANARY ISLANDS

EA7TH/8	**A**	**3,115,730**	**3017**	**98**	**248**
EA8BIE	"	116,156	287	45	97
EA8BGX	"	13,920	80	20	40
EA8AFB	14	27,496	169	18	38
EA8ABR	3.5	840	20	2	12

CAPE VERDE ISLANDS

D44BC	**A**	**5,418,018**	**4397**	**117**	**300**
			(Opr. N6TJ)		

CEUTA & MELILLA

EA9IE	**A**	**5,731,360**	**4252**	**113**	**339**
			(Opr. N6AA)		

GABON

TR8JLD	**7**	**90,771**	**390**	**23**	**56**

GAMBIA

C53AA	**A**	**3,447,396**	**2952**	**112**	**281**
			(Opr. OH8XX)		

MADEIRA ISLANDS

CT3ET	**21**	**171,014**	**776**	**20**	**54**

MAURITIUS

3B8DB	**A**	**154,332**	**480**	**35**	**73**

MOROCCO

CN8ES	**A**	**5,422,763**	**4103**	**107**	**336**
			(Opr. OH2MM)		

NIGERIA

JG1FVZ /5N8	**21**	**79,416**	**376**	**18**	**54**

REPUBLIC OF SOUTH AFRICA

ZS6BSZ	**A**	**492,525**	**609**	**91**	**184**
ZS2RM	"	143,361	325	54	99
ZS6P	**28**	**65,680**	**288**	**21**	**59**
ZS6TUK	"	6,510	73	8	22
ZS6BCR	**7**	**296,537**	**967**	**30**	**73**

TANZANIA

5H3BH	**14**	**760,784**	**1882**	**36**	**100**
			(Opr. SM8AJU)		

ASIA

CYPRUS

ZC4CZ	**A**	**1,127,648**	**1549**	**69**	**193**

HONG KONG

VS6DO	**A**	**1,534,698**	**2474**	**117**	**220**
			(Opr. JA5DQH)		

INDIA

VU2AJ	**A**	**114,777**	**384**	**33**	**84**
VU2JN	"	77,520	276	50	86

ISRAEL

4X4JO	**21**	**126,434**	**595**	**24**	**53**

JAPAN

JI1QPU	**A**	**1,340,808**	**1519**	**110**	**212**
JF1EQA	"	**954,786**	**1326**	**95**	**159**
JH1OGC	"	703,768	956	103	165
JF1SEK	"	391,950	628	90	135
JA1CJQ	"	121,511	289	67	102
JH1MTR	"	96,026	271	59	74
JE1ARQ	"	88,236	191	75	96
JA1OJZ	"	85,315	239	66	85
JH1AWN	"	70,412	212	68	48
JA1CE	"	51,062	163	57	64
JA1BSU	"	47,187	163	44	63
JP1SRH	"	29,072	138	33	46
JA1AAT	"	25,947	99	36	57
JA1JGP	"	17,886	102	28	38
JS1IVF	"	14,892	85	34	39
JA1BNW	"	11,095	100	26	39
JA1JBP	"	4,715	45	18	23
JJ1JHJ	"	2,160	38	10	11
JG1VOT	"	396	13	7	5
JA2SAP /1	"	360	8	7	8
JM1TUY	28	2,320	35	13	16
JI1CBF	**21**	**164,944**	**573**	**32**	**72**
JR1ZWH	"	35,904	193	25	43
JA1BFN	"	19,215	98	17	28
JA1BUI	"	13,407	130	16	25
JK1KRS	"	12,642	105	17	26
JM1WZP	"	11,960	93	20	26
JA1EM	"	11,730	82	21	30
JA1QXC	"	8,556	70	20	26
JE1DXC	"	7,215	65	17	22
JF1MYI	"	3,726	53	13	14
JM1LFV	"	3,589	36	15	22
JA1OP	"	3,422	42	16	13
JA1GO	"	3,198	33	17	22
JH1ADR	"	**1,215**	**19**	**15**	**12**
JK1MAZ	**14**	**240,768**	**866**	**33**	**66**
JA1NLX	"	60,989	324	25	46
JM1MCF	"	32,835	212	20	35
JE1REU	"	32,480	217	26	30
JA1DOY	"	13,612	130	17	24
JR1RCQ	"	12,672	87	24	40
JA1BUN	"	12,595	91	20	35
JG1RYQ	"	8,480	71	19	33
JO1QZI	"	7,486	84	17	23
JA1OYB	"	6,848	76	18	14
JA1KJW	"	6,327	63	17	21
JR1HYO	"	3,314	33	12	14
JO1EPD	"	2,668	32	12	17
JA1EL	"	2,000	29	9	16
JP1BPG	"	126	9	3	3
JJ1VUQ	**7**	**144,163**	**571**	**30**	**62**
JI1BNX	"	84,129	363	29	58
JA1YWG	"	41,118	209	27	50
JA1JIO	"	12,768	97	21	27
JN1AIF	"	9,216	103	14	22
JO1CRA	"	2,697	36	14	15
JA1PS	"	1,710	33	10	8
JN1VVB	"	1,560	30	10	10
JL1EJC	"	460	16	5	5
JK1RJQ	"	276	10	6	6
JA1NYV	"	76	19	2	2
JA1XAF	**3.5**	**68,248**	**339**	**26**	**50**
JA1SJV	"	9,890	99	18	25
JF1RPK	"	4,495	64	15	14
JF1NZW	**1.8**	**9,594**	**95**	**19**	**20**
JE1SPY	"	6,210	80	15	14
JA1AAV	"	6	3	1	1
JA2UOT	**A**	**99,138**	**319**	**55**	**68**
JA2MYA	"	71,680	220	58	70
JH2FFR	"	52,156	177	50	68
JA2ODS	"	49,764	144	58	74
JR2AGL	"	41,108	181	35	51
JA2BJC	"	36,960	153	39	57
JA2IHS	"	36,630	136	45	54
JA2OLJ	"	28,424	145	40	48
JA2OJ	"	27,946	122	34	55
JE2YFY	"	19,656	99	30	42
			(Opr. JA2KSA)		
JH2XTV	"	2,040	26	16	14

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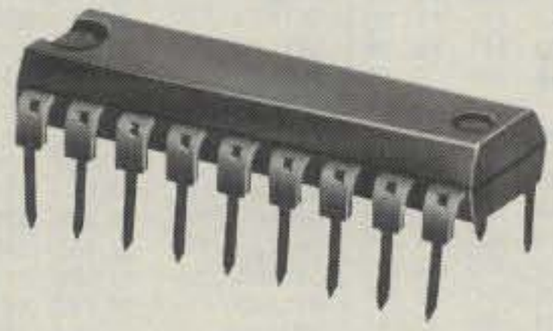

High-Performance DTMF Receiver In A Single High-Tech IC

SSI 202. Perfect for autopatching, repeater, link, remote-station control and selective calling. Features single analog input and eight built-in switched-capacitor filters—no input filtering is required. Provides selectable hexadecimal or binary coded 2 of 8 output. Clocked by low-cost 3.58 MHz crystal (our #272-1310, not included). 18-pin, 5 VDC, single supply. Complete with data and circuit examples. #276-1303 ..... **12.95**

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(1) Coax Cable. Top quality, low price, neighborhood close! Made in Fort Worth, Texas by Radio Shack.

RG Type	Ohms	Velocity Factor	Loss Per 100 ft.		Cat. No.	Price Per Ft.
8/AU	52	66%	50 MHz, 3.0 dB 200 MHz, 5.0 dB	100 MHz, 3.5 dB 400 MHz, 8.0 dB	278-1325	.32
8/M	52	75%	50 MHz, 2.2 dB 200 MHz, 4.6 dB	100 MHz, 3.0 dB 400 MHz, 7.5 dB	278-1328	.21
58/U	52	66%	50 MHz, 4.0 dB 200 MHz, 8.0 dB	100 MHz, 5.3 dB 400 MHz, 12.0 dB	276-1326	.16
59/U	75	75%	50 MHz, 1.8 dB 200 MHz, 3.9 dB	100 MHz, 2.8 dB 500 MHz, 7.5 dB	278-1327	.16

(2) Coax Cable Stripper. Indispensible. #278-240, **10.95**

(3) PL-259 Plug. #278-205 ..... **Pkg. of 2/1.99**

(4) M-358 "T" Adapter. Two SO-239 sockets to one PL-259 plug. Couples phasing lines in directive antenna arrays. #278-198 ..... **2.49**

(5) PL-258 Coupler. Joins two PL-259 plugs. #278-1369 ..... **1.49**

(6) UG-255/U Adapter. BNC male to SO-239. #278-120 ..... **2.39**

(7) UG-273/U Adapter. BNC female to PL-259. #278-121 ..... **2.39**

(8) RF Connector Sealant Tape. Keeps harmful moisture out and stays flexible. #278-1645 ..... **2.49**

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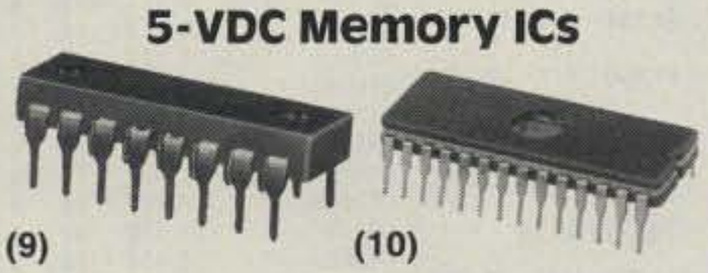

(9) 64K Dynamic RAM. 150 ns access time, low-power design. #276-2506 ..... **3.95**

(10) 256K Dynamic RAM. 150 ns access, low-power design 16-pin DIP with specs, pin-out. #276-1252 ..... **6.95**

(11) 64K EPROM. UV erasable. 250 ns access. 28-pin. With specs and pin-out. #276-1251 ..... **6.95**

25-Position Connectors

Fig.	Type	Cat. No.	Each
12	D-Sub Male	276-1547	**1.99**
13	D-Sub Female	276-1548	**2.99**
14	Hood for Above	276-1549	**1.99**

(15) Shielded 25-Position Hood. Keeps RFI protection when used with shielded cable. #276-1536 ..... **1.99**

Wire Antenna Goodies

(16) Heavy-Duty Antenna Wire. 65 feet of high-strength seven-strand, 22-gauge annealed bare copper. #278-1329 ..... **4.59**

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(18) Quiet Cooling Power

Efficient fans are ideal for cooling transceivers, linear amps and computers. AC operated fans are UL recognized.

Fig.	Size	Power	Cat. No.	Only
18	3″	7-13.8 VDC	273-243	14.95
19	4″	120 VAC	273-241	15.95
20	3″	120 VAC	273-242	14.95

Sophisticated Semis

(21) Super-Bright Red LED. Outputs 300 mcd at 20 mA, yet runs cool. T-1¾ package. #276-066 ..... **99¢**

(22) BS170 MOSFET. N-channel TMOS. Handles up to 60 VDC and 0.5 amps. #276-2074 ..... **1.19**

(23) UMC 3482 Melody Synthesizer IC. Preprogrammed with a dozen popular tunes. 16-pin DIP with data. #276-1797 ..... **2.99**

Audio Adapters and Plug

(24) 8-Pin Mike Plug. For most XCVRs. #274-025, **2.19**

(25) Stereo 1/8″ Plug to Mono 1/8″ Jack. #274-368, **1.29**

(26) Stereo 1/8″ Plug to Mono 1/4″ Jack. Use lightweight "mini" headphones with Ham equipment. #274-348, **1.59**

(27) Stereo 1/4″ Plug to Mono 1/4″ Jack. Use your best headphones with equipment, too. #274-360 ..... **1.59**

Our Best Digital LCD VOM In Convenient Fold-Up Design

- **Audible "Beep" Continuity Check**
- **Automatic Power-Off When Folded**

You select the function, it selects the proper range. Auto-range override, diode-check, ohms zero-adjust button, big LCD display. Measures voltage to 1000 DC and 500 AC, AC/DC current to 10 amps, resistance to 2 megs. 10⅞ × 5⅝ × 1½″ open. With leads. Batteries extra. #22-193 ..... **69.95**

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Our complete, easy-to-install security system alerts you to theft attempts when you're away from your vehicle. Digitally coded transmitter can also trigger optional vehicle siren and be used as a paging system. With in-car transmitter, pocket receiver/pager, instructions. Effective protection at a low price. Receiver battery extra. Transmitter for 12VDC neg. gnd. #49-791 ..... **79.95**

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Great for Hamfests and DX work! Set it to universal time just once—battery backup preserves accuracy during blackouts and line drops. Hi/lo brightness and 12/24-hour display controls. UL listed AC. Backup battery extra. #63-765 ..... **24.95**

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JA2VQP	A	897	19	11	12
JI2NQS	"	885	21	7	8
JR2ODK	"	300	9	7	8
JA2EIV	**21**	**108,756**	**387**	**32**	**74**
JA2DN	"	40,716	199	29	49
JA2KPV	"	16,881	131	19	32
JF2DDE	"	7,353	43	43	14
JE2SSX	"	420	10	7	8
JA2BNN	7.0	11,684	99	16	30
JG2LGM	"	2,500	51	10	10
JA2IVK	**3.5**	**19,224**	**144**	**19**	**35**
JE2LPC	"	4,170	66	14	16
JA2EVO	"	4,032	50	21	15
JA2EJI	"	3,960	43	21	15
JA2LA	"	740	20	10	10
JF3CCN	**A**	**352,581**	**647**	**79**	**132**
JJ3AIO	"	316,580	553	86	134
JR3BOT	"	292,800	578	74	109
JJ3JJL	"	199,296	410	79	113
JA3AA	"	156,519	329	73	114
JA3HTK	"	89,700	256	56	82
JA3ARM	"	53,318	207	43	63
JG3EHD	"	6,647	93	21	23
JN1ENK /3	"	3,080	38	17	18
JM3EYZ	"	2,820	38	12	18
JF3GKE	"	646	15	8	9
JI3BFG	28	49	4	3	4
JH3FQF	**21**	**22,770**	**130**	**24**	**42**
JE3ZFS	**"**	**18,480**	**142**	**22**	**38**
JG3NKP	"	17,802	90	30	39
JG3QCW	"	14,702	89	25	39
JE3NWN	**14**	**87,932**	**370**	**30**	**59**
JR3NZC	"	56,287	270	26	51
JF2ONG /3	"	5,859	79	12	15
JH3DEJ	"	5,544	30	9	7
JA3JM	**7.0**	**62,389**	**265**	**32**	**57**
JI3OIP	"	1,040	30	7	6
JH3BGG	**3.5**	**69,046**	**349**	**27**	**52**
JH4UYB	**A**	**257,873**	**494**	**79**	**118**
JA4ESR	"	113,538	304	65	84
JR4VGV	"	51,272	197	43	61
JA4AQR	"	2,296	28	14	14
JR4PYZ	"	663	17	9	8
JE4MKG	21	520	21	12	14
JE4QJP	"	42	3	3	3
JE4VVM	**14**	**153,450**	**610**	**31**	**59**
JE4CZM	"	53,710	235	30	52
JR4ISK	"	4,288	55	16	16
JA4GXS	7.0	10,512	86	19	29
JR4SRW	"	2,507	40	12	11
JA5JGV	A	28,325	111	47	56
JA5HF	"	28,188	129	36	51
JR6JZF /5	**14**	**90,792**	**341**	**34**	**63**
JA5BQX	"	42,772	232	25	43
JA5BJC	**7**	**421,296**	**1125**	**35**	**96**
JA5EZI	**1.8**	**1,848**	**36**	**11**	**11**
JA6BIF	**A**	**232,522**	**448**	**88**	**123**
JE6JRY	"	223,300	410	83	137
JA6LDD	"	95,880	210	77	93
JA6GCE	"	88,400	257	55	75
JA6AKV	"	17,500	94	29	41
JF6JQM	"	15,535	89	29	36
JF6KAC	"	13,786	82	28	33
JA6ABG	"	5,724	64	19	34
JA6BCV	"	5,687	42	22	25
JR6LDI	"	396	10	9	9
JR6GIM	**21**	**39,270**	**196**	**26**	**51**
JE6MOW	**14**	**341,280**	**1021**	**37**	**83**
JF6DSZ	"	46,080	225	27	45
JA6AZH	"	34,500	199	26	43
JA6RHH	"	1,500	21	13	17
JA6YBR	**7**	**73,872**	**403**	**25**	**47**
JR6PGB	"	51,111	242	29	52
JR6EZE	"	47,500	238	26	50
JR6LJO	3.5	10,656	93	20	28
JF6TMH	"	4	2	2	2
JH7DNO	**A**	**1,308,528**	**1497**	**112**	**200**
JA7DLE	**"**	**612,468**	**1084**	**83**	**131**
JA7BE	"	71,288	232	52	81
JE7IVP	"	30,160	145	32	48
JA7ASD	"	26,811	124	40	41
JA7TJ	"	15,561	94	33	30
JR7VOL	"	11,074	89	25	24
JA7DNJ	"	5,863	59	21	20
JR7CDL	28	165	6	5	6
JA7RHJ	**21**	**107,874**	**488**	**26**	**52**
JA7OYM	"	8,474	75	16	22
JH7LVK	**14**	**261,252**	**866**	**34**	**74**
JA7DOT	"	59,472	302	25	47
JA7YCQ	"	58,482	362	24	33
JH7XGN	"	29,574	178	24	38
JA7AXP	"	8,880	76	19	29
JA7EC	"	1,188	44	5	4
JA7HMZ	**7.0**	**165,138**	**606**	**31**	**71**
JR7BTI	"	51,984	282	28	44
JA7NI	"	13,200	117	18	26
JA7OUV	"	11,058	133	18	20
JA7OQO	"	5,143	60	15	22
JA7FFN	"	5,016	60	14	19
JE7MAY	"	3,870	52	14	16
JA7KM	"	1,224	26	9	9
JA7EDZ	3.5	1,836	27	12	15
JA7TQK	**1.8**	**4,284**	**56**	**18**	**18**
JA8DIM	**A**	**191,700**	**434**	**71**	**109**
JA8SW	"	31,620	129	40	53
JH8LIZ	"	3,196	43	14	20
JH8JYV	**14**	**144,127**	**512**	**31**	**70**
JA8CJY	"	34,200	213	22	38
JR8JTO	**7**	**17,936**	**125**	**21**	**38**
JA8BKI	"	7,035	73	16	19
JA8EJO	"	2,808	40	13	13
JE1KDM /8	"	1,155	30	8	7
JA8UBV	3.5	3,584	41	16	16
JE8KBM	"	396	14	6	6
JA9JFO	**A**	**278,658**	**484**	**86**	**140**
JA9CWJ	"	93,670	243	61	84
JA9PBZ	"	12,862	141	30	39
JA9FT	"	1,320	21	13	11
JA9LSZ	**21**	**39,234**	**190**	**27**	**51**
JH9KVF	"	16,020	125	17	28
JA9XBW	"	165	8	5	6
JA9PAK	14	38,130	218	23	39
JA9BOH	1.8	1,314	27	10	8
JH0NVX	**A**	**86,142**	**231**	**64**	**83**
JA0YMV	"	69,361	203	59	80
JA0KAZ	"	36,708	101	54	79
JA0NOE	"	8,576	61	22	27
JA0ELG	21	2,448	28	14	20
JH0XUP	"	546	16	6	7
JA0DXG	**14**	**117,040**	**549**	**28**	**48**
JA0CGJ	"	68,094	328	27	51
JA0DIN	"	3,818	58	11	12
JA0YAK	**7**	**67,322**	**312**	**27**	**55**
JR0NKU	"	2,990	52	13	10
JA0GZ	"	1,072	23	8	8
JH0NZN	"	96	6	3	3

KOREA

HL2XP	**A**	**100,480**	**414**	**52**	**76**
HL1LW	"	54,075	251	44	61

MALAYSIA

9M2AX	1.8	859	35	11	11

MONGOLIA

JT0APE	**1.8**	**5,880**	**124**	**12**	**23**
JT0EC	**"**	**5,304**	**105**	**13**	**21**

OMAN

A4XZG /15	**A**	**287,896**	**505**	**65**	**147**

SAUDI ARABIA

HZ1HZ	**A**	**638,614**	**774**	**86**	**212**

U.S.S.R. (ASIATIC)

ARMENIA

UG6JJ	A	27,936	135	23	49
UG6GG	**7**	**45,114**	**307**	**14**	**40**
UG6GAW	**1.8**	**55,440**	**327**	**16**	**47**

ASIATIC RUSSIA

RW9WA	**A**	**1,136,770**	**1373**	**86**	**224**
UA9XR	**"**	**768,690**	**1168**	**65**	**169**
UA9HTT	"	624,352	1186	65	153
UV9WW	"	602,784	1084	51	156
UA9XS	"	382,503	690	51	151
UA9CBR	"	337,392	618	57	156
UA9FD	"	176,778	503	33	126
UV9CE	"	139,185	395	35	100
UA9URF	"	102,816	323	50	94
UA9MR	"	49,096	123	56	96
UA9XBV	"	35,787	169	22	57
UA9ALD	"	34,860	187	19	51
UV9DZ	"	29,822	203	16	46
UA9XFO	"	17,160	96	11	36
UA9FZ	"	14,256	158	9	24
UA9XF	"	832	14	13	13
UA9XDG	"	550	11	11	11
UA9FGO	**21**	**59,180**	**237**	**15**	**34**
UA9AU	"	10,168	73	20	42
UA9ATA	**14**	**132,714**	**499**	**28**	**73**
UA9WDR	"	131,880	585	22	62
UA9ANN	"	53,105	311	15	50
UA9HFC	"	41,405	272	17	55
UA9SF	**7**	**127,626**	**514**	**24**	**65**
UA9WD	**"**	**120,300**	**554**	**22**	**53**
RA9SUV	"	87,550	365	21	64
UA9YAR	"	86,488	446	22	54
UA9XHT	"	15,539	140	12	29
UA9AJR	"	3,679	98	17	41
UA9SP	**3.5**	**151,102**	**625**	**17**	**69**
UA9AL	**"**	**120,225**	**588**	**15**	**60**
UA9FAR	"	114,450	584	14	60
UA9CBM	"	113,523	522	17	62
UA9AB	"	100,464	519	15	54
UA9SIJ	"	61,932	422	10	42
UA9WZ	"	55,519	347	13	46
UW9QA	"	46,911	334	12	45
UA9SBU	"	4,104	57	7	20
UA9KAA	**1.8**	**65,045**	**347**	**18**	**56**
RA9AKM	**"**	**63,291**	**441**	**13**	**38**
UA9AO	"	43,264	304	10	42
UW9SW	"	20,916	246	8	34
UA9AJX	"	19,017	153	12	39
UA9FNR	"	16,080	152	8	32
UV9WR	"	6,757	87	7	22
UA9CAQ	"	624	26	5	8
UW9LT	**A**	**793,755**	**1241**	**105**	**174**
UA9LCZ	**"**	**363,321**	**750**	**84**	**135**
RA9JB	"	109,347	550	50	73
UA9CFF	"	109,010	488	43	67
UA9ZI	"	94,963	513	48	49
UA9SGJ	"	93,624	318	51	90
UA9AG	"	86,856	252	51	103
UZ9AB	"	61,963	230	47	84
UA9SY	"	47,138	266	24	50
UA9SBQ	"	22,230	191	23	42
UW9CM	"	12,354	107	26	32
UA9DAK	"	5,319	127	11	16
UA9CS	"	1,065	69	10	10
UA9SG	**21**	**13,970**	**173**	**18**	**37**
UA9BCK	**14**	**48,316**	**384**	**15**	**32**
RA9JD	"	37,120	317	19	39
UA9SJO	"	35,622	256	19	44
UA9BDW	"	30,350	311	15	35
UA9JDQ	"	21,792	281	18	30
UA9QGZ	"	16,104	107	17	44
UA9ZDK	"	9,568	163	16	16
UA9TO	**7**	**67,520**	**513**	**19**	**45**
UA9AAB	"	57,524	360	24	49
UA9DW	"	10,080	170	17	19
UA9ZBP	"	8,624	159	13	15
UA9ZZ	"	8,505	188	14	13
UA9LFN	"	1,204	30	7	7
UA9AB8	**3.5**	**40,320**	**264**	**17**	**55**
UA9SMM	"	27,716	282	15	37
UA9WCL	"	19,800	226	10	30
UA9ZBW	"	8,664	206	13	11
UA9LJ	"	192	34	3	3
UA9BCV	1.8	1,932	33	8	20
RA9FA	"	732	44	6	6

AZERBAIJAN

UD9DKW	**A**	**747,770**	**1241**	**54**	**161**
RD6DJ	21	12,880	115	10	30
RD8DX	7	11,890	79	17	41
UD6DHM	**3.5**	**28,899**	**283**	**7**	**39**
UD6DC	**1.8**	**24,576**	**190**	**8**	**40**

GEORGIA

RF6FWW	**A**	**3,030,030**	**2705**	**102**	**291**
RF6FR	**"**	**728,739**	**1358**	**42**	**145**
UF6FHK	7	15,760	143	10	30
UF6AB	"	324	9	4	9
UF6FII	**3.5**	**24,295**	**210**	**9**	**34**
UF6VBC	**1.8**	**9,706**	**156**	**7**	**16**

KAZAKH

UL7EDR	**A**	**646,266**	**1058**	**56**	**164**
UL7NR	"	301,134	642	56	130
UL7CAA	"	277,240	852	50	86
UL7CEP	"	127,228	415	41	91
UL7BY	**21**	**93,632**	**414**	**25**	**63**
UL7TJ	"	5,734	44	18	29
UL7CW	**14**	**350,424**	**1089**	**33**	**91**
UL7CAZ	"	88,485	423	24	61
UL7CAC	"	81,640	287	30	74
UL7BX	**7**	**125,312**	**616**	**28**	**60**
RL7QA	"	53,700	381	16	44
UL7BB	**3.5**	**83,504**	**483**	**15**	**53**
RL7GA	"	60,444	400	17	52
UL7ECH	**1.8**	**16,926**	**160**	**9**	**33**
RL7LCT	"	7,448	115	7	21
UL7CAD	"	2,448	41	6	18

KIRGHIZ

UM8MFB	**A**	**138,966**	**509**	**32**	**82**
UM8MAN	"	51,150	238	39	71
UM8MFA	"	16,792	250	24	41
UM8MZ	**14**	**80,256**	**406**	**28**	**60**
UM8MIZ	"	72,228	406	20	54
UM8NAV	"	14,740	96	22	33
UM8MO	**7**	**225,584**	**960**	**25**	**67**
UM8MK	3.5	2,288	42	7	15
UM8MM	**1.8**	**10,640**	**137**	**7**	**28**
UM8MAA	"	1,420	35	7	13
RM8MA	"	266	11	6	8

TADZHIK

UJ8JA	**A**	**530,682**	**812**	**65**	**176**

TURKOMAN

UH8ED	3.5	252	11	5	7
UH8EAP	**1.8**	**5,320**	**88**	**8**	**20**

UZBEK

UI8IAJ	**A**	**152,687**	**1041**	**50**	**162**
RI8BP	"	54,896	376	45	101
UI8BAA	**7**	**77,088**	**470**	**22**	**51**

EUROPE

AUSTRIA

OE3RE	**A**	**184,801**	**592**	**51**	**130**
OE3HCS	"	15,910	120	24	50
OE3DSA	**3.5**	**201,576**	**1362**	**15**	**59**

AZORES ISLANDS

CT2CQ	**3.5**	**119,280**	**818**	**18**	**62**

BALEARIC ISLANDS

OH2LP /EA6	**A**	**68,026**	**463**	**36**	**77**
EA6GP	"	54,280	313	35	83
EA6VQ	**21**	**25,862**	**189**	**21**	**46**

BELGIUM

ON6CW	**A**	**58,527**	**560**	**16**	**48**
ON7BX	"	28,182	183	24	53
ON5SQ	**14**	**187,100**	**847**	**26**	**74**
ON5WL	**7**	**9,152**	**127**	**9**	**35**

BULGARIA

LZ1YJ	**A**	**188,686**	**758**	**57**	**123**
LZ2VP	**"**	**169,945**	**434**	**62**	**143**
LZ2SO	"	153,226	407	54	138
LZ1AG	"	149,902	315	68	173
LZ1MC	"	92,126	290	59	128
LZ1LW	"	59,994	365	33	68
LZ1FJ	"	39,800	276	26	74
LZ1BJ	"	31,114	217	25	69
LZ2CM	"	9,660	107	18	42
LZ1RN	**21**	**56,816**	**288**	**25**	**81**
LZ2RS	"	55,929	219	29	74
LZ1NS	"	22,575	143	21	54
LZ2TU/P	"	22,425	126	25	44
LZ2EV	**14**	**172,780**	**754**	**33**	**89**
LZ2ZA	"	73,728	504	30	66
LZ2SL	"	25,245	231	16	39
LZ1HY	"	25,456	160	15	59
LZ2ZA	**7**	**73,428**	**504**	**30**	**66**
LZ2CW	"	22,920	236	18	42
LZ2HK	"	6,302	87	15	31
LZ1GG	"	976	76	6	9
LZ2AX	**3.5**	**42,264**	**442**	**15**	**57**
LZ1VA	"	7,812	184	6	30
LZ2CJ	**1.8**	**81,900**	**619**	**20**	**71**
			(Opr. LZ2SC)		
LZ1TR	**"**	**30,153**	**370**	**17**	**52**

CZECHOSLOVAKIA

OK1DBM	**A**	**884,620**	**1040**	**90**	**256**
OK1VD	**"**	**692,512**	**1127**	**90**	**233**
OK2BFN	**"**	**667,652**	**1087**	**77**	**255**
OK2RU	**"**	**537,433**	**974**	**78**	**210**
OK2DB	"	311,658	699	68	186
OK1AJN	"	310,590	935	59	152
OK2ABU	"	265,524	777	55	148
OK3PQ	"	202,608	479	56	160
OK3FON	"	184,421	400	63	160
OK1AWC	"	146,387	407	51	130
OK1KZ	"	139,620	583	41	115
OK3YCA	"	133,991	381	53	125
OK1ALQ	"	118,335	360	51	110
OK3TAY	"	115,164	357	39	110
OK1DVK	"	96,664	329	50	122
OK1VK	"	88,478	226	61	105
OK2DB	"	81,312	210	56	120
OK1AXB	"	77,816	292	43	99
OK3CEL	"	67,281	353	35	88
OK1ZTW	"	62,594	275	39	80
OK1MKU	"	62,488	208	45	101
OK1PN	"	55,907	184	48	86
OK2PEM	"	47,520	242	31	41
OK1MZO	"	45,220	308	28	91
OK2BHQ	"	43,778	193	36	70
OK2EC	"	37,146	138	39	84
OK2BFX	"	33,522	162	30	144
OK3CWF	"	33,154	265	41	80
OK3CDZ	"	30,160	124	31	73
OK1MKI	"	29,890	211	22	56
OK1MTA	"	26,643	157	31	52
OK1DXW	"	24,319	211	21	62
OK1FCA	"	22,352	168	22	66
OK2BCZ	"	21,248	228	19	64
OK1HCD	"	21,031	148	33	61
OK2BJG	"	20,631	214	16	53
OK2BCI	"	19,838	85	41	68
OK1AJY	"	19,646	112	27	67
OK1AOT	"	19,332	106	39	69
OK1EP	"	16,317	95	31	80
OK1KCF	"	15,631	137	25	52
OK1DAU	"	12,285	102	19	26
OK2BLD	"	7,242	70	21	30
OK1AOR	"	5,880	46	18	31
OK3CQR	"	4,128	31	20	28
OK1AMB	"	2,709	23	21	12
OK2SWD	"	2,520	42	11	31
OK3CSQ	"	2,436	26	16	28
OK1HCH	"	1,702	43	10	37
OK1AIJ	"	736	33	4	19
OK3CEG	"	360	12	3	7
OK2QX	28	30	3	2	3
OK1AYQ	**21**	**19,332**	**135**	**20**	**34**
OK1JN	"	3,942	56	12	15
OK2YN	"	954	36	4	5
OK2BHV	**14**	**199,756**	**947**	**25**	**79**
OK2BGR	**"**	**69,916**	**404**	**20**	**57**
OK1DIL	"	53,798	311	21	53
OK2PFQ	"	45,144	267	22	50
OK3UQ	"	33,670	193	23	47
OK2BNX	"	29,238	194	19	47
OK2BWZ	"	23,876	511	13	34
OK1DLY	"	21,600	238	15	30
OK1SN	"	18,672	145	19	25
OK2BTP	"	17,243	177	16	27
OK3CAB	"	15,288	194	14	28
OK3ZWX	"	14,280	120	16	26
OK3IF	"	7,740	110	11	25
OK2PKS	"	5,940	96	10	20
OK1JDJ	"	810	27	4	6
OK1DWX	"	796	29	7	9
OK1AMF	**7**	**97,239**	**511**	**31**	**83**
OK1AZI	"	61,664	497	21	61
OK1MNW	"	56,358	340	24	77
OK1DKW	"	41,920	307	20	60
OK1MAW	"	38,064	245	27	77
OK1ABP	"	34,104	230	19	68
OK1GS	"	16,818	181	14	39
OK2SRA	"	9,360	147	12	36
OK2TED	"	650	18	7	18
OK1XW	**3.5**	**62,250**	**574**	**15**	**60**
OK2HI	**"**	**39,329**	**479**	**13**	**54**
OK1XJ	"	37,881	460	13	48
OK1DLF	"	14,178	248	9	42
OK1AWF	"	12,780	284	8	37
OK1MGW	"	11,480	132	11	45
OK2BUD	"	9,635	220	7	34
OK2PCF	"	8,904	188	7	35
OK3TDO	"	8,639	113	9	44
OK2PFX	"	8,235	139	9	36
OK3PCW	"	8,148	169	7	35
OK2PIO	"	2,548	88	5	23
OK1KAY	"	680	40	5	12
OK1KPU	**1.8**	**32,448**	**314**	**16**	**60**
OK2DFW	**"**	**29,160**	**467**	**9**	**51**
OL8COS	"	15,271	259	8	47
OK3CWQ	"	14,456	239	8	44
OL8CQP	"	12,852	242	7	44
OK1JDX	"	11,421	232	9	38
OL0CRG	"	10,890	230	7	38
OL7BLO	"	9,635	220	6	35
OK2PLA	"	7,544	165	7	35
OK2PLR	"	5,781	140	7	34
OL9CPG	"	4,305	119	7	28
OK1FZM	"	3,204	89	6	30
OK2BVG	"	3,010	70	8	35
OK1FZY	"	2,940	72	6	20
OL6BNB	"	2,914	95	4	27
OK1DWC	"	2,910	85	5	26
OL8COJ	"	2,460	80	5	25
OL6BNW	"	1,176	50	6	18
OK2PGT	"	1,175	47	5	22
OL5BOL	"	340	21	4	13
OL6BKZ	"	285	20	4	11
OK1DWJ	"	15	3	2	3

DENMARK

OZ7HT	**A**	**605,935**	**1310**	**73**	**180**
OZ5KU	"	210,474	502	53	145
OZ1CAR	"	116,160	374	47	118
OZ1NF	"	97,727	355	44	117
OZ4DZ	"	26,572	152	28	63
OZ2NU	"	25,043	190	23	56
OZ1AXG	"	11,070	97	21	33
OZ40C	"	2,981	32	18	24
OZ9MM	"	2,519	63	15	27
OZ5QU	21	11,110	80	18	37
OZ1DKG	"	10,455	108	13	28
OZ8CT	**14**	**73,372**	**447**	**24**	**59**
OZ1APA	"	13,959	122	16	31
OZ2PA	**7**	**28,471**	**326**	**15**	**56**
OZ5WQ	"	13,444	235	16	48
OZ1FTE	**3.5**	**45,390**	**255**	**21**	**68**
OZ2E	"	8,464	155	9	37

ENGLAND

G3LNS	**A**	**1,571,970**	**1888**	**100**	**266**
G3MXJ	**"**	**1,219,096**	**1413**	**104**	**284**
G4BUO	**"**	**1,111,456**	**1340**	**101**	**275**
G3UFY	"	491,504	789	77	201
G3VZT	"	403,310	974	76	203
			(Opr. G4BTY)		
G3ESF	"	212,176	657	47	131
G3NKS	"	200,433	526	55	158
G6QQ	"	90,424	315	37	90
G3JKY	"	66,023	340	33	70
G3ILO	"	45,475	218	29	78
G4OKN	"	41,256	291	29	79
G6NK	"	29,736	212	22	37
G4RKK	21	29,704	174	23	53
G3FXB	14	513,400	1493	35	101
G4CNY	"	311,924	1129	33	83
G4RFE	"	46,980	418	16	42
G4ZPG	"	11,520	136	12	28
G3YDV	**7**	**50,116**	**550**	**16**	**68**
G4UOL	"	44,770	419	15	59
G4ZFE	"	2,635	58	9	22
G4FAM	**3.5**	**143,165**	**1012**	**18**	**77**
G3FXA	"	13,145	118	11	44
G4OBK	**1.8**	**63,411**	**511**	**14**	**55**
G3XWZ	"	28,305	252	12	39
G3XTT	"	12,100	143	11	44
G3BDQ	"	8,892	121	12	45

FAROE ISLANDS

OY7ML	A	13,024	84	28	46
OY2H	**14**	**23,460**	**402**	**10**	**36**

FED. REP. OF GERMANY

DF9ZP	**A**	**2,164,709**	**2298**	**116**	**323**
			(Opr. DL6FBL)		
DF3CB	**"**	**1,062,324**	**1220**	**111**	**303**

DL1JF	''	**544,635**	**902**	**75**	**198**
DK6NP	''	502,054	722	80	249
DJ4AX	''	499,912	902	85	231
DL4FF	''	475,710	826	83	231
DL3LU	''	375,100	627	77	233
DL7AV	''	340,656	549	85	197
DL4BBO	''	339,190	902	63	151
DJ6QT	''	309,400	591	73	207
DJ9MH	''	279,864	632	74	202
DJ2YA	''	273,399	449	87	242
DL8KJ	''	265,846	506	69	169
DK3SN	''	213,354	503	54	108
DJ8JY	''	198,764	513	48	110
DL1TH	''	175,131	526	48	135
DL9EY	''	141,930	432	48	118
DJ5GG	''	135,605	385	54	131
DL2JO	''	128,586	406	48	126
DL9MBZ	''	102,770	237	26	87
DF4TD	''	94,540	393	42	103
DL3NAA /A	''	91,200	372	40	112
DL2JX	''	91,105	302	43	90
DF2HL	''	85,936	310	46	118
DK1GF	''	84,095	273	41	98
DJ4LK	''	75,036	202	53	116
DK5PR	''	72,800	204	53	107
DJ1YH	''	71,862	195	57	117
DL1SBF	''	70,016	261	42	86
DJ1VP	''	63,288	292	35	73
DL1MCD	''	63,104	270	36	92
DL1SBR	''	57,480	233	43	77
DJ0CP	''	44,036	172	32	69
DK1DB	''	41,580	212	33	77
DK7ZT	''	39,123	279	26	55
DL1ES	''	38,950	174	33	62
DJ2UU	''	36,951	213	31	82
DL1ZQ	''	36,279	210	59	87
DJ5AV	''	27,456	164	34	62
DK1PG	''	22,256	81	43	64
DJ1QJ	''	18,848	120	31	45
DF3QN	''	18,423	133	24	45
DL6QW	''	11,920	54	36	44
DL4RC	''	11,704	93	26	50
DL7YS	''	10,676	70	26	42
DF2RG	''	1,470	33	9	12
DK8NI	''	1,215	30	11	16
DL1RB	**21**	**48,555**	**223**	**24**	**59**
DJ9ZB	''	3,875	48	11	20
DL0ZC	''	1,649	40	7	8
			(Opr.	DL4FR)	
DF5WN	''	1,440	31	9	15
DK3GI	**14**	**776,860**	**1985**	**38**	**117**
DL4RX	''	85,942	389	28	69
DL3ZBJ	''	15,207	152	16	21
DL4NBV	''	2,175	52	7	18
DJ5JH	**7**	**86,020**	**378**	**29**	**86**
DF3ZR	''	38,025	268	17	58
DJ3TF	''	26,400	184	18	57
DL3DD	''	19,080	230	13	47
DF1SF	''	5,796	78	11	31
DF4QP	''	2,210	45	10	24
DL0LW	**3.5**	**48,896**	**614**	**13**	**51**
			(Opr.	DL2SAX)	
DL1HBT	''	11,868	240	10	33
DL4NAC	''	3,525	40	13	34
DK8NG	**1.8**	**56,416**	**509**	**18**	**64**
DK3KD	''	17,523	237	12	47
DF0THW	''	10,608	160	10	42
			(Opr.	DF4WP)	

FINLAND

OH2BH	**A**	**1,716,972**	**2096**	**108**	**290**
			(Opr.	OH1JT)	
OH6YF	''	**629,825**	**1192**	**76**	**219**
OH7EU	''	148,615	402	58	155
OH2ZAR	''	123,015	477	35	104
OH2LU	''	81,279	272	44	103
OH5PT	''	60,273	146	67	114
OH7NW	''	49,632	222	41	100
OH5MQ	''	35,900	257	30	70
OH5QY	''	27,270	200	26	75
OH8LP	''	24,640	160	29	59
OH8NEV /6	''	20,145	195	22	63
OH5MX	''	10,981	106	22	57
OH3NM	''	9,455	82	20	41
OH3RO	''	8,217	73	15	35
OH1PY	''	7,991	56	19	42
OH2VZ	''	5,670	56	18	27
OH7MS	**21**	**24,528**	**143**	**26**	**58**
OH2GI	''	8,100	70	16	38
OH2AQ	''	2,482	37	12	22
			(Opr.	OH2BUQ)	
OH8LC	''	1,792	38	8	20
OH3WD	''	432	9	7	9
OH2YL	''	363	37	11	22
OH8OS	**14**	**664,116**	**1977**	**34**	**103**
			(Opr.	OH6UM)	
OH8LQ	''	**190,145**	**1254**	**25**	**60**
OH2BYS	''	80,280	444	23	67
OH8LO	''	29,151	318	13	28
OH9PN	''	26,673	195	15	36
OH2BCD	''	26,220	192	17	40
OH2EJ	''	23,373	141	17	46
OH8OB	''	15,300	155	17	34
OH9RR	''	4,554	51	15	18
OH1AA	**7**	**133,504**	**680**	**31**	**81**
OH2HE	''	**101,091**	**733**	**23**	**70**
OH5UL	''	26,864	216	18	55
OH1RZ	''	2,184	32	12	30
OH2DE	''	1,872	30	10	16
OH6AM	''	966	32	6	15
OH2BCI	**3.5**	**79,580**	**647**	**19**	**65**
OH1TN	''	41,888	413	17	60
OH2PM	''	39,455	434	12	53
K8MN /OH2	''	22,214	303	14	44
OH3TR	''	17,225	152	9	44
OH6RC	''	7,830	145	8	37
OH6CD	''	5,624	134	8	30
OH6UL	''	4,551	82	7	34
OI5AX	''	170	20	3	7
OH6NG	**1.8**	**19,981**	**319**	**9**	**44**
OH1MA	''	9,800	154	12	37

FRANCE

FD1JCB	**A**	**357,603**	**1083**	**54**	**145**
F6DYX	''	**158,514**	**800**	**38**	**93**
F6DKV	''	148,678	522	49	111
F6HWM	''	95,708	314	55	87
F6EPQ	''	83,710	315	40	70
F6IRA	''	67,658	289	41	69
F9BB	''	60,884	208	42	82
F3AT	''	60,858	205	54	93
F6EQV	''	58,740	234	35	75
F6IJA	''	45,900	183	22	68
F6HWU	''	32,760	123	43	61
F6CUD	''	24,624	191	33	43
F6EZR	''	22,922	120	23	50
F/FG4DI	''	8,664	134	20	33
F6CXL	''	6,792	125	9	15
F6IRF	**21**	**126,217**	**620**	**25**	**66**
F6AUS	''	52,836	236	22	62
F5DE	''	24,672	198	16	32
F5AM	''	2,212	34	10	18
F9DK	**14**	**60,480**	**433**	**23**	**47**
F6BBJ	**7**	**116,737**	**679**	**29**	**78**
F3JL	''	56,232	462	18	54
F8TQ	1.8	270	18	4	11

GERMAN DEMOCRATIC REP.

Y24UK	**A**	**1,827,525**	**2212**	**107**	**306**
Y32KE	''	**360,060**	**953**	**61**	**143**
Y31PA	''	**220,675**	**695**	**50**	**125**
Y34SE	''	**188,656**	**471**	**55**	**153**
Y26FF/A	''	182,450	665	46	132
Y78ZN	''	152,076	502	48	126
Y28XL/A	''	148,848	526	48	120
Y26BH	''	132,936	436	49	125
Y54OL	''	120,624	435	49	119
Y22DK/A	''	107,450	343	51	124
Y42YG	''	104,912	402	44	114
Y36UE	''	99,687	564	46	95
Y22WF	''	95,004	369	39	87
Y25OF/A	''	90,300	357	46	104
Y53YN/P	''	89,675	285	54	121
Y21DG/A	''	88,560	333	46	118
Y71WN	''	61,312	239	35	95
Y23UL	''	60,604	205	37	72
Y51XG	''	58,688	247	38	93
Y55WH	''	57,517	364	29	84
Y25MG/A	''	56,160	209	45	90
Y44UI	''	56,088	257	37	115
Y22HF	''	49,149	205	36	93
Y55XD	''	48,906	313	26	73
Y23CM	''	42,840	171	35	91
Y37OJ	''	39,184	147	37	87
Y32PI	''	33,966	180	32	79
Y36TG	''	32,264	115	42	67
Y25TG	''	30,595	178	31	84
Y49RF	''	29,680	133	41	65
Y23RJ	''	21,680	179	23	57
Y71ZH	''	21,437	149	28	69
Y22GC	''	19,747	152	19	30
Y51UE	''	17,876	125	28	54
Y53XN/P	''	17,595	132	33	36
Y23JA/A	''	17,010	128	23	40
Y37ZK	''	17,000	161	18	51
Y38YE	''	15,785	144	23	54
Y87VL	''	15,549	89	25	46
Y36SG	''	15,400	77	33	44
Y31TL	''	15,054	141	27	51
Y32JK	''	12,705	88	26	51
Y21WI	''	12,455	97	21	26
Y21CF	''	11,592	65	26	37
Y31NJ	''	11,165	79	28	49
Y21EA	''	10,902	117	18	51
Y23HJ	''	10,224	110	18	53
Y33TB	''	8,512	79	20	36
Y26DM/A	''	8,025	49	30	45
Y24EA	''	7,150	49	22	28
Y38ZM	''	6,864	67	16	36
Y24JJ	''	6,204	78	12	35
Y38ZB	''	4,998	58	17	58
Y25CL/A	''	4,384	57	13	19
Y25XL	''	4,080	54	14	20
Y27UO/A	''	3,306	64	9	20
Y71VG	''	3,277	39	14	15
Y23HN	''	3,074	57	9	20
Y24MI	''	2,457	27	19	20
Y75ZH	''	1,533	25	10	21
Y31PL	''	1,080	26	8	7
Y37ZE	**21**	**29,008**	**152**	**24**	**50**
Y25TO	''	16,884	98	22	41
Y56ZA	''	14,586	113	16	35
Y31MO /P	**14**	**125,330**	**750**	**27**	**56**
Y32UC	''	**111,825**	**772**	**53**	**22**
Y44NO	''	52,360	385	24	44
Y51XE	''	44,608	328	20	44
Y51XJ	''	31,122	237	19	44
Y27GL /A	''	7,282	99	13	25
Y21XC	''	6,831	83	11	22
Y21UL	''	4,950	65	11	22
Y23BF	''	2,240	26	12	23
Y24LA	''	2,136	36	9	15
Y46XF	''	1,800	34	8	10
Y21FL	''	1,612	34	10	16
Y24YH	**7**	**42,484**	**322**	**16**	**70**
Y21BE	''	6,194	133	9	29
Y21HE	''	1,647	60	5	22
Y42HA	''	814	36	5	17
Y21NE /A	**3.5**	**91,324**	**843**	**17**	**62**
Y35ZK	''	18,095	339	9	38
Y52XF	''	6,438	171	7	30
Y37RB	''	2,432	50	8	24
Y36XC	''	2,220	62	7	23
Y21UH	''	2,090	57	5	25
Y33VA	''	1,944	33	9	15
Y26KL	''	1,566	50	6	23
Y24IB	''	594	35	4	14
Y37XJ	**1.8**	**16,008**	**343**	**7**	**39**
Y22TO	''	2,511	79	6	25
Y41TA	''	2,296	85	4	24

GIBRALTAR

ZB2EO	**A**	**239,400**	**730**	**50**	**130**
OH2KI /ZB2	**7**	**445,897**	**2105**	**29**	**98**

GREECE

SV1RP /SV7	**3.5**	**77,921**	**1015**	**14**	**53**
SV0AA	**1.8**	**3,936**	**77**	**8**	**33**

HUNGARY

HA0MM	**A**	**938,508**	**1295**	**103**	**268**
HG19HB	''	**739,364**	**1130**	**94**	**238**
			(Opr.	HA5ML)	
HA3RU	''	**566,350**	**1320**	**66**	**169**
HA7LM	''	448,024	968	71	207
HA5LZ	''	387,484	563	77	215
HA4XX	''	278,731	805	60	151
HA8XX	''	196,779	505	57	144
HA8IR	''	145,044	488	47	106
HA0HG	''	67,564	315	39	88
HA3HL	''	7,670	237	28	67
HA3GJ	''	6,336	55	17	31
HA1WD	''	4,479	63	15	29
HA1XR	''	2,575	36	12	13
HA3GQ	''	1,701	25	13	14
HA3MB	''	1,650	25	11	11
HA7RB	**14**	**104,037**	**449**	**29**	**82**
HA4ZX	''	37,686	270	17	49
HA8AT	''	19,035	224	13	32
HA0DD	''	17,360	156	12	44
HA5HH	''	11,088	129	10	34
HA3PT	**7**	**58,806**	**458**	**18**	**63**
HA9RT	**3.5**	**146,952**	**1030**	**26**	**78**
HA6NL	''	82,880	839	22	58
HA0VI	''	28,000	511	17	33
HA0IS	''	15,300	241	10	41
HA0EV	''	9,072	160	10	38
HA8CQ	''	6,401	158	9	28
HA5MM	''	4,554	153	7	26
HA8KVB	''	2,592	97	6	21
HA8LKK	''	663	43	5	12

ICELAND

TF3CW	**7**	**156,728**	**1020**	**22**	**66**

IRELAND

EI4DW	**A**	**95,030**	**336**	**46**	**124**
EI3DP	**21**	**36,224**	**361**	**16**	**48**

ITALY

I1XPQ	**A**	**250,020**	**530**	**73**	**175**
I0UZF	''	159,324	474	53	134
IK3FHL	''	31,365	202	26	59
I2ARC	**28**	**27,600**	**214**	**21**	**59**
I5MPN	**21**	**307,195**	**1000**	**37**	**94**
IK2DVG	''	214,049	778	34	87
I1KN	''	113,102	453	30	76
I2JIN	**14**	**137,700**	**558**	**27**	**73**
I03FIY	**7**	**348,612**	**1354**	**33**	**99**
I2MQP	''	112,575	664	23	72
I1XSG	''	55,389	472	16	56
I2YKV	''	8,304	120	13	35
I03JSS	**3.5**	**167,664**	**1226**	**17**	**67**
IY4FGM	**1.8**	**43,362**	**578**	**10**	**56**
			(Opr.	I4IKW)	
I2UBI	''	29,040	409	12	48
I1BAS	''	10,293	218	7	40

LUXEMBOURG

LX/DL1VJ	**A**	**106,088**	**473**	**42**	**107**
LX/DF4VS	**1.8**	**3,348**	**108**	**3**	**28**

NETHERLANDS

PA3BFM	**A**	**291,720**	**659**	**69**	**151**
PA3CXC	''	**141,390**	**425**	**50**	**116**
PA3BDK	''	105,336	352	45	126
PA3CWL	''	62,604	214	40	101
PA3CBZ	''	39,338	222	32	57
PA3BNT	''	30,094	143	29	53
PA3BTH	''	29,999	201	37	94
PA2REH	''	29,700	177	32	58
PI1GUE	''	10,450	79	24	31
PA3BZL	''	5,406	38	19	32
PA3CCF	''	5,358	35	25	32
PA0YN	''	3,510	80	12	33
PA0KHS	21	7,832	71	17	27
PA0UV	14	30,899	271	16	37
PA3DKX	''	20,776	162	14	42
PA3CEF	''	4,864	83	10	22
PA0LVB	**3.5**	**28,944**	**230**	**13**	**54**
PI5PVI	''	17,408	161	13	55

NORWAY

LA4YW	**A**	**121,218**	**415**	**45**	**133**
LA9XG	''	117,096	331	48	116
LA8CE	''	55,600	204	56	83
LA7SI	''	7,384	100	13	39
LA8CJ	''	5,106	59	17	29
LA1HCA	14	13,692	141	15	27
LA2IE	''	5,700	100	4	5
LA9HW	**7**	**37,051**	**458**	**13**	**54**
LA2CF	''	34,142	227	21	65
LA8WG	''	22,140	292	15	45
LA7JO	**3.5**	**65,824**	**752**	**21**	**68**
LA2EG	''	11,376	122	10	38

POLAND

SP2PDI	**A**	**680,640**	**1233**	**86**	**255**
			(Opr.	SP5GRM)	
SP7NJX	''	**201,846**	**427**	**62**	**172**
SP9DBA/9	''	**160,185**	**436**	**57**	**124**
SP3BYZ	''	145,440	460	54	106
SP9AKD	''	114,268	437	51	103
SP3PL	''	113,307	373	49	130
SP4EEZ	''	98,010	231	58	140
SP8AOJ	''	88,740	419	42	111
SP3BEJ	''	87,472	315	47	107
SP2BKF	''	31,369	131	28	99
SP9ZD	''	30,450	171	33	72
SP6CZ	''	24,095	136	31	74
SP8FNA	''	22,248	117	33	75
SP8AG	''	21,804	113	29	63
SP6FRF	''	21,672	231	26	46
SP9EOS	''	19,296	189	22	50
SP9MZH	''	18,630	147	20	61
SP3ZDB	''	18,088	225	19	57
SP3IOE/3	''	16,410	180	21	33
SP3AZO	''	15,980	122	28	57
SP9EEE	''	6,510	77	18	44
SP2BMX	''	6,462	37	25	29
SP3CDQ	''	6,216	53	19	23
SP5NX	''	6,118	71	16	21
SP2BMI	**21**	**34,470**	**147**	**26**	**64**
SP6BFK	''	28,272	145	26	50
SP3AOT	''	1,407	25	10	11
SP8DJL	**14**	**46,336**	**322**	**20**	**44**
SP4JSR	''	38,571	262	21	48
SP7FAH	''	20,700	196	14	31
SP7MGD	''	15,198	146	17	34
SP5GBJ	''	10,868	104	15	29
SP2HBP	''	9,633	117	13	26
SP4AVG	''	4,970	80	12	23
SP8HKT /5	''	2,737	55	8	9
SP5ARN	**7**	**77,086**	**406**	**29**	**80**
SP8NR	''	**67,410**	**395**	**24**	**81**
SP5JTR	''	56,661	320	24	77
SP5BWO	''	52,632	386	22	64
SP4GFG	''	38,152	380	18	58
SP6BVR	''	26,220	340	12	48
SP9CTW	''	25,012	225	16	58
SP9AOA	''	16,002	101	15	48
SP6CIK	''	15,994	122	15	57
SP9CVY	''	15,982	198	13	46
SP9IGY	''	12,890	160	12	43
SP6AYP	''	493	11	7	10
SP5CTY	**3.5**	**99,704**	**773**	**18**	**66**
SP3CCT	''	**97,272**	**1101**	**17**	**55**
SP6FER	''	**83,028**	**1069**	**13**	**55**
SP3HLM	''	26,496	240	14	58
SP6AZT	''	16,008	160	13	56
SP7LFT	''	1,340	65	6	14
SP5AD	**1.8**	**16,800**	**325**	**7**	**41**
SP5INQ	''	16,008	217	11	47
SP5GH	''	12,336	217	7	41
SP9DH	''	12,330	208	9	44
SP9GDB	''	10,665	237	7	38

PORTUGAL

CR3YL	**14**	**60,357**	**371**	**26**	**67**
			(Opr.	CT1YH)	
CT4DX	7	14,316	157	21	31
CT1AOZ	**1.8**	**43,416**	**408**	**12**	**42**

ROMANIA

YO8DDP	**A**	**364,452**	**1012**	**68**	**169**
YO2AQO	''	**235,578**	**706**	**62**	**155**
YO5AUV	''	130,637	519	56	113
YO2BP	''	74,200	563	25	81
YO5AAT	''	58,504	213	36	106
YO8PB	''	50,652	300	32	76
YO4BEX	''	41,760	243	31	89
YO4ZF	''	27,160	169	34	86
YO3CFF	''	13,860	104	29	61
YO6UX	''	12,137	152	22	31
YO9CYD	''	8,265	123	18	39
YO5BRZ	''	6,138	74	22	40
YO3KBC	''	2,898	52	16	26
YO4BQV	''	552	19	6	18
YO6ADM	''	210	7	3	7
YO6DDF	28	70	4	3	4
YO8BOI	21	4,558	39	19	24
YO8MI	''	1,248	34	6	10
YO4ATW	''	300	11	5	6
YO6VZ	**14**	**87,600**	**682**	**17**	**54**
YO3RF	''	59,976	273	29	73
YO9YE	**7**	**21,616**	**257**	**14**	**42**
YO5AVN	''	20,475	200	15	45
YO8GV	''	18,900	186	8	46
YO4BBH	''	5,565	120	7	28
YO4DCF	''	5,552	96	12	38
YO5CYH	**3.5**	**23,782**	**467**	**9**	**39**
YO9HP	''	21,306	262	12	41
YO8DOH	''	17,802	385	6	37
YO3AMC	''	10,710	272	7	31
YO6BTY	''	1,560	82	6	14
YO3KWJ	**1.8**	**61,466**	**587**	**12**	**61**
YO4KCA	''	26,300	430	10	40
YO9KAG	''	231	25	4	7

SARDINIA

IS0MH	**A**	**162,814**	**731**	**32**	**95**

SCOTLAND

GM3NHQ	**14**	**21,436**	**256**	**14**	**32**
GM3YOR	**3.5**	**72,310**	**727**	**15**	**55**

SICILY

IT9LMK	**21**	**20,735**	**176**	**19**	**46**

SPAIN

ED1CI	**A**	**513,600**	**964**	**64**	**150**
			(Opr.	EA1CIM)	
EA3FAA	''	**173,684**	**544**	**57**	**126**
EA3BOW	''	155,295	476	48	105
EA7XC	''	81,906	321	52	85
EA2CR	''	75,677	300	37	96
EA7AAW	''	48,642	302	52	82
EA4CPI	''	27,927	321	27	60
EA7AZA	''	17,280	100	37	59
EA4CQJ	''	14,616	93	26	46
EA5CKP	''	2,121	37	10	11
EA3DBO	''	1,922	28	14	17
EA3DWX	''	735	21	7	8
EA7BU	**28**	**5,106**	**62**	**14**	**32**
EA7BWN	21	3,549	47	15	24
EA4BV	''	1,139	29	7	10
EA7CFW	**14**	**274,789**	**1270**	**29**	**80**
EA3FKS	''	23,540	226	15	29
EA3CSX	''	2,024	53	6	17
EA7LM	7	8,055	121	11	34
EA2IA	**3.5**	**258,408**	**1397**	**28**	**83**
EA1NZ	''	14,841	141	11	40
EA7AIN	1.8	3,077	49	7	24

SVALBARD ISLAND

JW0A	**7**	**136,192**	**1043**	**23**	**63**

SWEDEN

SM5A0E	**A**	**271,488**	**684**	**64**	**160**
SM7WT	''	**197,035**	**353**	**73**	**178**
SM0COP	''	84,450	282	46	104
SM5RE	''	54,014	273	23	78
SM5DAC	''	46,306	182	32	105
SM7CNA	''	40,136	135	48	90
SM5BAX	''	34,800	129	46	70
SM6DUA	''	22,800	95	33	67
SM0CGO	''	20,586	119	33	61
SM0BDS	''	17,340	98	32	53
SM6PVB	''	12,285	101	23	40
SM6JY	''	9,993	165	17	31
SM7LAZ	''	6,681	85	17	34
SM3CBR	''	5,032	148	14	20
SM0MVX	''	221	10	6	7
SM0MRP	**28**	**294**	**14**	**3**	**10**
SM5AD	**21**	**64,400**	**239**	**27**	**78**
SM0KV/0	''	55,220	240	31	79
SM0CLE	''	20,898	116	22	59
SM5DUT	''	5,236	65	14	30
SM6LWH	**14**	**24,564**	**259**	**16**	**30**
SM0BVQ	''	19,116	173	17	32
SM7TV	''	16,900	145	18	32
SM5CBM	''	7,844	82	14	23
SM5UQ	''	7,828	125	12	26
SM0OFN	''	5,488	70	13	15
SM5DYN	''	4,704	112	10	22
SM0CCE	**7**	**70,830**	**549**	**22**	**68**
SM5DQC	''	6,642	58	20	34
SM3OII	''	2,415	60	8	27
SM2EKM	**3.5**	**154,464**	**821**	**26**	**70**
SM6BJI	''	82,902	712	16	66
SM3CVM	''	160	10	3	5

SWITZERLAND

HB9AGA	**A**	**636,768**	**1214**	**77**	**220**
HB9KC	"	135,056	389	52	132
HB9DDZ	"	106,492	414	48	110
HB9CXR	"	51,980	239	33	59
HB9QA	"	19,080	106	32	58
HB9AYZ	"	10,200	77	21	39
HB9CJG	**21**	**125,928**	**500**	**30**	**78**
HB9ZY	"	41,624	179	27	61
HB9DX	"	14,760	67	26	64
HB9CWZ	"	11,891	113	18	29
HB9CVO	14	18,172	189	14	30
HB9BPP	"	14,384	114	15	47
HB9CWA	**3.5**	**65,076**	**843**	**11**	**47**
HB9AMO	**1.8**	**95,201**	**740**	**17**	**66**

WALES

GW3JI	**A**	**239,412**	**675**	**52**	**161**
GW3MPB	**7**	**34,686**	**246**	**20**	**62**

YUGOSLAVIA

YU3EA	**A**	**942,288**	**1137**	**106**	**282**
YU2OB	"	**402,875**	**692**	**85**	**208**
YU7PXT	"	302,696	732	68	173
YU7SF	"	119,392	414	51	113
YU3CB	"	106,891	428	40	99
YU3MM	"	27,300	343	21	44
YU7ORQ	"	24,360	164	33	72
YU2LNF	"	22,144	251	15	49
YU1PQI	"	24	2	2	2
YU3ER	**28**	**4,032**	**55**	**11**	**31**
YU2LLL	"	264	17	4	8
YU2CT	**21**	**201,360**	**683**	**31**	**89**
YU1SZ	"	49,358	351	21	53
YU7MGU	"	15,555	117	22	39
YU1DX	**14**	**476,047**	**1451**	**37**	**106**
YT3A	"	**417,600**	**1222**	**36**	**108**
			(Opr. YU3BO)		
YU7AU	"	268,499	942	32	89
YU7RU	"	256,850	1025	31	79
YU7BJ	"	220,500	995	28	77
YU1KQ	"	159,520	943	24	56
YU1HA	"	100,881	555	27	72
YU4EJC	"	55,683	458	17	52
YU3TE	"	48,070	427	21	53
YZ9A	**7**	**637,144**	**2017**	**36**	**110**
YT3M	"	**472,102**	**1664**	**34**	**103**
			(Opr. YU3ZV)		
YU2AKL	"	120,201	732	27	78
YU3QI	"	113,564	979	31	85
YU2LCF	"	29,025	226	16	59
4N1A	**3.5**	**200,655**	**1911**	**24**	**81**
			(Opr. YU1OFQ)		
YU3RU	"	**141,944**	**1037**	**20**	**68**
4N3E	"	**131,024**	**1276**	**15**	**61**
			(Opr. YU3HAM)		
YU4EU	"	112,926	864	22	65
YU7PFR	"	61,855	486	20	69
YU7DVW	"	45	6	3	6
YU7BW	**1.8**	**46,209**	**527**	**14**	**59**
YU4YA	"	35,840	378	13	57

U.S.S.R. (EUROPEAN)

BYELO-RUSSIA

UC2OBB	**A**	**256,432**	**912**	**49**	**139**
UC2OM	"	206,848	657	54	148
UC2AFZ	"	110,536	505	41	123
UC2OT	"	58,058	236	45	109
UC2LCU	"	38,856	164	34	68
UC2SLR	"	16,320	90	22	46
UC2SLX	"	5,304	58	18	34
UC2LCW	"	2,061	63	10	23
UC2AW	21	10,788	70	20	42
UC2WBI	14	22,550	205	14	36
UC2AAD	**7**	**34,504**	**309**	**16**	**60**
RC2AB	**3.5**	**82,620**	**1013**	**12**	**56**
UC2WM	"	33,264	488	11	45
UC2OAR	"	17,157	321	7	36
UC2AA	**1.8**	**17,755**	**259**	**11**	**42**
UC2WAZ	"	**13,671**	**218**	**8**	**41**
UC2WO	"	11,968	225	6	38
UC2BA	"	667	25	5	18

ESTONIA

UR2RNG	**A**	**76,454**	**464**	**30**	**97**
UR2RND	"	50,850	202	46	104
UR2RBQ	"	15,912	127	20	52
RR2RX	"	5,978	44	20	41
UR2ROA	"	3,648	74	10	38
UR2RHF	"	3,550	27	24	26
RR2RR	"	897	13	11	12
RR2RW	**14**	**362,614**	**1428**	**32**	**86**
UR2FU	**7**	**138,575**	**745**	**31**	**84**
UR2RCU	"	**135,675**	**810**	**29**	**78**
UR2RCJ	"	5,400	107	7	33
UR2RFG	"	2,088	26	16	20
UR2RGN	**3.5**	**105,840**	**866**	**21**	**63**
UR2RER	"	65,450	627	17	68
UR2RAH	"	2,852	75	6	25
UR2RKO	"	2,280	76	5	25
UR2RU	**1.8**	**7,448**	**180**	**7**	**31**

EUROPEAN RUSSIA

UA4RZ	**A**	**785,902**	**1339**	**90**	**244**
UA6AF	"	**547,937**	**787**	**99**	**274**
RZ3AM	"	**374,256**	**883**	**77**	**199**
UA1ZO	"	**293,384**	**797**	**45**	**124**
UW3ZV	"	277,020	569	62	167
UA4CK	"	266,400	752	58	167
RA3RN	"	247,211	435	69	200
RW3AU	"	235,712	514	68	196
RA3VM	"	193,980	354	72	193
UA6LUE	"	193,256	624	47	149
UA4HDV	"	170,304	472	57	135
UA4CH	"	165,912	511	57	129
RW3DW	"	161,119	468	63	160
RV6AA	"	131,880	785	44	124
UA1AFM	"	123,032	568	45	124
UA4AIY	"	120,048	451	47	117
UA1QCM	"	106,500	464	38	112
UA6BFI	"	104,676	554	36	107
UA6BJQ	"	100,200	516	35	115
UA1ANA	"	91,635	444	30	93
UA4ALI	"	91,360	340	52	108
UA4HFK	"	86,728	289	47	101
UA4WCE	"	84,348	400	34	98
RA4PM	"	68,445	405	44	125
UA3LAR	"	59,408	190	50	108
UA3TCJ	"	57,875	192	40	85
UA3GGQ	"	36,948	256	27	78
UA3ECJ	"	36,640	250	21	59
UA6ARX	"	34,450	187	34	72
UA3OOQ	"	33,820	233	26	63
UA3UCD	"	33,024	245	29	67
UA3TBY	"	31,668	220	21	63
UA6LFQ	"	26,040	216	22	71
UA3GEC	"	24,695	289	17	38
UA3TGO	"	21,840	183	27	64
UV3DN	"	21,357	250	17	46
RZ3DM	"	20,475	102	30	75
RA3DVC	"	20,119	127	14	45
UW4CN	"	18,912	123	30	66
RZ3DZ	"	15,662	115	18	64
RA6AJQ	"	15,028	180	14	38
UA3DMJ	"	14,280	109	30	54
UA4ANZ	"	12,851	93	25	47
UA4CAR	"	12,844	126	16	47
RV6AF	"	11,826	83	25	56
UA4SSS	"	11,431	114	24	47
UA1AUA	"	9,804	98	20	37
UA1CFF	"	7,632	162	14	36
UA6BJB	"	7,360	160	14	32
UA1DF	"	7,038	54	19	32
UA3QLJ	"	6,027	95	18	23
UA4CDL	"	4,631	76	18	32
UA1CED	"	3,999	96	11	32
UA1ABB	"	3,043	230	11	15
UA3TF	"	754	45	11	11
UA3SET	"	672	26	9	19
UA6LQ	**28**	**1,200**	**31**	**7**	**18**
UA6APU	"	260	8	6	7
UA3RMN	"	16	2	2	2
UA4WBG	**21**	**66,928**	**432**	**25**	**64**
UA6LCN	"	**65,145**	**328**	**28**	**73**
UA6ED	"	50,078	329	28	70
UA4LCH	"	32,984	272	20	56
RA3VA	"	14,539	92	21	46
UA3TAM	"	13,862	133	17	41
UA3XBB	"	12,152	96	18	44
RA6LE	"	7,262	92	16	38
UA4WI	**14**	**200,236**	**958**	**31**	**82**
UA4WBV	"	**168,080**	**748**	**30**	**80**
UA4LBF	"	159,948	781	28	80
UA3YAO	"	51,988	345	22	60
UA4LCR	"	39,606	574	17	52
UA1QBV	"	32,850	235	18	55
UA3ABT	"	30,083	279	18	49
UA6BPM	"	29,512	269	17	45
UA1FV	"	29,500	310	18	41
UA3AGF	"	29,463	255	16	45
UA6AG	"	20,160	163	19	51
UA4NFX	"	13,120	257	11	30
UA3DCX	"	9,100	144	11	28
UA4ANR	"	5,292	74	14	28
UA3TZ	"	4,752	86	9	27
UA3XN	"	2,296	40	10	18
UA4WF	"	2,158	55	8	18
UZ3TG	"	1,173	51	7	16
UA3QPW	"	546	26	7	7
UA3SCH	"	42	3	3	3
UA1DZ	**7**	**406,080**	**1489**	**35**	**106**
UA1ALZ	"	**294,264**	**1054**	**35**	**99**
RA1AO	"	191,471	894	34	85
RA4HC	"	137,598	699	29	73
UA4WPX	"	98,382	442	33	81
UA3QBX	"	52,516	474	16	60
UA3GDJ	"	19,040	180	16	40
UA4LDJ	"	14,250	196	14	43
UA3AOF	"	9,282	149	13	38
UV6ACM	"	8,640	62	17	43
UA3TDR	"	6,118	126	9	29
UA1AKC	"	1,593	49	5	22
UA1ZFT	"	750	18	8	7
UA3LBE	"	322	13	5	9
UA6WAV	"	282	14	3	6
RA3DX	**3.5**	**87,892**	**722**	**19**	**67**
UA4HNP	"	**73,950**	**593**	**19**	**68**
RA1AL	"	59,676	593	17	59
UA4QM	"	51,546	475	14	57
UA1PAO	"	39,215	393	14	41
UW3UO	"	24,339	348	10	47
UA4AO	"	23,265	315	9	46
UA3XDS	"	21,054	347	10	48
UA4WEJ	"	20,300	258	9	41
UA6AS	"	15,008	186	11	45
UA3TGC	"	14,742	274	7	35
UV6AY	"	13,248	22	8	40
UA3BK	"	5,670	109	7	35
UA3XBY	"	2,898	74	9	37
UA4FMO	"	2,704	66	6	20
RA6AOS	**1.8**	**13,488**	**200**	**10**	**38**
UA4CLV	"	**9,912**	**184**	**8**	**34**
UW3QR	"	9,912	131	9	50
UA4NFV	"	8,843	156	8	29
UW3GL	"	5,966	105	7	31
UW6OE	"	5,883	129	7	37
UA3YBJ	"	4,472	79	8	35
UV3QNO	"	4,315	107	6	29
UA3RFZ	"	2,883	79	6	25
UA4PLS	"	1,955	80	6	17
UV6AGF	"	1,092	34	5	16
UA3ATV	"	820	32	6	14

KALININGRAD

RA2FC	A	13,588	111	12	29
UA2EC	**1.8**	**12,555**	**248**	**6**	**39**

KARELIA

RA1NA	**A**	**279,770**	**911**	**59**	**143**
UA1NAY	"	24,931	154	32	75

LATVIA

UQ2PQ	**A**	**590,548**	**1260**	**78**	**244**
UQ2GDL	"	**357,244**	**879**	**70**	**198**
UQ2GMR	"	344,864	994	58	150
UQ2GT	"	344,214	984	60	174
UQ2GEO	"	56,700	256	31	95
UQ2GD	"	32,870	201	30	65
UQ2GQ	"	7,100	84	16	34
UQ2GIA	"	4,336	119	21	55
UQ2HO	21	11,900	78	20	48
UQ2GCW	"	7,847	49	23	36
UQ2GP	7	15,210	100	21	57
UQ2GJV	**3.5**	**34,148**	**506**	**10**	**49**
UQ2GGE	"	16,907	273	10	43
UQ2GBJ	"	11,567	236	6	37
UQ2GCP	"	4,168	106	6	28
UQ2GHB	"	627	25	4	15
UQ2GMB	**1.8**	**8,034**	**176**	**7**	**32**
UQ2GNL	"	5,950	152	6	29
UQ2MU	"	3,808	101	6	26

LITHUANIA

UP2BIM	**A**	**2,150,640**	**2162**	**124**	**391**
UP2BO	"	**1,235,616**	**2027**	**87**	**279**
UP2NK	"	**777,960**	**1244**	**92**	**268**
UP2PAW	"	221,123	621	65	152
UP2BKT	"	196,184	807	42	137
UP2PAQ	"	191,070	588	56	142
UP2DV	"	155,636	512	51	138
UP2BLF	"	149,942	713	45	113
UP2BB	"	98,670	512	32	98
UP2BDO	"	46,731	298	31	80
UP2BPO	"	46,117	319	24	83
UP3BC	"	21,525	151	25	50
UP2BIP	"	11,620	78	27	43
UP2BNL	"	3,420	134	11	33
UP2NX	"	1,472	22	11	12
UP2DT	**14**	**101,600**	**630**	**22**	**58**
UP2PCI	"	**61,334**	**324**	**22**	**69**
UP2BNR	"	9,801	136	13	20
UP2BKA	**7**	**85,500**	**631**	**23**	**72**
UP2BIW	"	**67,500**	**489**	**22**	**78**
UP2BLE	"	40,964	278	23	75
UP2BEI	**3.5**	**75,150**	**685**	**17**	**58**
UP2BHN	"	**62,472**	**650**	**15**	**61**
UP2OO	"	40,548	462	12	50
UP2BBI	"	34,100	534	10	45
UP2CT	"	30,508	453	9	49
UP2BH	"	27,702	413	10	44
UP2NC	"	8,512	207	7	31
UP2BGR	"	2,030	63	6	23
RP2BIL	**1.8**	**9,087**	**223**	**6**	**33**
RP2BID	"	774	40	5	13
UP2BEN	"	765	40	5	12

MOLDAVIA

UO5OJO	7	3,430	84	8	27
UO5GR	**3.5**	**18,900**	**203**	**10**	**44**
UO5OJM	**1.8**	**8,190**	**182**	**6**	**33**

UKRAINE

UB5EC	**A**	**1,468,310**	**2158**	**102**	**307**
RB5MF	"	**759,304**	**1260**	**95**	**269**
RB5IA	"	**521,236**	**1045**	**73**	**238**
RB5GW	"	492,030	598	102	324
UT4UWK	"	477,048	1170	64	200
RB5ID	"	471,129	1015	81	210
UB5QKQ	"	405,450	887	59	196
UB5IJA	"	319,347	729	67	192
UY5TE	"	249,948	754	59	153
RT4UN	"	248,066	695	55	148
UB5IAN	"	241,782	931	38	139
UB5QJI	"	228,750	786	42	141
RB5EX	"	209,844	646	51	150
UB5UEG	"	133,734	426	44	142
UB5EF	"	109,836	470	46	116
UB5UHJ	"	98,696	352	39	107
UB5DW	"	98,235	274	52	125
RB5EV	"	93,789	420	45	108
UB5III	"	91,356	330	41	97
UB5TN	"	85,244	207	60	151
UB5UHT	"	67,203	325	30	101
UT5UGR	"	65,296	208	39	115
UB5VK	"	60,915	251	37	94
UB5LAL	"	57,876	195	39	117
RB5ML	"	49,200	276	27	93
UB5TCJ	"	49,050	191	34	75
UY5YY	"	48,372	256	35	104
UB5DAV	"	46,863	216	31	96
UB5IPH	"	38,412	233	25	74
UB5KDD	"	37,278	162	39	70
UB5KBV	"	33,390	138	37	68
UY5GM	"	32,315	127	46	69
UB5HKW	"	29,145	196	25	62
RB5UU	"	24,430	210	24	46
UB5EPA	"	20,712	174	20	51
UB5KG	"	20,520	99	30	60
UB1RR	"	17,780	204	28	40
UB5RDZ	"	12,702	120	19	54
UB5EFA	"	12,240	74	27	58
UB5ZFE	"	8,510	57	30	44
UB5TCS	"	6,642	123	20	34
UB5AEZ	"	6,077	162	21	44
UB5EIT	"	5,703	117	27	78
UT5HP	"	5,665	62	16	39
UB5KEG	"	5,000	75	17	33
RB5AE	"	4,466	136	19	39
UB5XX	"	2,812	55	9	28
UB5TAT	"	1,156	20	14	20
UT5UCM	"	238	10	7	7
RB5IOV	"	108	24	4	5
UB5TAU	**21**	**41,280**	**216**	**24**	**62**
RB5LM	"	27,297	165	23	58
RT5UO	"	18,328	95	24	55
UB5ZR	"	11,978	97	16	37
UB5ZFX	"	4,218	76	9	28
RB5IY	"	1,749	23	12	21
UB5WE	**14**	**258,512**	**897**	**33**	**93**
UB5NQ	"	**219,500**	**870**	**33**	**92**
RB5LO	"	182,400	732	32	88
UB5WBX	"	101,192	536	24	67
UB5ZCW	"	93,141	601	21	58
UB5CN	"	60,960	350	19	61
UB5IRM	"	55,327	451	18	43
UB5QBC	"	55,020	323	21	63
UB5BZ	"	52,546	249	24	62
UB5SBF	"	49,282	311	24	58
UB5JNW	"	43,778	418	13	46
UB5WCV	"	33,051	238	19	50
UB5IOD	"	27,738	193	21	46
UB5QIG	"	23,954	223	18	41
UB5CCP	"	20,880	259	14	34
UB5EW	"	13,810	140	17	32
UT4UI	**7**	**256,399**	**1005**	**33**	**88**
UB5CE	"	**119,280**	**625**	**30**	**82**
RB5MA	"	107,463	540	33	80
UB0YR	"	102,752	598	22	82
RB5MM	"	95,600	533	28	72
UB5KW	"	69,466	471	23	71
RB4IRO	"	49,998	380	22	56
UB5MEG	"	38,500	317	22	55
UB5QMA	"	37,650	305	19	56
UB5CEI	"	33,892	253	19	55
UB5IBV	"	24,864	187	20	54
UB5ITW	"	20,894	214	15	47
UB5EEP	"	20,625	252	12	43
UB5IOJ	"	18,088	188	14	42
UB5IDA	"	10,918	105	14	39
UT4UX	"	10,492	112	14	39
UB5KAG	"	1,836	36	8	19
UB5SBR	"	1,710	43	6	24
UB5NFD	"	864	49	5	11
UB5IIA	**3.5**	**74,700**	**711**	**18**	**65**
RT4UF	"	**71,346**	**786**	**12**	**54**
RB5JI	"	**66,880**	**707**	**16**	**60**
UB5UKH	"	47,784	501	12	54
UB5FAN	"	35,860	612	8	48
UB5MLP	"	35,778	392	14	53
UB5ISX	"	33,001	412	12	49
UB5WCF	"	30,682	421	10	48
UB5RS	"	21,788	341	10	42
UB5UIZ	"	21,300	372	9	41
UB5IHQ	"	21,041	318	10	43
UT5XW	"	19,396	278	11	41
UT5UGN	"	9,016	146	7	42
UB5QEB	"	8,646	197	11	22
UT5UHU	"	1,512	72	6	15
UT5JBG	"	512	27	6	10
RT5UY	**1.8**	**30,956**	**355**	**13**	**58**
UB5ZAL	"	**28,288**	**332**	**13**	**51**
RT4UA	"	19,883	292	11	48
UB5DAX	"	16,933	296	7	44
UB5WCO	"	14,798	270	8	41
RB4IVG	"	2,958	111	7	22
UT4UR	"	2,336	61	7	25
UB4JCV	"	760	34	5	15

OCEANIA

AMERICAN SAMOA

AH8A	**A**	**1,218,400**	**1935**	**82**	**118**
			(Opr. W6OSP)		

AUSTRALIA

VK2BQQ	**A**	**380,017**	**697**	**74**	**119**
VK5GZ/P	"	21,432	171	24	33
VI3KS	"	2,325	53	9	6
VK6AJ	**21**	**233,100**	**882**	**25**	**65**
VI4XA	"	219,120	942	28	55
VK2APK	**14**	**280,497**	**868**	**31**	**80**
VK4TT	"	47,520	244	25	41
VK3MJ	**3.5**	**13,572**	**66**	**17**	**12**
VK6HD	**1.8**	**12,330**	**97**	**19**	**26**

FRENCH POLYNESIA

FO8JP	**21**	**59,052**	**480**	**17**	**25**

GUAM

NY6M/ KH2	**A**	**1,545,768**	**2116**	**94**	**158**

HAWAII

KH6RS	**A**	**760,548**	**1416**	**86**	**97**
					(Opr. AH6AZ)
WH6W	**21**	**53,145**	**408**	**19**	**26**
KH6MD	**14**	**610,722**	**1640**	**37**	**89**
					(Opr. N6HR)
K8MR /KH6	7	126	7	3	3
KH6CC	**1.8**	**23,746**	**257**	**15**	**16**

INDONESIA

YB8ARA	**A**	**1,714,405**	**1898**	**104**	**201**
YB3ATB	"	325,422	623	59	120
					(Opr. PAØLOU)
KA7KSY /YB	"	128,684	408	45	61
YC2FEA	"	78,064	215	50	86
YB4FNN	**21**	**118,746**	**493**	**24**	**57**
YCØBRX	"	45,024	218	24	43
YC2FEE	"	18,900	114	23	37

KERMADEC ISLANDS

ZM8OY	**21**	**314,880**	**1304**	**26**	**56**

MARSHALL ISLANDS

KX6DS	**1.8**	**14,246**	**150**	**16**	**18**

NEW ZEALAND

ZL1AIZ	**A**	**59,052**	**188**	**46**	**68**
ZL2BDC	"	2,772	36	13	15

PHILIPPINES

WA7CQE /DV2	**21**	**70,928**	**465**	**17**	**35**
KD6TB /DU2	7	9,432	91	13	23

SAIPAN

NH6J/KH8	**A**	**3,334,986**	**3721**	**112**	**190**

SOUTH COOK ISLANDS

ZK1XU	A	90,043	262	56	71
					(Opr. W7TB)
ZK1XT	**21**	**225,432**	**1224**	**22**	**40**
					(Opr. K5BDX)
ZK1XR	14	1,360	30	11	9
					(Opr. KG6AO)

ARGENTINA

LU8DQ	**A**	**3,989,814**	**3030**	**134**	**315**
LU6UO	"	**348,530**	**890**	**70**	**122**
LU1EWL	"	231,819	557	59	88
LU7JI/J	"	29,526	214	46	65
LU4FDM	**21**	**561,200**	**1654**	**30**	**85**
LU1DZ	"	26,502	223	14	28

BRAZIL

PT7AA	**A**	**109,142**	**451**	**23**	**59**
PY2KP	"	70,224	201	57	75
PY2OHJ	"	13,160	73	33	37
PY1DUB	"	11,178	85	20	26
PY4WS	"	8,468	55	28	30
PT7CG	"	960	24	10	10
PY3BC	28	1,936	35	11	11
PY4WAS	**21**	**98,900**	**399**	**27**	**59**
PT7DX	**14**	**71,442**	**383**	**25**	**56**
PY5AKW	"	9,996	77	18	31
PY1AYE	"	6,897	77	16	17
PY2PNA	"	3,675	57	17	18

CHILE

XQ1ADG	**A**	**234,156**	**727**	**45**	**69**
CE4GQS	"	20,853	136	34	29
CE5CNT	"	20,240	129	24	31
CE3DNP	**21**	**752,496**	**2086**	**31**	**91**
CE2BFR	**14**	**42,284**	**311**	**27**	**35**
CE6GEY	7	11,760	97	16	26

COLOMBIA

HK1AMW	**A**	**1,267,032**	**1781**	**82**	**166**
HK1HHX	**7**	**274,122**	**952**	**24**	**73**

EQUADOR

HC1BI	1.8	3,780	92	6	8

NETHERLAND ANTILLES

PJ2FR	**A**	**5,434,550**	**4071**	**123**	**328**
			(Opr. W8ZF)		

PERU

OA4ZV	**A**	**940,168**	**1299**	**89**	**159**

TRINIDAD

9Y4VT	**A**	**5,676,536**	**4646**	**122**	**290**
			(Opr. OH2BH)		

URUGUAY

CX5AO	**21**	**1,300,025**	**2949**	**37**	**112**

VENEZUELA

YV5TK	**A**	**4,839,410**	**3444**	**134**	**332**
			(Opr. K5GN)		
K3UOC /YV4	"	1,168,272	1637	85	159
YV7QP	28	2,664	49	10	14
YV5JUX	21	23,403	273	9	20
YV4ABR	"	4,354	107	7	7
YX5A	**14**	**1,065,860**	**2637**	**33**	**104**
YV3AGT	**1.8**	**147,588**	**591**	**21**	**63**
YV1OB	"	51,042	365	12	35

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

UNITED STATES

K1KI	**3,477,100**	**2180**	**134**	**416**
KM1C	**2,251,770**	**1656**	**120**	**350**
K1XM	1,610,046	1359	114	300
KY1H	1,024,380	1138	89	226
AK1L	459,796	574	79	205
WB1CNM	46,965	303	49	106
N2RM	**2,893,366**	**1875**	**130**	**407**
N2PP	**1,495,713**	**1300**	**108**	**301**
K2NJ	1,461,465	1202	113	310
KU2C	873,633	825	118	263
W2UI	329,807	449	81	190
K2TD	314,784	402	85	203
N3ED	**2,905,875**	**1777**	**138**	**429**
K3OO	**2,530,456**	**1626**	**138**	**398**
KT3M	1,809,804	1584	111	291
K3NZ	1,217,160	1075	116	276
W3AP	1,026,292	874	116	296
KB3MM	736,848	751	96	248
K3MD	615,940	741	90	209
W3GU	574,992	676	88	209
K3WJV	353,726	433	91	207
W3MA	306,504	424	82	176
K3SO	165,807	303	63	144
W4WJ	**564,566**	**617**	**113**	**245**
WA4CTC	**453,120**	**516**	**103**	**217**
WI4R	416,712	555	93	198
WA4QQV	384,769	551	89	174
WZ4Z	357,870	435	98	204
W4LVM	270,144	391	82	170
W4OO	260,568	351	97	185
K8UNP/4	256,680	351	93	183
KA4EQW	154,508	264	69	145
WS4E	143,252	264	81	155
W2SR/4	124,865	214	75	146
W4PRO	122,100	236	60	125
WB4BBH	111,607	181	81	152
K5OTI/4	94,954	177	64	133
W4KO	56,304	144	46	92
K4LW	8,254	83	35	64
KB4LN	1,736	24	11	17
K5RR	**1,039,346**	**954**	**118**	**279**
W5ASP	464,646	638	84	175
N6ND	**2,031,253**	**1617**	**143**	**296**
N6VR	**1,319,921**	**1474**	**102**	**211**
K6ZM	1,297,545	1316	120	225
N6AW	1,258,631	1275	117	224
WB6FDQ	528,480	656	107	181
W6BIP	513,450	670	111	204
WK6V	398,360	658	88	142
W6BJH	346,764	564	84	129
K6BWX	26,208	98	41	55
KI6T	18,423	101	31	38
K7LXC	**921,552**	**1243**	**96**	**167**
NC7K	341,226	626	84	129
W8GWC	**1,825,634**	**1413**	**123**	**326**
WD8IXE	**1,547,535**	**1302**	**121**	**294**
N8ET	163,842	356	54	112
K9ZO	**1,114,182**	**977**	**126**	**297**
N9WA	270,744	432	74	158
W9CA	70,970	177	59	93
KA9P	44,261	265	62	117
K4VX/Ø	**2,716,780**	**1867**	**142**	**388**
NØGA	559,599	663	96	213
WØNA	306,070	470	80	161
KJØG	195,592	383	64	120
NMØF	189,388	296	79	147

BARBADOS

8P9AG	**807,225**	**1490**	**72**	**163**

BELIZE

V3A	**5,068,554**	**4362**	**141**	**373**

CANADA

VO2WL	**886,049**	**4539**	**63**	**128**
VE2UMS	352,640	1016	49	96
VG3IY	**1,763,784**	**2011**	**110**	**264**
VE3JW	8,908	122	14	20
VG4ALO	**437,400**	**1322**	**61**	**101**
VE6CSE	13,630	137	25	22

PUERTO RICO

KP4BZ	**4,992,390**	**4612**	**117**	**325**

SABLE ISLAND

CYØSAB	**3,316,973**	**4039**	**95**	**252**

AFRICA

MADEIRA ISLANDS

DF8ZH/CT3	**2,251,956**	**2283**	**87**	**245**

NAMIBIA

ZS3/W6QL	**1,722,951**	**2343**	**70**	**189**

ASIA

PEOPLES REPUBLIC OF CHINA

BY1PK	**579,924**	**2032**	**61**	**117**
BY4AA	**281,214**	**1139**	**64**	**89**
BY8AA	**114,912**	**686**	**35**	**73**
BY5RA	**95,942**	**1012**	**35**	**42**

INDIA

VU2TEC	**30,690**	**212**	**20**	**35**

JAPAN

JA1YBK	**1,774,676**	**1787**	**119**	**242**
JS1JRZ	**1,242,362**	**1506**	**111**	**187**
JA1YAD	731,340	1075	97	158
JA1YFG	485,780	822	91	136
JA1YAG	81,065	233	68	87
JA1YCL	70	20	8	6
JE2YRD	**970,088**	**1461**	**90**	**148**
JA2YDC	311,634	620	76	123
JA2YKD	27,413	131	35	44
JA8YAU	**457,532**	**807**	**86**	**128**
JA8YBY	56,286	205	43	63

THAILAND

HSØA	**1,978,767**	**3034**	**102**	**241**

U.S.S.R. (ASIATIC)

UZ9AYA	**3,881,148**	**2745**	**126**	**377**
UZ9SWY	**2,085,440**	**1903**	**102**	**290**
UZ9CWA	1,132,305	1453	77	208
UZ9OWE	406,526	932	49	132
UZ9XWA	315,720	653	50	130
UZ9CYP	313,467	699	52	125
UZ9OWD	256,816	914	40	86
UZ9OXM	197,575	556	63	112
UZ9OXI	100,495	552	40	61
UZ9XWW	228	9	6	6
UZØCWA	**781,334**	**1634**	**90**	**137**
UZØAWB	**681,724**	**1077**	**81**	**161**
UZØQWA	599,890	1290	85	154
UZØCWO	291,166	865	80	117
UZØLWO	271,284	658	78	110
UZØLWX	255,510	939	45	122
UZØQWE	185,697	520	46	95
UZØQWF	131,906	472	30	86

ARMENIA

UG7GWL	**2,519,400**	**2763**	**87**	**236**

AZERBAIJAN

UD7DZA	61,110	219	35	70
UD7DWZ	30,958	230	10	36

KAZAKH

RL8PYL	**3,618,897**	**2874**	**133**	**354**
UL8LWA	735,300	1460	50	130
UL8LWU	103,536	431	36	77

TURKOMAN

UH9AWE	**32,524**	**244**	**11**	**36**

UZBEK

UI9AWX	**610,926**	**1059**	**70**	**163**
UI9BWI	303,456	692	55	119

EUROPE

BULGARIA

LZ2KTS	**4,252,248**	**3392**	**155**	**461**
LZ1KNP	339,819	884	59	166
LZ1KTM	315,864	612	66	148
LZ1KVF	308,788	529	73	166
LZ1KRC	100,620	738	42	75
LZ2KMM	41,697	195	35	78
LZ1KKR	26,660	223	26	50

CZECHOSLOVAKIA

OK5R	**3,865,496**	**3178**	**141**	**443**
OK5W	**2,538,892**	**2369**	**125**	**384**
OK3KAG	1,467,525	2025	103	322
OK3KCM	1,066,736	1872	91	228
OK3RJB	695,652	1179	89	259
OK5SSM	401,580	1025	66	164
OK3RKA	359,900	712	70	166
OK1OAZ	344,469	1020	51	148
OK2KMR	240,856	750	55	132
OK3KTD	227,424	706	59	147
OK3KYR	161,568	447	48	128
OK1KQJ	151,962	368	58	128
OK1ORA	129,762	346	50	128
OK1KZD	122,108	470	46	132
OK1KLV	101,170	407	38	96
OK3KGQ	41,850	300	20	55
OK3KZA	41,607	421	20	47
OK2KPS	35,245	289	26	69
OK1KOK	34,755	190	30	75
OK2KLI	27,768	175	31	73
OK2KHF	20,064	270	13	63
OK3KHO	7,515	98	15	30
OK3KSQ	3,328	65	8	18

ENGLAND

GB4DX	**2,456,524**	**2879**	**108**	**305**

FINLAND

OH2VY	**2,377,151**	**2415**	**129**	**368**
OH8AV	**1,833,350**	**2312**	**90**	**280**
OH6AW	1,107,478	1793	88	226
OH2BAH	361,678	789	77	201
OH9AB	182,546	595	47	135
OH5AF	73,659	278	40	89
OH6AA	27,864	154	34	74

FRANCE

F5IN	**3,403,656**	**3168**	**124**	**368**

GERMANY (FRG)

DKØTU	**1,284,840**	**1614**	**106**	**281**
DLØIU	**1,020,006**	**1394**	**95**	**256**
DKØMM	963,558	1256	108	290
DFØAFZ	780,192	1307	87	237
DA1WA	522,518	1028	78	196
DLØLR	502,202	940	79	214
DL1FC	371,168	840	60	184
DF4RD	248,976	526	68	166
DLØER	225,412	681	60	128
DF6WR	222,604	618	62	140

GERMANY (GDR)

Y33ZL	**1,217,115**	**2173**	**99**	**288**
Y45ZM	160,380	486	56	124

HUNGARY

HG6N	**3,403,056**	**3470**	**127**	**369**
HG7B	**3,091,548**	**3253**	**125**	**357**
HG5A	**3,043,782**	**3039**	**127**	**366**
HG9R	2,774,904	2825	130	376
HA6KNG	1,150,560	2016	86	196
HG8U	815,300	1405	81	229
HA7KLG	802,990	1518	81	214
HA3KNA	779,868	1329	92	232
HA2KMR	579,072	1439	64	192
HA8KUC	521,118	1323	69	165
HA5KDX	478,066	845	91	211
HA8KAX	431,460	851	80	190
HA5KFZ	238,648	802	59	125
HA6KNX	155,680	563	45	115
HA7KMP	137,760	506	52	112
HA8KCK	116,433	502	42	111
HA8KUN	86,800	387	41	99

JERSEY

GJ0AAA	**2,987,988**	**3635**	**110**	**343**

LIECHTENSTEIN

HB0CVQ	**760,194**	**2202**	**64**	**205**

LUXEMBOURG

LX9BV	**662,354**	**1566**	**64**	**189**

NETHERLANDS

PA3DQW	**249,150**	**1002**	**46**	**119**
PA0KOR	183,654	444	56	123

NORWAY

LA5X	**1,643,895**	**2179**	**105**	**346**

POLAND

SP6PAZ	**1,149,632**	**1653**	**93**	**259**
SP5PBE	**981,704**	**1504**	**95**	**233**
SP1PEA	333,648	835	69	183
SP6KSD	175,957	604	47	132
SP9KAQ	13,800	146	27	42
SP7KTE	3,650	40	18	32

ROMANIA

YO5KTB	22,560	131	18	62

SPAIN

EA3VY	**3,391,388**	**3484**	**123**	**361**

SWEDEN

SK6TW	**1,095,192**	**1988**	**87**	**241**
SK2AU	669,146	1541	69	209
SK5EU	518,425	1451	62	171
SK6EI	268,755	754	66	139
SM6DYK	225,036	840	47	124

SWITZERLAND

HB9AJ	**398,088**	**1115**	**66**	**162**

UN-VIENNA

4U1VIC	**38,088**	**306**	**23**	**46**

YUGOSLAVIA

YT2R	**1,449,920**	**1911**	**102**	**292**
YT3T	**1,363,401**	**1889**	**103**	**284**
YU3AI	933,524	1562	78	214
YT2C	744,030	1354	80	235
YU3GHI	113,760	494	41	117
YU3DFT	19,434	120	27	52

USSR (EUROPEAN)

BYELO-RUSSIA

UC1AWC	**683,602**	**1448**	**85**	**193**
UC1OWA	201,299	658	50	143

ESTONIA

UR1RWX	**2,620,691**	**2865**	**127**	**380**
UR1RYY	415,777	902	73	204

EUROPEAN SSR

UZ4FWO	**3,046,956**	**2763**	**144**	**419**
UZ6LWZ	**1,783,960**	**1979**	**132**	**383**
UZ4WWB	**1,049,792**	**1639**	**97**	**279**
UZ3AXH	571,298	1182	78	223
UZ3AYR	507,318	1011	74	208
UZ1TWB	419,328	1137	58	194
UZ3WWW	378,852	824	72	190
UZ3AZM	318,375	915	54	171
UZ3AXX	313,922	1007	64	174
UZ3AWP	287,976	951	63	150
UZ4LWU	227,162	728	46	128
UZ3DXW	184,275	810	46	129
UZ3SWW	101,960	416	52	143
UZ3AZG	77,625	399	31	84
UZ3QWM	74,354	430	40	73
UZ3DZW	42,409	304	35	73
UZ3QXU	27,370	218	27	58
UZ3DWX	13,035	92	21	58
UZ3XWN	9,212	135	10	39
UZ3XWM	4,644	56	12	31
UZ4FWE	2,805	57	5	12
UZ3TWT	173	7	6	7

FRANZ JOSEPH LAND

RZ1OWA	**20,210**	**155**	**21**	**26**

KALININGRAD

UZ2FWA	**1,958,264**	**2342**	**116**	**368**
UZ2FWN	56,498	407	29	77

LATVIA

UQ1GWW	**2,133,515**	**2236**	**122**	**363**
UQ1GXN	**1,864,408**	**2290**	**105**	**298**
UQ1GXT	48,574	203	50	99

LITHUANIA

UP1BWW	**1,472,310**	**2166**	**100**	**299**
UP1BZM	**1,087,768**	**1543**	**95**	**281**
UP1BYW	200,376	667	45	151
UP1BWB	162,583	550	54	145
UP1BWF	84,800	595	26	80
UP1BXA	2,508	50	12	26

UKRAINE

UB4QWW	**1,299,942**	**1940**	**100**	**299**
UB4XWB	**910,052**	**1137**	**106**	**301**
UB4WZA	676,814	1140	85	242
UB4MWA	658,287	1290	84	217
UB4QWE	228,888	866	49	138
UB4LZA	218,685	799	42	141
UB0SZZ	196,380	808	42	138
UB4QXU	184,518	720	40	122
UB4ZWC	104,902	630	27	91
UB4IYU	104,310	342	52	138
UB4MWU	60,452	302	30	89
UB4IWN	43,568	267	29	83
UB4IWC	15,662	124	27	55
UB4DWW	10,804	207	10	37
UB4MZK	7,685	67	16	37
UB4IWR	3,060	58	16	36
UB4TWQ	957	17	13	16

OCEANIA

HAWAII

KH6XX	**4,212,528**	**4212**	**137**	**235**
K4TEA/KH6	2,124,100	2638	112	163

NEW ZEALAND

ZL2WB	29,440	160	32	32

PHILIPPINES

DX2F	**721,791**	**1537**	**66**	**105**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES

N2AA	**8,770,631**	**4577**	**149**	**510**
W3LPL	**7,011,840**	**3756**	**153**	**487**
N5AU	**5,374,392**	**3082**	**162**	**442**
K2TR	**4,853,520**	**2988**	**145**	**422**
K1RX	**4,348,222**	**2904**	**124**	**399**
N3RS	**4,030,565**	**2518**	**135**	**416**
W3GM	3,986,010	2427	144	423
KS8S	**3,874,156**	**2417**	**146**	**426**
N6RO	**3,844,173**	**2841**	**157**	**344**
W0AIH/9	**2,453,688**	**1971**	**139**	**338**
N6TU	2,786,544	2202	137	307
K5LZO	**2,308,941**	**1795**	**140**	**313**
N4ZC	**1,849,108**	**1601**	**111**	**287**
W6TMD	1,671,102	1695	125	228
K6TQ	930,258	1014	108	213
N3LR	667,185	806	90	195
W3NX	418,077	499	92	217

ALASKA

NL7G	**3,604,935**	**4330**	**121**	**214**

ANTIGUA

V2A	**7,463,449**	**6209**	**134**	**363**

AFRICA

CEUTA

EA9CE	**9,374,244**	**6088**	**121**	**396**

ASIA

GEORGIA

RF3V	**12,666,192**	**7131**	**157**	**487**

JAPAN

JA3YBF	**4,519,400**	**3539**	**149**	**323**
JA2YKA	**4,383,500**	**3166**	**159**	**341**
JA9YBA	**3,861,927**	**3190**	**142**	**291**
JA3YKC	3,012,256	2628	137	279
JA7YAA	**2,014,096**	**2164**	**123**	**220**
JA7YFB	1,975,125	2057	110	235
JA1YXP	349,180	605	93	128
JA3YUA	41,800	165	38	57

EUROPE

CZECHOSLOVAKIA

OK7AA	**5,741,950**	**5260**	**139**	**436**

FINLAND

OH7AB	**3,794,640**	**4357**	**124**	**365**

GERMANY (FRG)

DL0KF	**3,909,040**	**3739**	**135**	**389**
DF0BV	**2,872,155**	**3111**	**122**	**393**
DL0WU	1,587,404	2193	91	273

LITHUANIA

UP7A	**6,882,560**	**6017**	**152**	**456**

QRPp

YU3BC	**A**	**544,810**	**905**	**74**	**227**
SP3KEY	"	**492,900**	**784**	**82**	**236**
RB5IJ	"	**267,997**	**552**	**74**	**189**
4X6IF	"	**246,019**	**544**	**47**	**110**
K3WS	"	**241,345**	**376**	**76**	**159**
K7SS	"	**192,700**	**437**	**62**	**102**
OK3IAG	"	**148,400**	**443**	**55**	**157**
G4ELZ	"	**130,938**	**464**	**41**	**116**
UT4UB	"	**106,820**	**433**	**38**	**102**
DL9YX	"	**95,064**	**213**	**62**	**171**
JA7AS	"	**86,612**	**282**	**48**	**70**
YO8BSE	"	**86,410**	**460**	**41**	**97**
SM5CCT	"	**66,096**	**315**	**39**	**105**
OK1DKR	"	53,620	276	35	105
SP5LM	"	44,100	312	31	74
N1AFC	"	**43,785**	**156**	**38**	**67**
G4FDC	"	38,437	179	35	84
UB5REN	"	30,996	154	37	89
YO3CDN	"	28,896	190	30	66
UA1ANP	"	28,036	289	20	66
W1SOX	"	26,700	129	29	60
W4OEL	"	26,076	95	37	69
JA1XDA	"	18,728	134	22	56
OK1DZD	"	16,575	128	27	48
G4MQC	"	16,510	150	16	49
Y23UA	"	**14,620**	**126**	**24**	**62**
WB7APW	"	14,454	87	31	35
DL4FN	"	10,988	124	15	52
WT4G	"	10,579	66	29	42
Y26JD	"	10,416	200	10	38
Y24TG	"	9,480	88	18	42
G4KIU	"	8,692	104	15	38
N8CQA	"	8,432	62	30	38
OK1DRQ	"	8,190	111	12	53
YU1PKC	"	6,790	66	17	53
YO8CMB	"	6,750	73	15	39
YO4BQV	"	6,060	72	17	43
Y23TL	"	5,565	80	13	40
EA1KC	"	5,424	79	14	34
LZ1WY	"	2,170	48	11	24
VE3NYT	"	1,102	58	9	10
SM7CZC	"	736	20	8	15
UR2RDJ	"	300	16	4	16
Y24HG	"	270	19	6	9
LZ2RM	"	110	6	4	7
4Z4NUT	**21**	**189,306**	**834**	**22**	**56**
4X6NM	"	**109,080**	**511**	**23**	**53**
YO5BQ	"	**20,328**	**117**	**24**	**42**
JH9HXF/1	"	**18,644**	**117**	**22**	**37**
UB5WAB	"	**15,447**	**111**	**19**	**38**
UR2CR	"	**10,143**	**84**	**17**	**46**
JA1KUU	"	1,608	24	12	12
SP2UU	"	1,071	21	9	12
G3CWL	"	952	24	8	9
RB5QZ	"	204	12	4	8
UA0SAU	**14**	**63,770**	**405**	**22**	**48**
UC2AAX	"	**45,852**	**689**	**17**	**51**
JA2VKD	"	**35,526**	**222**	**21**	**41**
I4KRF	"	**25,546**	**257**	**14**	**39**
JA1BN	"	**22,512**	**147**	**23**	**33**
OK2BMA	"	**10,575**	**109**	**15**	**30**
PA0ADT	"	3,552	65	8	16
OZ1JVN	"	3,000	69	8	22
RA3GD	"	1,776	52	7	17
G3DOP	"	1,716	62	7	15
VE7EKS	"	150	16	3	2
G3VMY	**7**	**21,948**	**275**	**13**	**49**
SP5CJQ	"	**15,720**	**120**	**14**	**54**
OK1DCP	"	**12,400**	**190**	**12**	**38**
EA6NP	"	**7,141**	**141**	**10**	**27**
YU2CAH	"	1,081	34	5	18
YU1OWW	"	817	42	4	15
JH7ASD	"	252	17	4	3
HA6AIM	**3.5**	**17,531**	**353**	**7**	**40**
OK1JJF	"	**13,684**	**304**	**7**	**37**
UP2BPN	"	**9,196**	**203**	**8**	**30**
HA8LKB	"	**7,884**	**207**	**6**	**30**
SP9GKM	"	**7,650**	**220**	**5**	**29**

The sky hook for DF0THW's 160 antenna.

OK2PAW	"	5,215	144	5	30
Y25XA	"	**4,680**	**110**	**7**	**33**
Y26WM	"	4,068	109	6	30
Y2IRG	"	2,895	80	5	29
Y24ZF	"	2,624	81	5	27
OK1DIQ	"	2,580	87	5	25
OK1MNV	"	1,675	68	4	21
SP9NSV	"	840	63	4	11
Y23OH	"	703	38	3	16
Y26EH	"	345	23	2	13
Y23JF	"	165	16	2	9
N7NV	"	112	8	4	4

PA3AFF	"	72	8	3	6
UB5AFM	**1.8**	**15,043**	**253**	**8**	**41**
OK1DRO	"	**8,400**	**198**	**6**	**36**
UO5OLW	"	**5,696**	**157**	**6**	**26**
OK3CXS	"	4,323	145	6	27
UB5KBJ	"	4,064	121	6	26
OL1BKO	"	3,944	114	5	29
SP5SDA	"	**2,937**	**85**	**6**	**27**
OL4BOR	"	1,403	62	4	19
UB5VAA	"	920	32	6	17
UA3PNN	"	120	21	8	15
YO6KKK	"	56	10	3	7

CHECK LOGS

Our thanks go to the following stations who sent in check logs: AK2H, DL4TH, DL5IJ, DL9VDQ, EA7CJM, EA7FTN, EA9AM, HA4KYH, HA7KPW, HA0LG, KL7AF, KL7UR, KY0A, LA5DW, LA9ZV, LA0EH, LZ1DQ, LZ1KAU, LZ1CW, LZ1IA, LZ2EE/M, LZ2JE, LZ2KSB, N2RT, OH1XX, OH1KQ, OH2RL, OH3HS, OH3WR, OH3MC, OH4RM/3, OH5FA, OH6AK, OH6DZ, OH6QP, OH6XA, OH6NH, OH7NW, OH8ZX, OK1IAR, OK2BPU, OK2BQU, OK2BSG, OK2AG, OK3CGT, OK3CUZ, OK3EQ, OK3CQD, OK3-28011, OZ1ABA, OZ1EUO, OZ1FGS, OZ1IDL, OZ1IPP, OZ1JLX, OZ1JNR, OZ2E, OZ2JI, OZ4RS, OZ4XX, OZ5PA, OZ5S, OZ7GM, OZ7JU, OZ8AE, PA3BFH, PA0PUR, PY1OL, PY2MT, PY3CJI, RA1QAZ, RA1WA, RA3AOD, RA3AR, RA3EF, RA3NB, RA3VO, RA4NBR, RA6AHA, RA0AA, RB5HB, RB5NT, RB5QB, RB5RR, RB5UA, RB5UX, RB0HZ, RC2AP, RL7GC, RL7GE, RT5JH, RV4LA, SK0RQ/5, SM2LCI, SM2NTU, SM5APS, SM5BFJ, SM5CVC, SM5DQC, SM5FUG, SM5LL, SM6BGA, SM6BZE, SM6CDN, SM6MNH, SM6OLL, SM6OOF, SM6OPM, SM7ASN, SM7KNW, SM7KWE, SM7NEX, SM7OKC, SM0CSX, SM0LZT, SP2GJV, SP2HOU, SP2NAX, SP2GBL, SP2GUV, SP2DKI, SP2NA, SP2HFL, SP2GOW, SP2BRN, SP2GUC, SP2US, SP2ZDX, SP4ETO, SP4LKT, SP4EAK, SP4JWR, SP4DCR, SP4DGN, SP5CCC, SP5ENA, SP5CWQ, SP5ATO, SP6BEN, SP6NVF, SP6DMI, SP6BFK, SP7HOZ, SP8JMA/8, SP8GSC, SP9ADY, SP9BBH, SP9HWN, UA1OGI, UA1QD, UA1ZGD, UA1ZGO, UA3AEX, UA3AGW, UA3AMV, UA3ANO, UA3ARI, UA3DB, UA3DFV, UA3DIW, UA3DL, UA3DQS, UA3EDQ, UA3ET, UA3IAK, UA3ICJ, UA3IDT, UA3LCC, UA3MDV, UA3NBT, UA3PB, UA3PDW, UA3PFN, UA3PGZ, UA3QJC, UA3QLC, UA3SEY, UA3TBM, UA3UAR, UA3UAY, UA3VGY, UA4CGP, UA4COQ, UA4HJA, UA4HKJ, UA4HLD, UA4HLX, UA4HML, UA4LFD, UA4NBD, UA4SBW, UA4UBG, UA4WAP, UA4YA, UA4YAQ, UA4YZ, UA6ADH, UA6AHF, UA6AUT, UA6HNU, UA6JDE, UA6JDW, UA6JY, UA6LON, UA6PCH, UA6YCI, UA9CBO, UA9DC, UA9FJZ, UA9HBM, UA9OFV, UA9OP, UA9QBT, UA9SEX, UA9SGN, UA9UGG, UA9XSE, UA9YIE, UA0FEO, UA0KCL, UA0QA, UA0QCA, UA0ZC, UB4LAA, UB5AGL, UB5AKA, UB5ECB, UB5FCE, UB5FDG, UB5FDM, UB5IMD, UB5JLJ, UB5LIE, UB5JS, UB5QJA, UB5UCH, UC2AIH, UC2LB, UJ8JMM, UL7VAD, UM8MP, UO5ODA, UO5OO, UP2BOW, UQ1GWY, UQ2GCV, UQ2GLQ, UQ2GLY, UQ2GMC, UQ2PG, UR2JW, UR2ZN, UT4UH, UT4UN, UT4UWU, UT5UCU, UT5UDI, UT5UHR, UV6AZ, UV9OK, UV0JL, UW3EG, UW6HO, UW9AO, UW9CL, UY5GG, UZ3ER, UZ6HR, UZ2FWZ, UZ3EWW, UZ4SWN, W4KM, WA6FGV, XE2AAM, Y22EO/A, Y22JD, Y22ON, Y22XO, Y22WB, Y23CO, Y24GE, Y24ND, Y24XD, Y24XJ/A, Y24XM/A, Y24WJ, Y24ZH, Y25GH, Y25IJ, Y25SM, Y26GN, Y26IL/A, Y26SO, Y26SM/A, Y27IO, Y27KO, Y27YH, Y28FC, Y28IL, Y31TF, Y39OH, Y41WM, Y43SM, Y43VA, Y44YK, Y47MN, Y54ZA, Y55NA, Y75YL, YO2ARV, YO2BON, YO3AAQ, YO4BII, YO5YJ, YO5TA, YO6LV, YO8BVS, YU1RS-1066, YU2CKL, YU4EJA, YU7AJD, YV4ABR, F11ARQ, EA8-370082.

Disqualifications: AG2S excessive duplicates (4.0%) and unverifiable contacts; 4N4C excessive duplicates (6.1%).

Phone Results Corrections

Errata: UP2NK was a SSB score and #1 in Lithuania. HB0AEN was HB0AON; DF5BM was a CW log; DK1HY was DK1HV; DL9AV was DL7AV; Y5ANL was Y54NL; UG2GLW was UQ2GLW; K1OX should be K1OX (Opr. KC1F); and K3RV/4, the #2 USA and #6 World 14 MHz score was omitted, his score was 914,132/1798/36/137.

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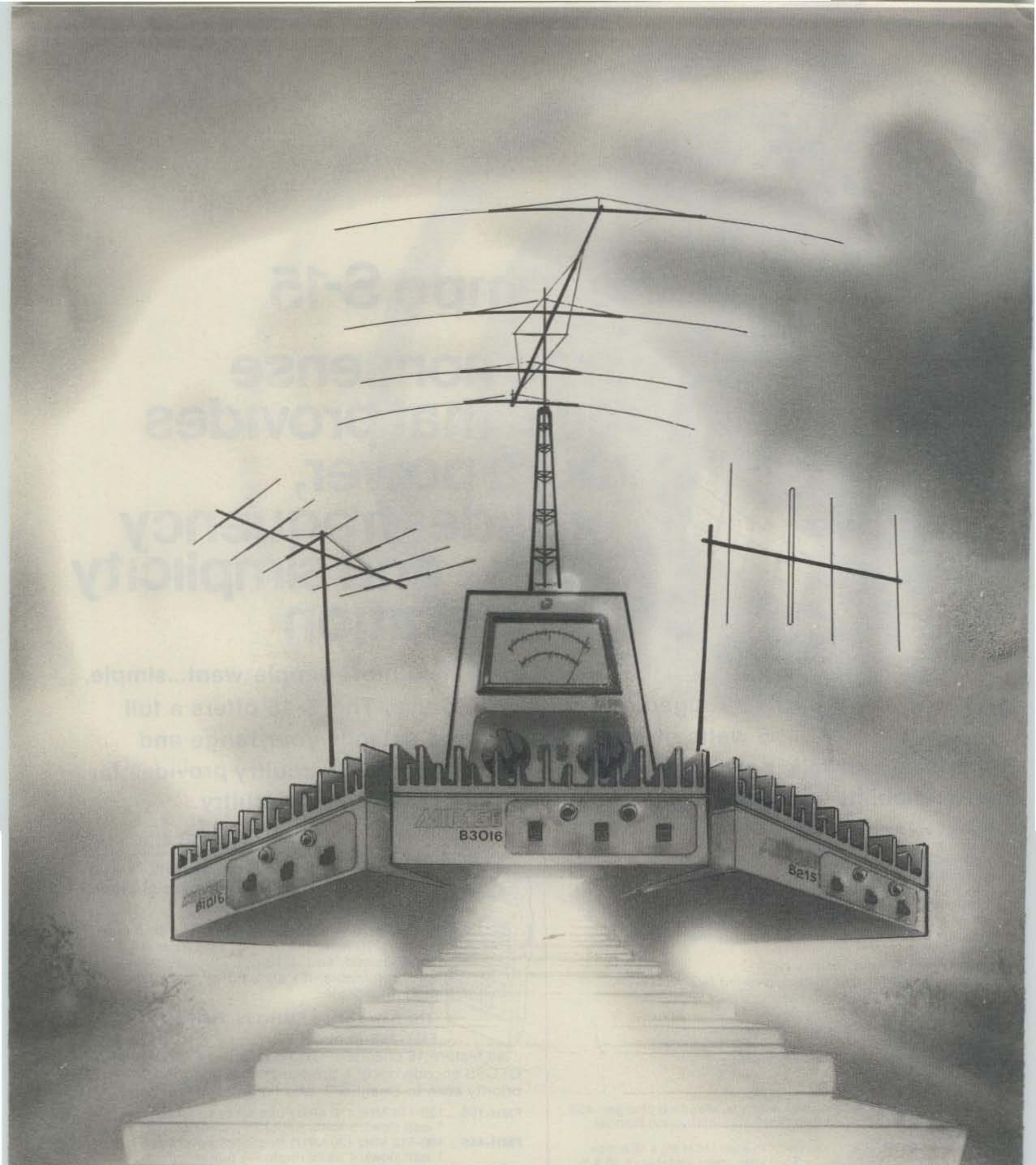

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CIRCLE 135 ON READER SERVICE CARD

CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6SSS

In the records listed below, boldface listings denote world records. Number groups after calls are: year of operation, total score, contacts, zones, and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band
WORLD RECORD HOLDERS

1.8	UP2BBT/U6V('83)	203,416	1,490	8	39
3.5	VE3BMV('85)	383,040	1,629	25	89
7.0	VP2ET('85) (Opr. K5RX)	850,795	2,295	31	124
14	VP2KAA('81)	2,011,185	4,186	37	150
21	AH0AB('82) (Opr. JA3DOC)	1,923,840	4,509	36	108
28	YV2AMM('82)	1,839,004	3,700	37	130

AFRICA

1.8	EA8AK('82)	34,220	201	12	46
3.5	CT3BZ('79)	235,113	772	22	87
7.0	EA8AK('84)	776,700	1,736	35	115
14	CR6WW('74)	1,058,446	2,152	35	132
21	EL2AV('81)	1,404,936	3,087	35	117
28	OH2MM/CT3('79)	1,827,150	4,068	37	113

ASIA

1.8	UP2BBT/U6V('83)	203,416	1,490	8	39
3.5	UW9AF('83)	222,192	554	19	53
7.0	JA5BJC('85)	310,905	764	36	111
14	N2BZQ/4X('82)	1,142,964	2,347	36	135
21	4S7AAG('81) (Opr. OH2BCP)	918,925	2,897	38	137
28	4X0U('80) (Opr. 4X4UH)	1,187,200	2,555	37	123

EUROPE

1.8	LZ2CJ('84)	107,818	1,319	13	61
3.5	4N3E('85)	162,628	1,046	27	82
7.0	IO3MAU('83)	355,000	1,447	31	94
14	YZ9A('85)	1,286,126	2,954	38	142
21	LZ2KTS('83) (Opr. LZ2CC)	1,368,897	2,821	39	152
28	9H1EL('81)	1,355,760	3,662	36	132

NORTH AMERICA

1.8	VE3NNR('85)	47,390	672	14	21
3.5	VE3BMV('85)	383,040	1,629	25	89
7.0	VP2ET('85) (Opr. K5RX)	850,795	2,295	31	124
14	VP2KAA('81)	2,011,185	4,186	37	150
21	VP2KAC('81)	1,783,500	3,941	37	137
28	KV4FZ('79)	1,482,525	4,079	39	126

OCEANIA

1.8	KH6CC('85)	45,984	484	13	19
3.5	T32AF('85)	222,768	1,064	23	49
7.0	T32AF('84) (Opr. KH6UR)	677,844	2,045	34	80
14	ZM1BIL('83)	1,334,232	2,635	38	136
21	AH0AB('82) (Opr. JA3DOC)	1,923,840	4,509	36	108
28	AH0B'(82) (Opr. JA2VUP)	1,788,430	4,173	36	109

SOUTH AMERICA

1.8	YV2IF('84)	18,291	172	14	25
3.5	YV3AZC('84)	351,324	1,238	26	82
7.0	9Y4VU('84)	700,488	1,718	28	110
14	FY7AK('76) (Opr. F5QQ)	1,415,329	2,950	36	127
21	CX4CR('82)	1,602,120	3,519	36	120
28	YV2AMM('82)	1,839,004	3,700	37	130

Single Operator/All Band

AF	EA8AK('81)	9,974,811	5,506	152	457
AS	EX6F('84)	6,362,000	4,648	113	387
EU	YU3EY('82)	4,913,574	3,170	136	455
NA	HI8PGG('81) (Opr. N1GL)	9,009,721	7,190	131	392
O	KH6XX('81)	5,713,434	4,912	131	262
SA	9Y4VT('82) (Opr. N6AA)	11,954,696	7,082	146	422
QRP	TG9GI('82)	1,035,693	1,747	75	192

Multi-Operator/Single Xmtr.

AF	ED9CM('83)	10,157,160	5,148	152	511
AS	RG6G('82)	12,276,352	6,012	156	558
EU	I4RYC('80)	9,918,368	5,997	139	453
NA	NP4A('82)	14,953,818	8,772	174	585
O	KH6XX('85)	7,632,357	5,657	149	308
SA	9Y4W('82)	16,775,034	8,097	158	540

Multi-Operator/Multi-Xmtr.

AF	EA8CR('77)	21,351,898	10,290	153	544
AS	EW6V('82)	18,746,136	10,100	142	544
EU	OH0W('82)	19,030,501	10,773	188	729
NA	VP2KC('79)	37,770,012	17,767	175	677
O	KH6XX('79)	21,990,252	10,989	184	494
SA	P41C('81)	41,957,244	17,718	173	625

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	39	7	9
9Y4VT	3.5	404	17	57
(1982)	7.0	748	25	78
11,954,696	14.0	1,620	32	89
	21.0	1,476	34	96
	28.0	2,795	31	93
	Total	7,082	146	422

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	124	8	25
9Y4W	3.5	296	17	59
(1982)	7.0	594	27	86
16,775,034	14.0	1,953	35	127
	21.0	2,104	35	121
	28.0	3,026	36	122
	Total	8,097	158	540

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	261	9	21
P41C	3.5	861	22	69
(1981)	7.0	1,752	30	98
41,957,244	14.0	4,837	38	156
	21.0	5,790	39	143
	28.0	4,813	35	138
	Total	17,718	173	625

CQ World-Wide DX Contest All-Time C.W. Records

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	YV3AGT('85)	147,588	591	21	63
3.5	VP2KAC('83) (Opr. N4RJ)	332,880	1,302	28	86
7.0	VP2KAA('83) (Opr. N4PN)	837,366	2,461	30	104
14	VP2KAA('80) (Opr. N4PN)	1,244,782	3,111	37	117
21	LU8DQ('81)	1,359,711	2,993	37	116
28	LU8DQ('79)	1,033,399	2,775	34	93

AFRICA

1.8	EA8AK('82)	75,768	385	15	51
3.5	EA9EU('83)	229,150	787	14	75
7.0	EA7TL/9('83)	354,308	1,175	21	80
14	CR6IK('74)	925,386	2,021	38	116
21	5Z4MX('83)	820,338	1,953	35	106
28	FR0MM('79)	978,012	2,590	36	90

ASIA

1.8	UP2BBT/U6V('83)	83,160	481	14	49
3.5	UP2NK/UF('84)	283,362	1,230	19	64
7.0	UP3BA/UF('84)	573,648	1,755	27	87
14	4X0U('82)	735,504			
21	4Z4NUT('80)	519,831	1,500	34	83
28	4X4UH('80)	554,645	1,772	32	83

EUROPE

1.8	HB9AMO('85)	95,201	740	17	66
3.5	EA2IA('85)	258,408	1,397	28	83
7.0	YZ9A('85)	637,144	2,017	36	110
14	DK3GI('85)	776,860	1,985	38	117
21	YU3ZV('81)	732,096	1,957	37	107
28	DK3GI('79)	592,848	1,584	31	101

NORTH AMERICA

1.8	K5UR('85)	47,005	219	25	60
3.5	VP2KAC('83) (Opr. N4RJ)	332,880	1,302	28	86
7.0	VP2KAA('83) (Opr. N4PN)	837,366	2,461	30	104
14	VP2KAA('80) (Opr. N4PN)	1,244,782	3,111	37	117
21	VP2KAC('80) (Opr. N4RJ)	1,075,407	2,955	36	105
28	KV4FZ('79)	653,072	2,384	32	87

OCEANIA

1.8	KH6CC('85)	23,746	257	15	16
3.5	VR3AH('76)	178,560	956	24	40
7.0	KH6XX('84)	427,230	1,424	33	68
14	KH6MD('85)	610,722	1,640	37	89
21	KH6XX('78) (Opr. K7SS)	816,102	2,311	38	81
28	KG6DX('80)	801,876	2,367	35	79

SOUTH AMERICA

1.8	YV3AGT('85)	147,588	591	21	63
3.5	4M3AGT('83)	133,152	617	21	52
7.0	YX5A('84)	696,150	2,003	29	88
14	PJ9CC('80) (Opr. K4BAI)	1,209,022	2,914	34	105
21	LU8DQ('81)	1,359,711	2,993	37	116
28	LU8DQ('79)	1,033,399	2,775	34	93

Single Operator/All Band

AF	CN8CX('82) (Opr. K6NA)	6,234,664	4,354	121	358
AS	UF6CR('82)	4,613,680	3,982	92	312
EU	CT1BCM('84) (Opr. OH2BH)	3,295,152	3,108	123	344
NA	NP4A('83) (Opr. K3UA)	6,027,752	4,537	139	399
O	N6BT/AH0('81)	4,241,746	4,083	121	228
SA	9Y4VT('83) (Opr. N6AA)	7,153,434	4,961	127	359
QRP	UP2BIM('82)	899,932	1,351	83	279

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	94	6	8
9Y4VT	3.5	421	18	53
(1983)	7.0	838	20	69
7,153,434	14.0	1,439	31	80
	21.0	1,288	27	76
	28.0	881	25	73
	Total	4,961	127	359

Multi-Operator/Single Xmtr.

AF	EA9EU('80)	5,077,696	3,884	116	326
AS	RG6G('82)	10,394,658	5,355	166	511
EU	YU3EY('81)	7,674,190	4,051	150	345
NA	NP4A('82)	11,648,565	6,881	168	515
O	KD7P/KH2('84)	4,487,665	3,375	159	296
SA	P41E('81)	8,059,296	5,055	148	388

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	172	15	35
NP4A	3.5	589	23	73
(1982)	7.0	1,342	28	92
11,648,565	14.0	1,270	36	108
	21.0	1,547	34	106
	28.0	1,961	32	101
	Total	6,881	168	515

Multi-Operator/Multi-Xmtr.

AF	EA8CR('78)	17,734,970	9,799	142	463
AS	EW6V('82)	14,702,688	8,001	159	504
EU	OH0W('82)	14,371,840	9,515	184	618
NA	NP4A('80)	17,627,820	10,846	171	487
O	AH0C('83)	6,877,750	5,164	149	302
SA	P42E('82)	23,295,408	12,315	161	475

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	390	12	28
P42E	3.5	1,083	22	60
(1982)	7.0	1,995	29	81
23,295,408	14.0	2,965	36	112
	21.0	3,351	32	103
	28.0	2,531	30	91
	Total	12,315	161	475

CQ World-Wide DX Contest
All-Time U.S.A. Records

BY FREDERICK CAPOSSELA, K6SSS

Tabulated below are the record-high scores achieved by U.S. Contesters in the CQ World Wide DX Contest. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	AA1K/3('85)	24,633	165	19	50
3.5	W1ZM('83)	177,862	669	27	86
	(Opr. K1ZM)				
7.0	W7RM('85)	243,270	813	31	71
	(Opr. W7WA)				
14	K1OX('85)	1,131,328	2,176	36	140
21	N7DD('81)	923,945	1,998	36	121
28	N7DD('80)	754,536	1,730	36	113

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	27	8	19
K1AR	3.5	168	24	80
(1985)	7.0	97	22	67
4,007,648	14.0	1,073	34	116
	21.0	1,007	28	109
	28.0	98	13	36
	Total	2,465	129	427

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	34	14	30
KX4S	3.5	208	24	80
(1985)	7.0	222	30	101
4,603,120	14.0	1,167	34	134
	21.0	769	31	118
	28.0	41	15	40
	Total	2,441	147	505

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	109	8	16
N2AA	3.5	406	24	79
(1979)	7.0	366	28	84
13,299,750	14.0	1,646	40	152
	21.0	2,198	40	144
	28.0	1,354	36	120
	Total	6,079	176	595

CW

Single Operator/Single Band

1.8	K5UR('85)	47,005	219	25	60
3.5	W1FV('85)	197,120	603	27	85
7.0	K1OX('85)	439,632	1,055	32	110
14	K2VV('85)	655,046	1,567	35	107
21	W1RM('82)	483,560	1,196	33	107
28	N4WW('82)	394,940	1,064	33	97

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	63	11	32
K1AR	3.5	329	19	69
(1985)	7.0	607	30	89
3,397,905	14.0	967	33	97
	21.0	428	23	72
	28.0	4	4	4
	Total	2,398	120	363

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	17	9	16
N4AR	3.5	67	16	62
(1981)	7.0	461	28	92
4,564,350	14.0	755	34	110
	21.0	499	33	101
	28.0	686	32	97
	Total	2,485	152	478

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	72	14	27
W2PV	3.5	427	18	70
(1981)	7.0	1,101	30	103
10,431,729	14.0	1,389	35	118
	21.0	1,228	35	103
	28.0	1,050	34	106
	Total	5,267	166	527

Club record: Frankford Radio Club ('79) 173,821,640

Tech Talk from ICOM

ICOM

Optimizing with Accessories

In the same manner that belts, shoes, and neckwear coordinate and complement a basic wardrobe, mating station accessories also creates a smooth interworking amateur radio set-up of exceptional flexibility. The "professional difference" resulting from inclusion of such items produces a station that can work DX with ease, turn a high score in any contest, and is a sheer dream to operate.

Recognizing that situation, ICOM complements each of its general coverage, HF, VHF and UHF receivers and transceivers with a full line of performance-optimizing accessories. Some of those items are small and comparatively inexpensive, others are larger and quite sophisticated. This arrangement provides individual equipment tailoring and the capability of assembling a truly personalized station.

As an example of deluxe station assembly, let's consider the unlimited versatility produced by combining an ICOM IC-2KL linear amplifier and AT-500 automatic antenna tuner with an IC-751, IC-751A, IC-735, or IC-745 HF transceiver. Each of these units interconnect with their host transceiver via a single multi-wire cable: neat, simple, and easy to install in any location.

Both the IC-2KL and AT-500 are solid state in design and fully automatic in operation. You can switch on this top-of-the-line station, tune a desired DX station (on any band your antennas operate) and call him/her right "on the spot" without warmup or tuning delays. Meanwhile, other operators are still reaching for knobs and switches to swing their linear amplifiers and antenna tuners into action. You're moving up and down the band, even changing bands, and "kicking off" DX pileups while others can only follow your uncompromising lead. That's the ICOM advantage!

The IC-2KL amplifier features several capabilities that simply are not available in competitive units. Band selection automatically tracks with its host transceiver, and broadband circuits let you operate any 160 through 15 meter amateur frequency (including WARC) without pretuning.

The IC-2KL amplifier and its power supply are housed in separate cabinets for easy handling, and each is no larger than its mating transceiver. The unit is protected against antenna mismatching, overheating, overdrive, excessive RF output, and unbalance of its dual power amplifier sections. Its approximate 500 watts output is an optimum level for generating a strong signal, and it doesn't require a massive current 110 or 220 volt AC outlet for operation. It's also the ideal amplifier for condo or apartment use.

ICOM's AT-500 is actually two units in one small cabinet. It's an automatic 160 through 10 meters antenna tuner (including WARC bands) and an antenna switch which follows band selections from its mated transceiver. During operation, the tuner presets its variable capacitors for optimizing reception on a selected band. The application of RF energy then fine tunes adjustments for an optimum impedance match within one or two seconds time.

Up to four antennas can be connected to the AT-500's rear panel for automatic selection when the AT-500's AC switch is on. A 100 watt version of the AT-500 (AT-100) is also variable for use with "barefoot" ICOM transceivers, and a cabinet-matched AT-150 (100 watt antenna tuner) is available for the IC-735.

A variety of internal and "expandable" accessories are also available for ICOM's HF, VHF and UHF transceivers. A full discussion of the most popular of those items, additonal IF filters, was presented in a previous Tech Talk. A reprint of that information is available directly from ICOM America.

If computer control piques your interest, a connector is available for the IC-751, IC-751A, IC-271A/H, IC-471A/H and IC-1271A transceivers.The IC-735 needs no connector. Using minimim support hardware and software, frequency, mode, memory selection and scanning can be performed via your home computer.

Need power supply flexibility? ICOM's IC-PS35 (20A) AC supply can be installed inside the IC-751, IC-751A, or IC-745 transceivers for "single box" use. Alternately, the husky IC-PS30 (25A) can be used for simultaneously powering several transceivers (great for OSCAR use).

If your interests include mobile and portable activities, ICOM's all band and fully automatic AH-2 antenna system places unlimited operating pleasures right at your fingertips. This mobile whip and microprocessor controlled tuner combo accepts frequency information from its mated transceiver for simple "tune any station and give a call" convenience. The tuner includes eight internal memories for storing and immediately recalling impedance matching data of previously tuned frequencies, and a simple random wire can be substituted for the mobile whip for optimum mobile or field day operations.

Although space limitations preclude full discussions of all ICOM accessories, the overall message of the Tech Talk is quite apparent. Whatever HF, VHF, or UHF unit you use or plan to use, a glamorous line of complementing accessories are available for optimizing its capabilities in a personalized manner. If you're interested in top-of-the-line performance and operator-friendly gear, the obvious choice is, naturally, ICOM!

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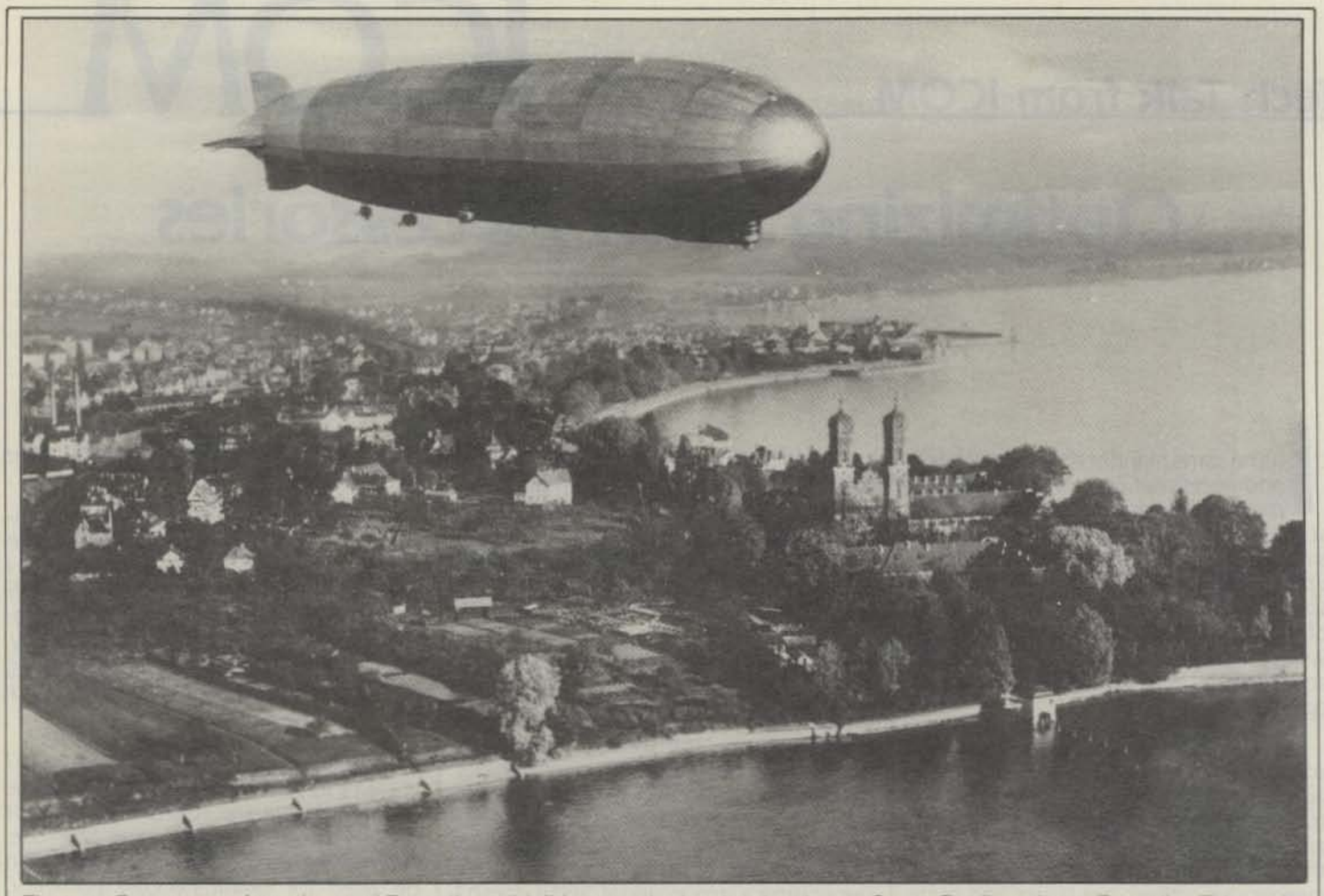

The term Zepp comes from the word Zeppelin, a dirigible named after its developer, Count Ferdinand von Zeppelin. This early photo shows the most famous of the Zeppelins, the LZ127 or Graf Zeppelin. *An interesting note about the Zeppelins is that they were made in Friedrichshafen, Germany (the city under which this Zeppelin is flying). Friedrichshafen today is the home of Europe's biggest amateur radio hamfest, the Dayton of Europe.*

In the final installment of this three-part series W1ICP covers questions and answers relating to whether or not one should use a Transmatch.

The Unexpurgated Transmatch

Part III — Conclusion

BY LEW MCCOY*, W1ICP

This is the final installment of my questions and answers article relating to whether or not one should use a Transmatch.

End or Zepp Feed

Lots of questions were asked about end or Zepp feeding a wire as in fig. 1. The term *Zepp* feed comes from long ago when Zeppelins (gas-filled dirigibles) flew the skies. A trailing wire from the Zeppelin was end fed, usually with open-wire feeders, and the lengths of the trailing wire and feeders were important. (I don't really know the reason, but I guess it was to avoid voltage-fed antennas and the high RF field around explosive gases!) By the same token, I never understood the term *center-fed Zepp*, which is still commonly heard on the bands. I think the terms came from amateurs who really, above all else, liked the sound of names. In any event, I did have a center-fed dipole up, about 150 feet long, using open-wire feeders, and several amateurs called it a "center-fed, double-extended Zepp." There is an antenna that is center fed with 0.64 wavelength each side of the feedpoint that has that name applied to it. But when anyone says "Zepp feed," I think end-fed. Otherwise, I don't know what in heck they are talking about. (After checking with several real experts, I found they agreed with me!) This is a long

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

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Say You Saw It In CQ

way from the question, but I thought you would be interested in that relatively useless information. (I think I'll write some ham trivia questions. That should be fun!) The "Zepp" feed I am talking about is an end-fed wire fed with open-wire feeders or twin lead.

I haven't mentioned radiation patterns, but I should here. End-feeding an antenna can produce patterns different from center feed. It depends, of course, on how long the antenna is. For example, end-feeding a full-wavelength dipole produces a clover-leaf pattern, one with four main lobes (more or less). If that same antenna is fed in the center, it becomes two half-wavelengths (in phase), and the pattern is a figure-eight with two major lobes and with a slight gain in each lobe over a single half-wavelength. I would recommend a study of the *Handbooks* for more information on this subject.

Getting back to end-feed, if you want to use open-wire feeders for such an antenna, by all means do so. For myself, I have always used a good earth ground on the rig (and Transmatch) and then fed the antenna wire directly on the end (no feeders). One precaution I would observe here is to insulate the antenna wire and not let it touch any metal around the shack. Also, and most important, try to make the wire an odd multiple of a quarter wavelength on the most used band. This will provide low-impedance current feed, and the system is likely to be cooler as far as RF around the shack is concerned.

The important point of all of the above —end-feed, double-extended Zepps, center-fed Zepps, etc.—is that they are all multiband antennas when used with a Transmatch. With the open-wire feed they can be very, very good multiband antennas, working on all bands.

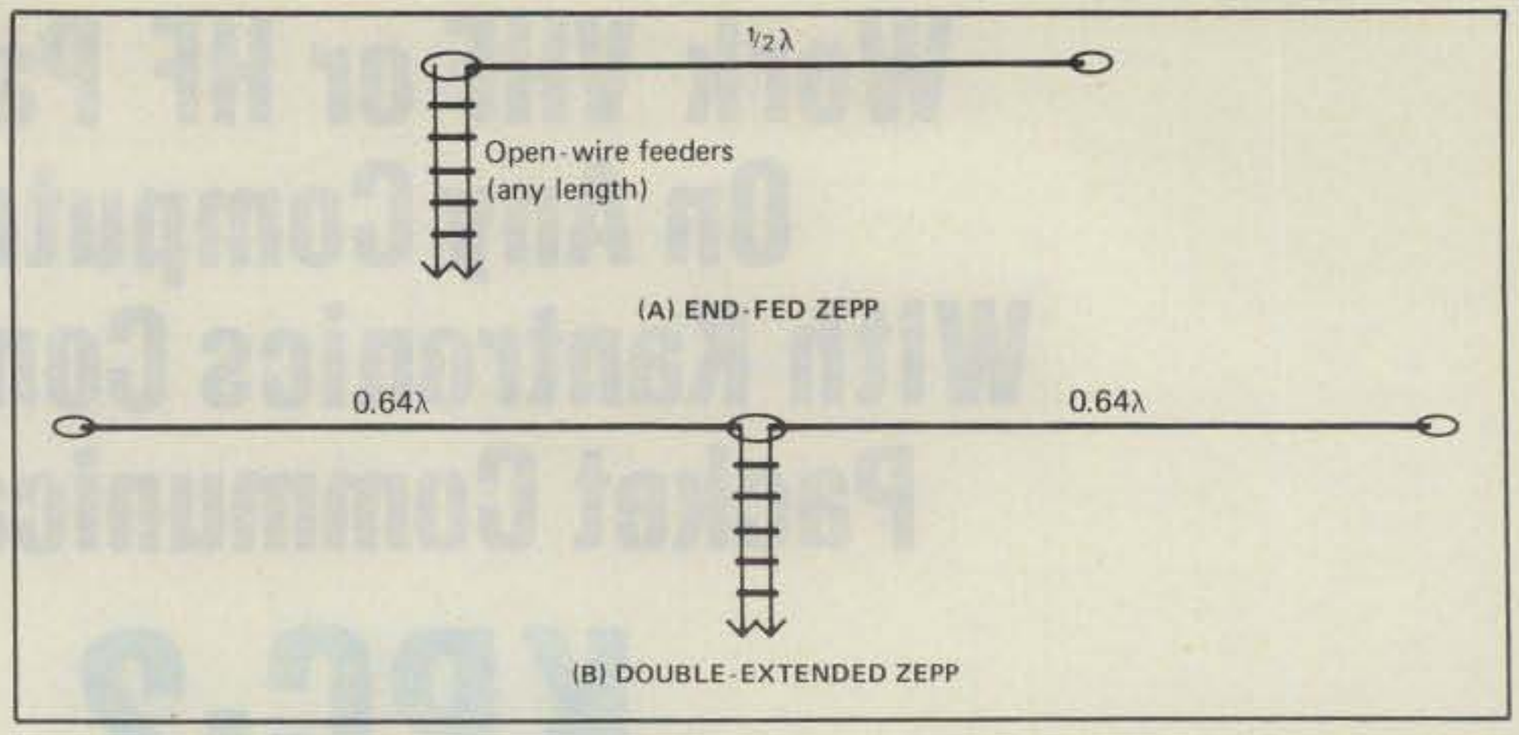


Fig. 1– At (A) is an end-fed Zepp described in the article. At (B) is a double-extended Zepp, which, assuming you have the space, is an extremely effective antenna. This antenna has a gain of 3 dB over a half-wavelength dipole. The dimensions given are for the lowest frequency band. The antenna will be an outstanding performer on any higher band used. Also, it can be used in an inverted-Vee configuration, but will be best when mounted horizontally, and as high as possible.

Grounds

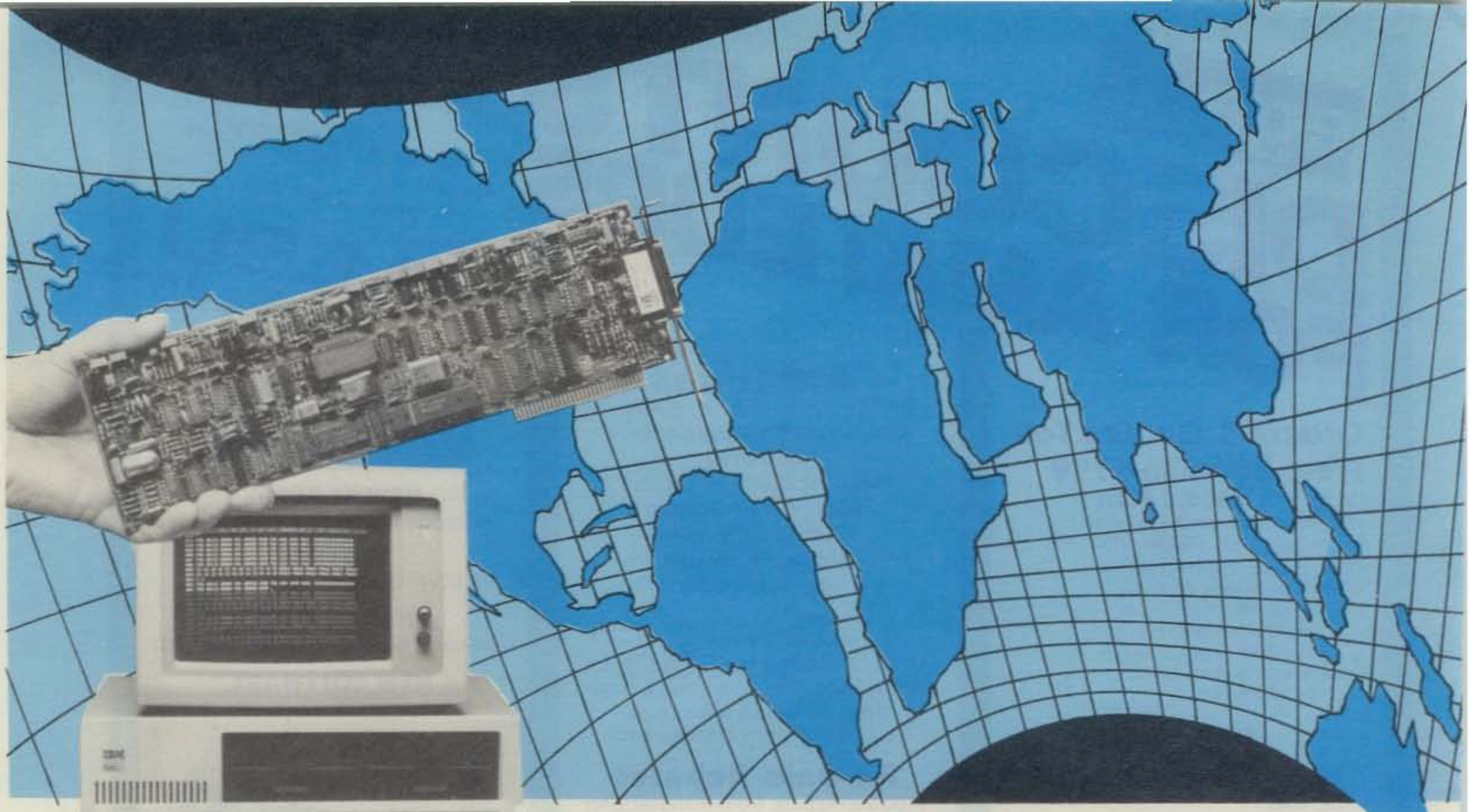
I also received several questions about grounds, and what I use. Should I ground the Transmatch? This is really a subject that deserves a full article—or more. However, a few guidelines might help. In the first place, all modern electrical-outlet installations carry a ground that goes back to the power service entrance, which is grounded with a good electrical ground (or should be). Many amateurs will install another ground (rod, usually) directly at the station location. This can get a little sticky to understand, but there could be some differences between these two grounds. If your earth conductivity is very good, then the difference is minimal. However, I once had a location where the power-company ground was about 100 feet from my station ground and the two grounds were at a different potential. I kept getting slight shocks from my equipment until I finally found out what was happening and did some "regrounding" so that everything was at the same voltage level. What has this to do with antenna systems and antenna performance? If you live some distance above ground, such as in a tall building, the ground return can be quite long and act as part of the antenna. I know one amateur who lived in a high-rise. He was an old broadcast station engineer who was familiar with grounded verticals, so he ran a wire down the building, grounded it, and then fed it at the top (his apartment) and used is Transmatch. Each station has different grounding characteristics, so it is well nigh impossible to give advice that covers all.

Ground Radial Systems

While this has nothing to do with Transmatches, many questions were about running lots of radials out from around the base of a tower and would doing this improve the beam performance? Would radials reduce ground losses? These are easy to answer in one sense, but difficult in another. Let's discuss horizontally polarized beams as an example because those are the type of antennas most of us use.

A mess of radials around the base of a tower helps to establish the electrical height of the beam and therefore its impedance and, to some extent, the radiation patterns. Please note that I say "*help to establish*" simply because one would have a difficult, if not impossible, task in establishing a really good ground. One must keep in mind several things here. First, the actual feed impedance of a horizontally polarized antenna, such as your 20 through 10 meter beam, is determined by several factors, one of which is its height above electrical ground. Unless we were doing some kind of outdoor antenna laboratory tests, there would be no purpose in installing the radials. Second, and this is the most important, the radials beneath the tower will not improve the efficiency of the radiated pattern of a horizontally polarized antenna. (The radials could reduce some losses, but these are so minimal that they are not worth considering.) If one looks at the radiation pattern of a beam, it would show major lobes at some particular angles both above and below the beam.

Let's assume we have a major angle of radiation at 30 degrees above and below the beam. Let's further assume the beam is mounted at 60 feet above ground on the tower. The 30-degree major lobe above the beam leaves the antenna and goes up into the ionosphere to reach the various ionized layers and then be reflected and refracted back to earth at some distant point. If you are handy with math, you can calculate the distance the 30-degree signal will go if we assume an F-layer at 150 miles (the signal would go quite a distance at 30 degrees and 150 mile-high ionosphere reflector!). However, and this is where the clinker with our radials system lies, the other half of that 30-degree major lobe takes off from the bottom of the beam, going downward. The signal is going to strike the earth some distance out from your tower and radial system; the exact distance out will depend on the height of the tower. However, the distance out will most surely be on someone else's property, so the nice ground you built under the beam, the radials, are useless. The reflectable ability (I like that term!) of the earth where our major lobe strikes is the governing factor in how much signal is lost. Unfortunately, there isn't much we can do about that part of our signal unless we live on the shore of the ocean and aim our beam out over the ocean. (Years ago I said the best radio location would be on a mile-high plateau covered by a salt marsh, which I now



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have—almost!) I know some antenna engineers may argue with me for trying to oversimplify a complex subject of antenna grounds, but this is about as simple a way as possible to answer the questions about a radial field below a beam or horizontally polarized antenna.

More Feed-Line Questions

Some questions were from amateurs who had poor locations and asked about using long runs of open-wire feeders to avoid the losses of coax. I have never tried such things myself, but I know of amateurs who had runs of up to a thousand feet of open-wire line and claimed good results with such long runs.

Others asked about radiating feed lines (parallel standing waves) and what, if anything, should be done about them and would a Transmatch help. First, in a multiband antenna system consisting of a dipole that uses tuned feeders, it is foolish to worry about feed-line radiation as such. Such radiation is not lost power, but radiated power; it actually goes somewhere and is likely to work someone for you. If you are worried about such feeder radiation, then follow the old rules about bringing the feeders away from the antenna at right angles and so on. But it is something I don't concern myself with in that type of system. A directional antenna system is a completely different story.

If there is one thing you don't want, it is to put up an expensive tower and a directional beam, and then have the coaxial feeders radiate. A radiating feed line can seriously degrade front-to-back and front-to-side performance of a beam. Of course, I am talking about coaxial feed here, not open-wire line. One normally would feed a beam with coax. A balun transformer is usually installed at the beam. The purpose of the balun is to provide balanced feed for a "balanced antenna" while using an "unbalanced" feed line (coax). With simple coax feed one attaches the center conductor to one side of the antenna and the outer shield to the other side. The RF from your transmitter flows on the inner conductor and the inside of the outer conductor. When the outside shield is attached to the antenna, one must keep in mind that physically, both the inside and outside of the outer shield are attached. If RF flows on the outside of the outer shield, then a condition known as parallel standing waves exists on the outside, and the waves will cause the line to radiate. Supposedly, putting in a balun will cure this problem. However, in actual practice this may or may not happen. Unfortunately, if the outer shield happens to be resonant in any amateur band on which the beam is used, the RF field will couple to the outside of the line (because it is resonant) and set up the condition of parallel standing waves.

In fact, any wires or metal that happens to be resonant lengths—telephone lines, house wiring, plumbing, TV feed, etc.—in the strong RF field around your station will be coupled to the signal, and strongly.

Of course, the basic questions would be, how do I know if I have this problem with my coax and how do I fix it? One simple method of detecting parallel standing waves is to set your SWR meter reading (forward) to about half scale and then observe the meter; run your hand up and down the coax while watching the meter. The reading should not change in the slightest. (Parallel standing waves will cause erroneous SWR readings—usually.) Another more accurate way is to grid-dip the line in each band and see if it is resonant (keep in mind here that you are only grid-dipping the outside of the outer braid). You can make a small loop in the coax (essentially, a one-turn coil) to get good coupling to the grid dipper. Tune the dipper through each band, looking for a dip (resonance). If you have this condition, the easy cure (sometimes) is to change the length of the coax or ground lead to make it nonresonant. For gosh sakes, don't prune the coax. That costs too much!

The resonance I am talking about is the electrical length of the outside of the shield and what is attached to it. That includes the length from the antenna, to the Transmatch, etc., to where the coax is returned to true earth ground (and we don't know where that is). Obviously, the easiest thing to do is to change the length of your ground wire a few feet because this changes the resonance. One has to be careful here, because changing the length may make the doggone line resonant in some other band! There, experimenting is in order. A Transmatch may or may not help in these situations. For myself, I would use one.

Some General Information

If you write to me with questions, please enclose an SASE. Also, being more or less retired, I work in spurts, so don't expect an instant answer. Oh yes, back issues of *CQ* are available for $2.50 postpaid. There are probably plenty of points that I have missed, and I am sure the mail will have those questions. If so, I'll write some more material on the antenna and Transmatch subject. Thanks for reading this far, and I hope I have helped you. Good luck and good DXing CQ

1986 CQ WPX CW Contest High-Claimed Scores

The following scores are early-bird high claimed scores as of 31 July 1986. These are raw scores subject to verification.

U.S.A.
SINGLE OPERATOR ALL BAND

K3Z0	3,136,710
KI6P	2,883,440
KZ2S	2,552,168
NI6W	1,888,705
W3GM	1,801,926
W3UM	1,691,870
KM9L	1,569,792
NN7L	1,563,016
AJ6V	1,346,436
WA6AUE	1,321,840
W0JLC	1,137,012
K3WW	1,064,700
KQ8M	1,046,952
NJ2L	971,964
WA3SPJ	952,614
W0HBH	884,352
KA1LZR	690,176
K5ZD/1	665,328
KS1J	664,158
NA9J	601,328

28 MHz

KE5CV	16,560
KU2Q	4,158
WB7FDQ	3,965
WA7KLK	768

21 MHz

WZ4Z	189,336
KJ3L	142,674
KV8Q	127,232
K6LY	104,272
K5MA/1	58,604

14 MHz

K2VV	2,543,826
N2AA	2,063,205
WD8IXE	1,724,712
KI1G	1,719,640
N3RS	1,473,958
W9SU	1,012,419
K9QVB	1,010,150
AG7M	895,860
N6ND	882,320
WD8LLD	879,014

7 MHz

NE6I	529,856
N6VI	513,558
AF5M	324,896
K5NW	323,056
K6NA	301,378
KI3V/7	289,852
KJ0H	220,950
K1TR	214,720
N2UN	201,564
W8IMZ	194,886

3.5 MHz

K5NA/2	199,688
WB6JMS	38,012
KA1DWX	21,216
W9LT/4	12,702
WB4FOT	2,356

1.8 MHz

W0ZV	7,280
K5UR	6,000
KG7D	4,080
NA2M	920

MULTI—OPERATOR SINGLE TRANSMITTER

KR0Y	4,552,356
N4WW	4,255,460
NK2H	2,287,300
WC6H	2,166,747
KB1W	2,120,900
WL7E/6	1,634,010
AI6U	1,427,189
WR6R	858,143
KB0U	546,260
AC5K	223,041

MULTI-OPERATOR MULTI-TRANSMITTER

K6XO	476,971

QRPp

K1CGJ	A	169,120
WB9HRO	A	132,252
NT7S	A	114,582
N1AFC	21	9,600
KU7Y	14	114,807
KB9S	14	112,548

DX
SINGLE OPERATOR ALL BAND

YU1AO	3,465,563
8P9AR	3,386,740
4M4A	3,090,906
G3FXB	2,816,182
6Y6A	2,349,189
IK2DVG	2,203,230
K8HVT/KP2	2,020,822
OH1AF	1,751,376
PJ2LS	1,388,730
JE1YYE	1,336,190
NP4C	1,293,733
A25/ZS6BRZ	1,088,668
JG1FVZ/5N0	1,014,220
OH2BCI	867,854
XL7QO	798,870
TK/DL4FF	782,544
KD2HE/VP9	762,540
K1BAZ/DV1	744,592
VE1CYL	744,198
YO9HP	698,973

28 MHz

YU7AJD	14,960
KH6DW	6,888
VE2AEJ/3	4,756
LZ1KWS	2,880

21 MHz

4Z4NUT	1,370,800
YT3W	972,486
ZV2KT	556,898
ZS6BCR	496,107
GD0/N4ZC	452,250
YB4FN	387,936
VK4XA	333,162
EI3DP	158,860
KH6WT	129,801
YC4FRX	126,160

14 MHz

WC4E/KP4	3,629,772
VE6CB	1,413,468
OH2AC	1,248,792
OH8SR	1,230,768
OA4ZV	1,203,255
VE1NG	1,106,300
JK1MAZ	1,068,940
LZ1YE	1,050,336
OH6YF	1,048,544
JL1MUT	870,942

7 MHz

VP2VCW	4,696,686
CX8BBH	1,131,282
HA9RE	890,272
OE1JNB/3	592,668
YU2AKL	486,519
JA7HMZ	485,520
JA0YAK	433,546
F6BEE	404,144
IO0SKK	333,696
LA9HW	322,080

3.5 MHz

CT5AT	697,248
YU1AWW	317,580
DF9ZP	236,534
LZ2SQ	224,730
LA7JO	178,620
OH3RF	156,032
OK2HI	151,578
SP5GIQ/7	143,982
YU7SF	81,549
LZ1IL	78,260

1.8 MHz

YU2TW	62,646
VE3BMV	43,736
VE3INQ	15,704
OK1JDX	11,592
YV1OB	11,550
G3XWZ/A	10,868
SP9DH	7,700
KG6DX	1,224

MULTI-OPERATOR SINGLE TRANSMITTER

LZ7A	7,274,497
OH7AB	4,854,840
C30CSA	3,726,900
GB2MM	3,647,520
4A1HC/2	3,199,899
YT2R	2,883,302
OK3RMM	2,750,748
YE0X	2,178,871
YT3T	2,125,680
JA1YBK	2,017,026
IO2UIY	1,873,612
JA7YFB	1,655,290
OH1AD	1,637,610
JA1YAD	1,619,872
OK3KAG	1,591,740

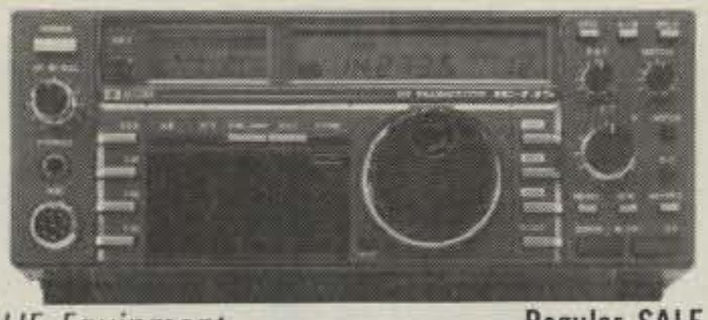
MULTI-OPERATOR MULTI-TRANSMITTER

JA3YBF	8,669,826
NL7G	6,831,042
JA2YKA	5,225,625
JA1YXP	1,565,256
JA3YDS	703,937

QRPp

WP4F	A	602,591
FO8JP	A	574,340
YU3BC	A	439,624
SM0AJU	A	408,478
4X6IF	A	402,750
WP4D	21	305,109
JH9HXF/1	21	36,176
JA2DN	14	145,755
SP5CJQ	14	106,140
OH1EB	14	98,790
DL2HCB	7	99,468
G3VMY	3.5	29,568
OK2SSS	3.5	16,872

Note: Queries pertaining to the WPX Contest should be sent to N8BJQ via *CQ* Magazine, 76 No. Broadway, Hicksville, NY 11801.



HF Equipment	Regular	SALE
IC-735 HF transceiver/SW rcvr/mic	999.00	**849.95**
PS-55 External power supply	199.00	**179.95**
AT-150 Automatic antenna tuner	445.00	**359.95**
FL-32 500 Hz CW filter	66.50	
EX-243 Electronic keyer unit	56.00	
UT-30 Tone encoder	17.50	

IC-745 9-band xcvr w/.1-30 MHz rcvr	1049.00	**899.95**
PS-35 Internal power supply	199.00	**179.95**
EX-241 Marker unit	22.50	
EX-242 FM unit	44.00	
EX-243 Electronic keyer unit	56.00	
FL-45 500 Hz CW filter (1st IF)	66.50	
FL-54 270 Hz CW filter (1st IF)	53.00	
FL-52A 500 Hz CW filter (2nd IF)	108.00	**99.95**
FL-53A 250 Hz CW filter (2nd IF)	108.00	**99.95**
FL-44A SSB filter (2nd IF)	178.00	**159.95**

IC-751 9-band xcvr/.1-30 MHz rcvr	1399.00	**999.00**
IC-751A 9-band xcvr/.1-30 MHz rcvr	1649.00	**1399**
PS-35 Internal power supply	199.00	**179.95**
FL-32 500 Hz CW filter (1st IF)	66.50	
FL-63 250 Hz CW filter (1st IF)	54.50	
FL-52A 500 Hz CW filter (2nd IF)	108.00	**99.95**
FL-53A 250 Hz CW filter (2nd IF)	108.00	**99.95**
FL-33 AM filter	35.25	
FL-70 2.8 kHz wide SSB filter	52.00	
RC-10 External frequency controller	39.25	

Other Accessories:	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	**1699**
PS-15 20A external power supply	169.00	**154.95**
PS-30 Systems p/s w/cord, 6-pin plug	299.00	**269.95**
OPC Opt. cord, specify 2, 4 or 6-pin	10.00	
MB Mobile mount, 735/745/751A	24.50	
SP-3 External speaker	61.00	
SP-7 Small external speaker	49.00	
CR-64 High stab. ref. xtal (745/751)	63.00	
PP-1 Speaker/patch	159.25	**149.95**
SM-6 Desk microphone	44.95	
SM-8 Desk mic - two cables, Scan	78.50	
SM-10 Compressor/graph EQ, 8 pin mic	136.25	**124.95**
AT-100 100W 8-band auto. antenna tuner	445.00	**389.95**
AT-500 500W 9-band auto. antenna tuner	559.00	**489.95**
OPC-118 Adapts AT-100/500 to IC-735	16.00	
AH-2 8-band tuner w/mount & whip	625.00	**549.95**
AH-2A Antenna tuner system, only	495.00	**429.95**
OPC-137 Adapts AH-2/2A to IC-751/745	16.00	

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Other Accessories - continued:	Regular	SALE
GC-4 World Clock **(Closeout)**	99.95	**59.95**
GC-5 World clock	91.95	

6-meter VHF Portable	Regular	SALE
IC-505 3/10W 6m SSB/CW portable	549.00	**489.95**
BP-10 Internal Nicad battery pack	89.00	
BP-15 AC charger	14.00	
EX-248 FM unit	55.50	
LC-10 Leather case	39.50	

VHF/UHF base multi-modes	Regular	SALE
IC-551D 80W 6-meter SSB/CW	799.00	**699.95**
EX-106 FM option	140.00	**126.95**
BC-10A Memory back-up	9.50	
IC-271A 25W 2m FM/SSB/CW	859.00	**759.95**
AG-20 Internal preamplifier	64.00	
IC-271H 100W 2m FM/SSB/CW	1099.00	**969.95**
AG-25 Mast mounted preamplifier	95.00	
IC-471A 25W 430-450 SSB/CW/FM xcvr	979.00	**869.95**
AG-1 Mast mounted preamplifier	99.50	
IC-471H 75W 430-450 SSB/CW/FM	1399.00	**1169**
AG-35 Mast mounted preamplifier	95.00	

Accessories common to 271A/H and 471A/H		
PS-25 Internal power supply for (A)	115.00	**104.95**
PS-35 Internal power supply for (H)	199.00	**179.95**
SM-6 Desk microphone	44.95	
EX-310 Voice synthesizer	46.00	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	14.00	
UT-15S UT-15S w/TS-32 installed	92.00	

VHF/UHF mobile multi-modes	Regular	SALE
IC-290H 25W 2m SSB/FM, TTP mic	639.00	**569.95**
IC-490A 10W 430-440 SSB/FM/CW	699.00	**599.95**

VHF/UHF/1.2 GHz FM	Regular	SALE
IC-27A Compact 25W 2m FM w/TTP mic	429.00	**379.95**
IC-27H Compact 45W 2m FM w/TTP mic	459.00	**399.95**
IC-37A Compact 25W 220 FM, TTP mic	499.00	**439.95**
IC-47A Compact 25W 440 FM, TTP mic	549.00	**489.95**
PS-45 Compact 8A power supply	139.00	**129.95**
UT-16/EX-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	
IC-28A 25W 2m FM, UP/DN mic	429.00	**379.95**
IC-28H 45W 2m FM, UP/DN mic	459.00	**399.95**
IC-48A 25W 440-450 FM	459.00	**399.95**
HM-14 TTP microphone	55.50	
UT-28 Digital code squelch	37.50	
UT-29 Tone squelch decoder	43.00	
HM-16 Speaker/microphone	34.00	
IC-3200A 25W 2m/440 FM w/TTP	599.00	**499.95**
UT-23 Voice synthesizer	34.99	
AH-32 2m/440 Dual Band antenna	37.00	
AHB-32 Trunk-lip mount	34.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	20.18	
Larsen PO-MM Magnetic mount	19.63	
RP-3010 440 MHz, 10W FM, xtal cont.	1229.00	**1099**
IC-120 1W 1.2 GHz FM Mobile	579.00	**499.95**
ML-12 1.2 GHz 10W amplifier	379.00	**339.95**
IC-1271A 10W 1.2 GHz SSB/CW Base	1229.00	**1079**
AG-1200 Mast mounted preamplifier	105.00	
PS-25 Internal power supply	115.00	**104.95**
EX-310 Voice synthesizer	46.00	
TV-1200 ATV interface unit	129.00	**119.95**
UT-15S CTCSS encoder/decoder	92.00	
RP-1210 1.2 GHz, 10W FM, 99 ch. synth	1479.00	**1299**

Hand-held Transceivers

Deluxe models	Regular	SALE
IC-02AT for 2m	399.00	**339.95**
IC-04AT for 440 MHz	449.00	**389.95**
Standard models	Regular	SALE
IC-2A for 2m	279.00	**249.95**
IC-2AT with TTP	299.00	**259.95**
IC-3AT 220 MHz, TTP	339.00	**299.95**
IC-4AT 440 MHz, TTP	339.00	**299.95**
IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	459.00	**399.95**
A-2 5W PEP synth. aircraft HT	569.00	

Accessories for Deluxe models	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	74.25
BP-8 800mah/8.4V Nicad Pak - use BC-35	74.25
BC-35 Drop in desk charger for all batteries	74.95
BC-16U Wall charger for BP7/BP8	20.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

Accessories for both models	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	47.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	37.50
BP-4 Alkaline battery case	15.25
BP-5 425mah/10.8V Nicad Pak - use BC35	58.50
CA-5 5/8-wave telescoping 2m antenna	18.00
FA-2 Extra 2m flexible antenna	11.50
CP-1 Cig. lighter plug/cord for BP3 or Dlx	13.00
CP-10 Battery separation cable w/clip	22.50
DC-1 DC operation pak for standard models	23.25
EX-390 Bottom slide cap	5.50
MB-16D Mobile mtg. bkt for all HTs	21.99
LC-2AT Leather case for standard models	54.50
RB-1 Vinyl waterproof radio bag	31.50
HH-SS Handheld shoulder strap	16.95
HM-9 Speaker microphone	47.00
HS-10 Boom microphone/headset	23.25
HS-10SA Vox unit for HS-10 & Deluxe only	23.25
HS-10SB PTT unit for HS-10	23.25
ML-1 2m 2.3w in/10w out amplifier	**SALE 99.95**
SS-32M Commspec 32-tone encoder	29.95

Receivers	Regular	SALE
R-71A 100 kHz-30 MHz, 117V AC	$949.00	**799.95**
RC-11 Infrared remote controller	67.25	
FL-32 500 Hz CW filter	66.50	
FL-63 250 Hz CW filter (1st IF)	54.50	
FL-44A SSB filter (2nd IF)	178.00	**159.95**
EX-257 FM unit	42.50	
EX-310 Voice synthesizer	46.00	
CR-64 High stability oscillator xtal	63.00	
SP-3 External speaker	61.00	
CK-70 (EX-299) 12V DC option	12.25	
MB-12 Mobile mount	24.50	
R-7000 25 MHz-2 gHz scanning rcvr	1099.00	**969.95**
RC-12 Infrared remote controller	67.25	
EX-310 Voice synthesizer	46.00	
AH-7000 Radiating antenna	89.95	

(9)

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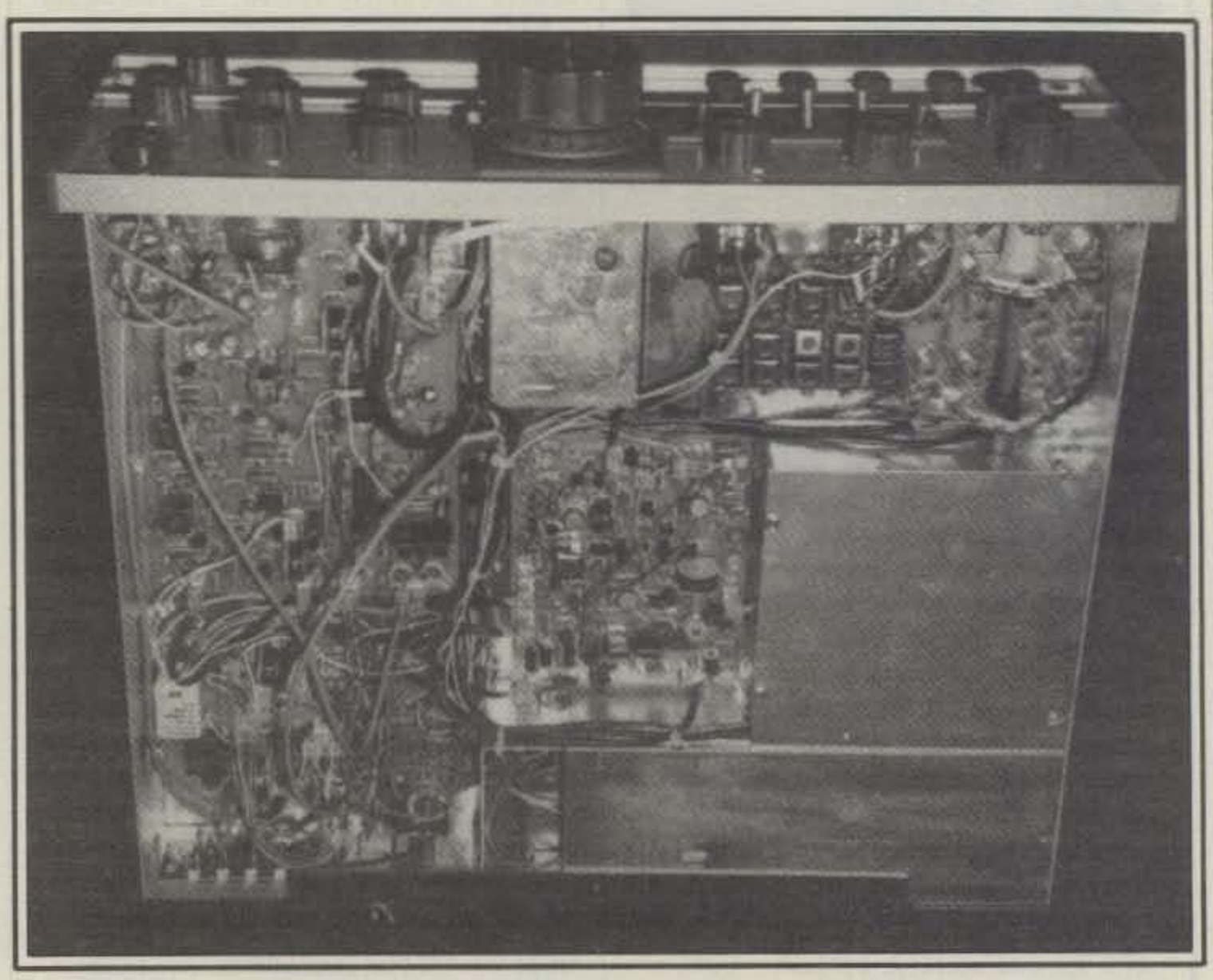
CQ REVIEWS:

The Ten-Tec Corsair II Transceiver—Part II

BY JOHN J. SCHULTZ*, W4FA/SV0DX

In reviewing a new piece of equipment, it's very hard to set guidelines, especially how much space to allow for publication. Sometimes the equipment is deceptively simple, and through use one finds much to write about and describe. In these instances the review, if run intact, would take up a majority of an issue, excluding other articles of interest. Although I don't like the practice of publishing reviews in several parts, it comes down to the only practical way of presenting all of our findings and at the same time giving readers additional amateur radio material to read and enjoy.

This month we conclude our review of Ten-Tec's Corsair II transceiver. Last month we left our discussion at the point of describing the front-panel metering. We now take up that discussion with a description of the Corsair II's frequency readout system. —K2EEK



A look inside with the bottom cover shell removed.

The frequency readout still uses 6-digit 0.3 inch LED numerals, but the color scheme has been changed with the display having five yellow readouts and a green one for hundreds of Hertz. However, behind the scenes there is much more than a cosmetic color change. The display driver circuitry has been completely changed and a logic board with a new MC68705P3 LSI circuit introduced. Fig. 5 shows the logic board diagram. Apparently, the LSI handles a variety of functions concerned with control, counting, and display, and last, but not least, it contains the iambic keyer and keyer memory functions.

Finally, to sort of "top off" an overview of the new circuitry in the Corsair II, fig. 6 shows the LPF-TR (low pass filter—transmit/receive) board. This board is the heart of QSK operation when using CW. The final amplifier output is disconnected from the low-pass filters and antenna circuit during *receive* by relay K1 to prevent signal "suck-out." Q1 indirectly controls the connection of the antenna to the receive terminals during non-transmit periods by biasing diodes D1 and D2. These PIN diodes, when not forward biased for receive, are back biased for antenna isolation on transmit by a voltage rectified by D3 to D6. The circuitry looks relatively simple, but it requires a very careful balance of switching and recovery times to achieve high-speed, clean, full QSK.

Construction

During the course of trying to obtain at least a basic idea of the circuitry in the Corsair II, a fair amount of time was spent roaming around the PC boards inside the transceiver. All of the boards are very well laid out, the component locations are clearly labeled, prime quality parts are obvious, and each board is interfaced with connectors to other boards so any individual board can be removed for service purposes rather easily. The only minor point that was missed, in my opinion, was that the internal speaker did not have a cable disconnect at the speaker terminals. Therefore, when I rather quickly removed the bottom cover (which holds the internal speaker), I pulled the voice coil connections on the speaker completely apart. A new speaker was purchased and easily installed.

From a mechanical construction viewpoint the Corsair II rates very high marks. Good hardware is used throughout. There are some riveted mountings used for phone-type rear-panel connectors. But, for the connectors which are likely to receive hard usage (e.g., the SO-239 antenna connector) solid hardware with plenty of lockwashers is used. As with the original Corsair, one continues to have the feeling that the Corsair II was designed with a great deal of attention to those internal details which would augur

c/o CQ Magazine

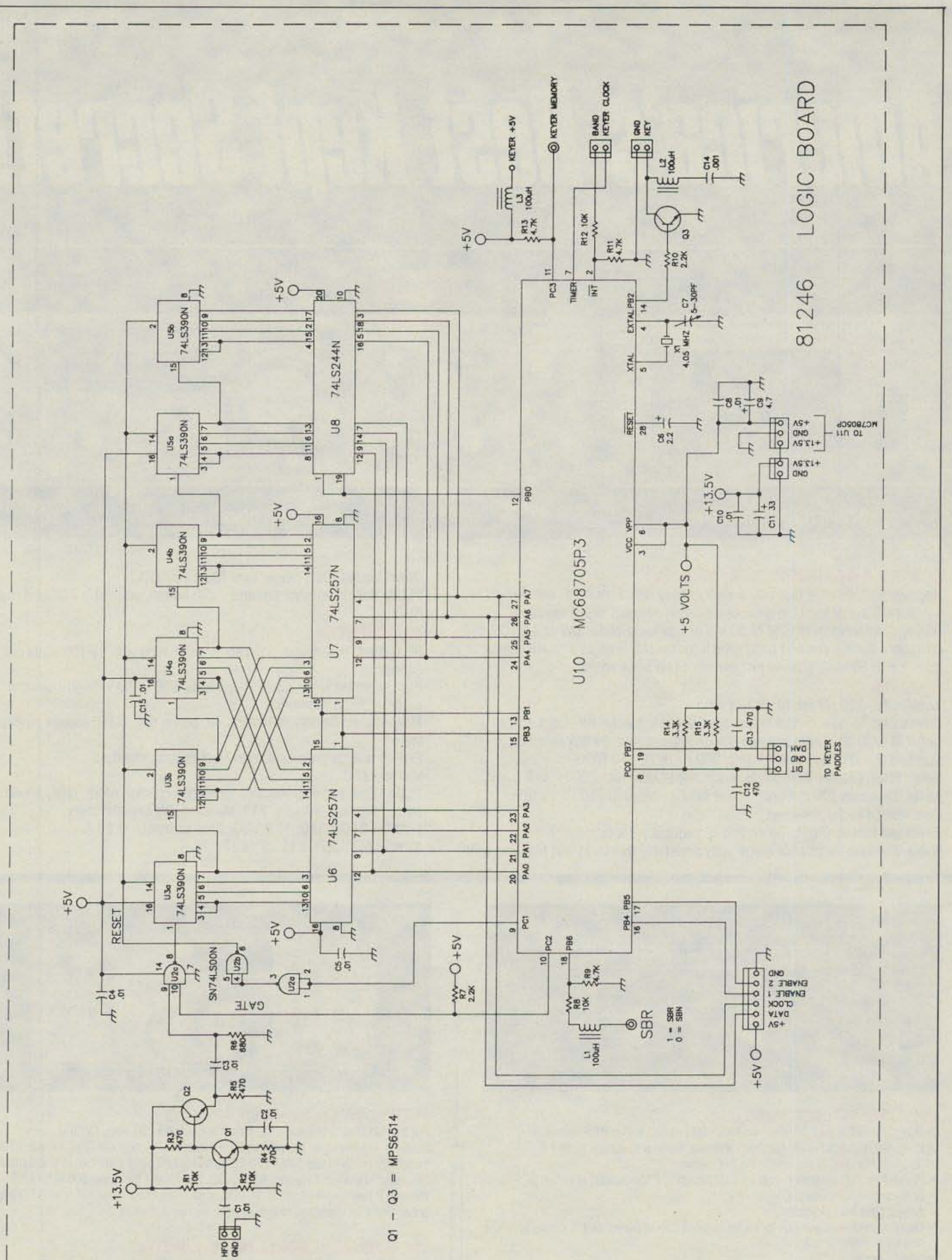


Fig. 5– The logic board. U10 also contains the keyer circuitry.

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CORSAIR II HF TRANSCEIVER, Model 561

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RECEIVER

Sensitivity: 0.25 µV for 10 dB S/N ratio.
Selectivity: 16 pole crystal ladder filter, 2.4 kHz bandwidth. 1.6:1 shape factor at 6/60 dB. Three position, mode independent, switch selects standard 2.4 kHz, optional 1.8 kHz, 500 Hz or 200 Hz filters.
Notch filter: Greater than 50 dB notch, adjustable from 200 Hz to 3.5 kHz.
Audio Bandpass filter: 8 pole, active filter centered at 750 Hz variable from filtered to flat response.
Passband tuning (PBT): Tunes 2nd IF frequency 3 kHz.
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Offset tuning: Dual range, tune RX, TX or TRX.
PLUS: Built-in antenna pre-amp, spot button, selectable AGC and much more.

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RF Output: Broadband, solid state, self tuning with 85-100 watts out, all bands.
Built-in Iambic keyer. Speed adjustable 8-50 WPM with 40 character programmable memory.
Multi-meter: Selectable reading, Ic, power out, SWR, speech processing level.
Built-in speech processor, with level control, standard.
Variable ALC.
PLUS: Rear panel connectors for station control, AFSK, QSK, phone patch, auxiliary antenna, PTT, standard CW key, and more.
POWER REQUIRED: 13.8 VDC, Base or mobile at 20 A.
Size: HWD 5.25″ x 15.25″ x 15″.

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Designed to match your 50 ohm, un-balanced coaxial, transmitter output to virtually any, balanced or un-balanced antenna. General coverage from 1.8 to 30 MHz. Handles all the power the law allows.

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- Built-in balun.
- System by-pass switch.
- 4 Position antenna select switch.
- Attractive Ten-Tec Corsair styling.
- Also available in kit-form. Model 4229.

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Put the fun back into hamming. This is a top notch, 50 watt, CW transceiver. Features found in only the best rigs are included. Full break-in QSK, excellent RX selectivity on CW (also tunes LSB/USB) and 100% solid state circuitry. Broadband "no tune" RF amp. Operates 80, 40, 30, 20, 15 and the lower 500 KHz of 10 meters. Power required, 12 to 14 VDC at 6A. Size HWD 4″ x 10″ x 10.5″. Weight 6 lbs. Great for portable, mobile or base station operation.

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REMOTE VFO, Model 263

Uses the same PTO design as the CORSAIR. Adds complete TX/RX frequency control. Front panel switch selects, CORSAIR transceive, 263 transceive, CORSAIR TX/263 RX, 263 TX/CORSAIR RX. You can also listen to both frequencies simultaneously. A balance control is provided for priority adjustment. Also makes provision for Xtal control. Connects to CORSAIR with cables provided. Size is HWD 5.25″ x 7.5″ x 12″.

MATCHING POWER SUPPLY, with built-in speaker, Model 260

A highly regulated and filtered, 20 amp. supply. Includes protective circuit breaker and primary power fuse. Can use either 115 or 230 VAC, 50/60 Hz. Size is HWD 5.25″ x 7.5″ x 12″.

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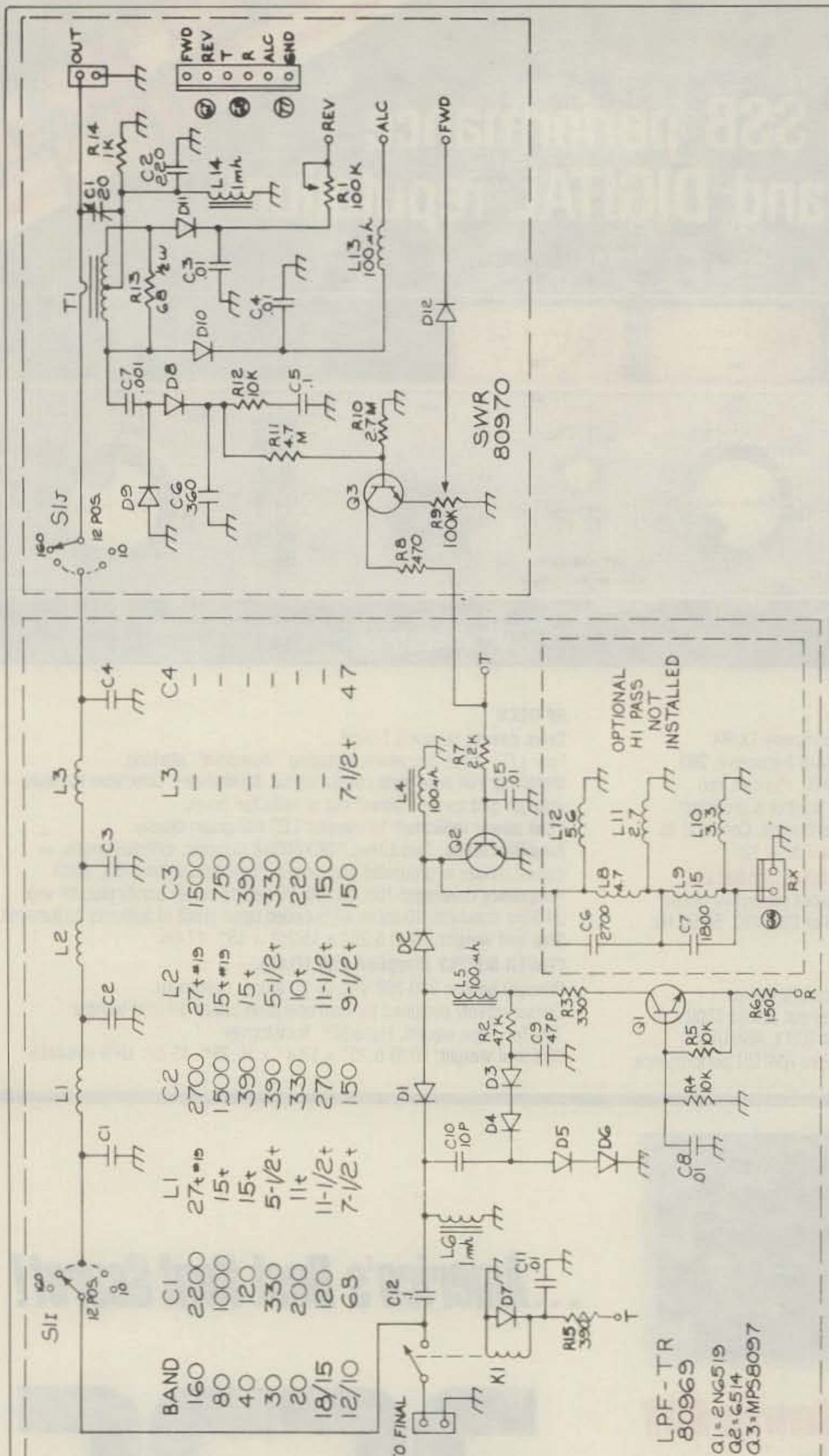

Fig. 6– The low-pass filter and transmit/ receive board which contains the antenna switching circuitry for QSK operation.

for the combination of an extremely long, normal service life, yet allow the relatively easy removal of PC boards or other components if service work is necessary.

Two of the photographs show the transceiver with its top and bottom outer shell covers removed. Ten-Tec has stayed, basically, with its original design concept of distributing the transceiver's circuitry among a large number of PC boards. In fact, although all sorts of circuit boards have changed, their "head count" remains at 22. This construction approach requires a good amount of interconnection wiring among the boards, but it keeps the signal circuits better isolated, and the interaction between diverse signal paths is minimized.

One can see from the photographs that the PC boards are very neatly arranged. Some of the cable runs seem to be a bit haphazard, but in reality they are well grouped and held together by numerous cable ties. The shielding of individual boards or sections has been increased. For instance, looking at the photograph of the bottom interior one can still see the shielded PTO assembly behind the main PTO tuning knob. However, new shielding has been added to completely enclose the Oscillator/Mixer assembly (middle right) and the bottom of the power amplifier section (lower right). The actual power amplifier is in another separately shielded enclosure directly connected to the heat sink on the rear of the transceiver. Because of the added shielding, only a small portion of the bandswitch can be seen (upper right corner). All of the main RF paths for the bandpass and low-pass filters are switched by the bandswitch. No relays or diode-switching schemes are used. Diode switches are used, however, in some sections of the transceiver for in/out switching of the RF amplifier stage on receive, selection of the optional IF filters, routing of the IF signal, and various other functions.

Looking at the top interior view, one immediately spots that a new shield has been placed over the top side of the power amplifier section. The large shielded enclosure in the upper middle part of the photograph used to house the frequency counter circuitry. It still houses that type of circuitry and also the circuitry shown in fig. 5. One can see three blank areas (middle left) which are provided for mounting any of the three optional IF filters.

Bench Checks

The "specs" measured on the Corsair II proved to be better in many cases than those found on the original Corsair. Certainly, none came out worse. There are no super dramatic improvements in any given area, but the fact that so many improvements were noted "across the board" confirms again that Ten-Tec worked over the original design in every corner. Some of the measurements were so uniform it was not felt useful to tabulate them. For instance, the power output varied at most ±2 watts from 100 watts on all bands. Full power output was available for at least 30 minutes key-down without anything seeming to go astray (not using any external fan). Transmit third-order IMD products on 20 meters measured −34 dB at full output (an improvement of several dB). Unwanted sideband rejection and carrier suppression both improved to better than −63/64 dB.

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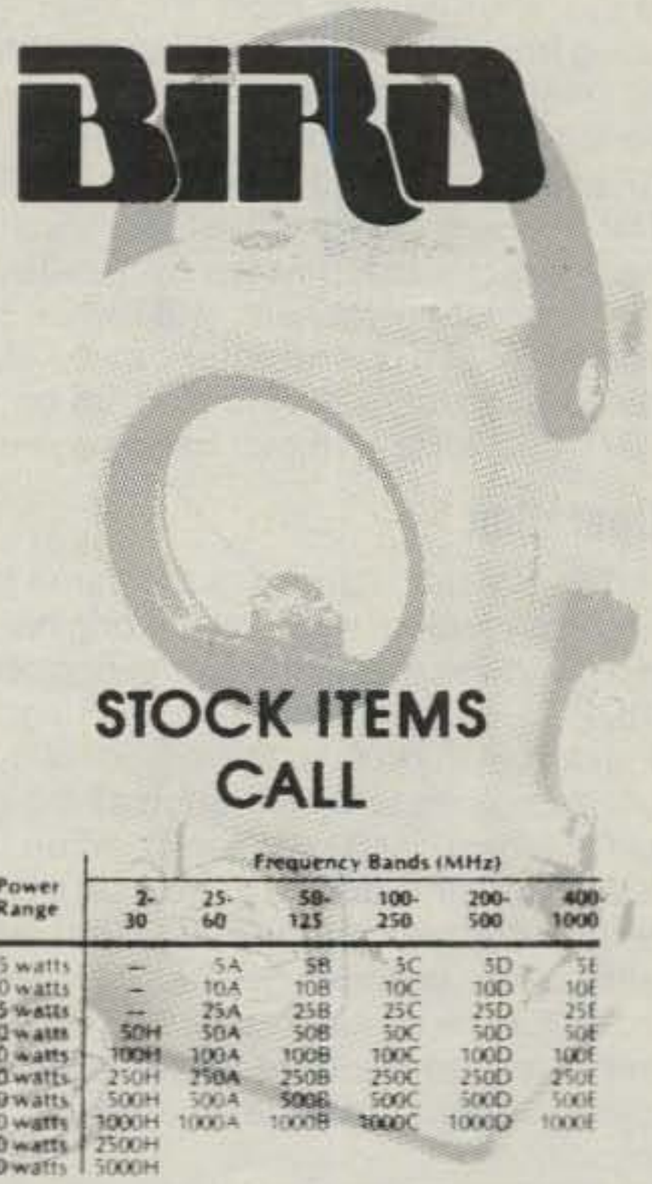

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25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
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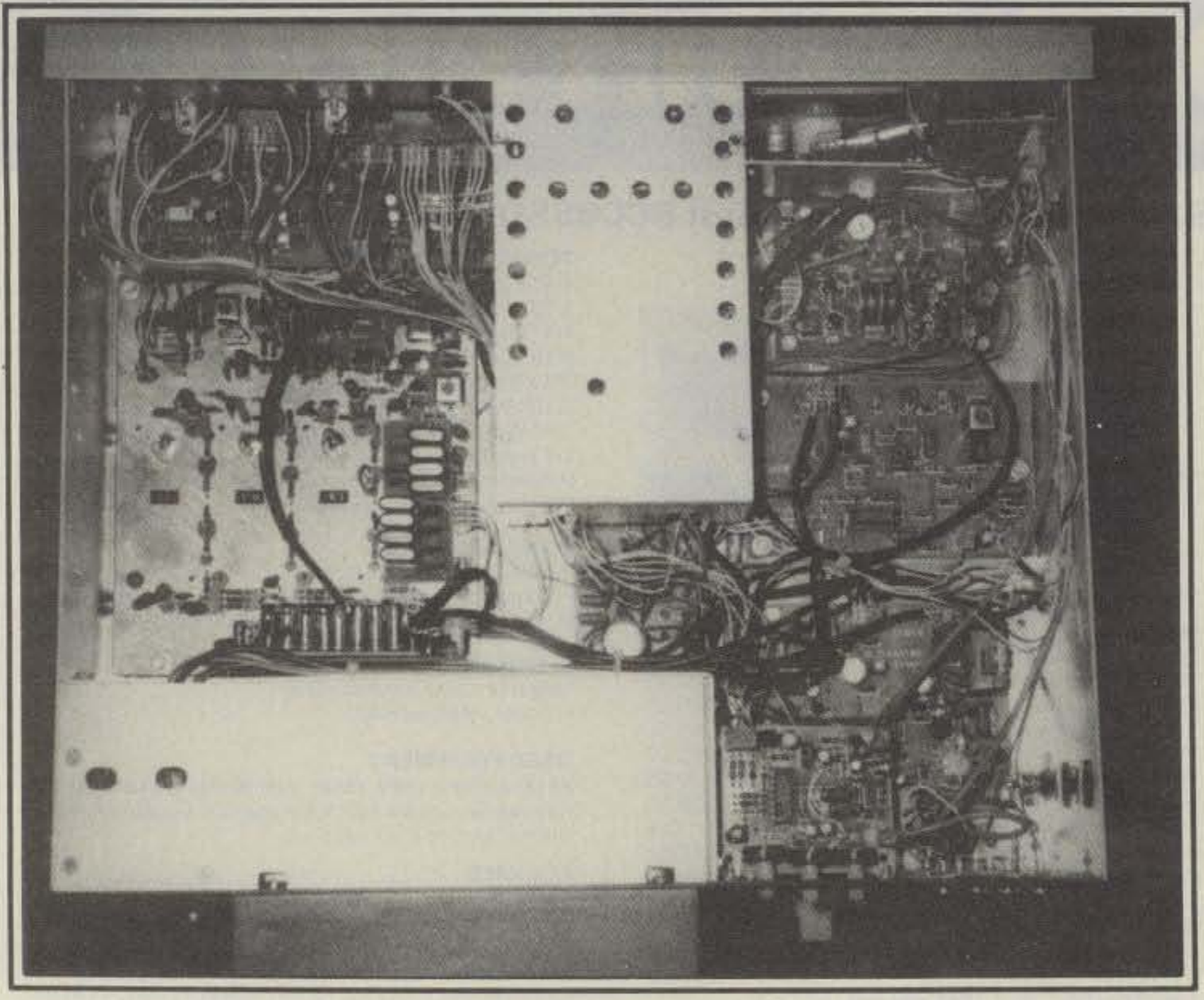

A look inside with the top cover removed.

On the receive side, the dynamic range showed the most improvement, going from 90 to 96 dB (SSB bandwidth on 40 meters). The third-order intercept point was an excellent +19 dB with the RF amplifier *out* and +7 dB with it active. The receive "birdies" of significance were exactly those noted by Ten-Tec in the instruction manual: 1.838, 21.300, and 28.980 MHz. The latter can be eliminated by using the VFO overrun on the 29.0–29.5 MHz 10 meter band segment.

Operation

The Corsair II provides the same light and easy tuning "feel" as the original design with the main tuning covering about 18–20 kHz per revolution. Markings on the skirt of the knob can be used for quick but approximate QSY's, such as the typical up/down 3 or 5 kHz. Ten-Tec didn't follow my original advice to provide a deeper fingertip well on the knob. That would still be my preference. The new yellow color for the digital frequency readout is very easy on the eyes while being sufficiently bright under any ambient light condition.

Ten-Tec makes a point of the fact that the "S" meter reads the commonly accepted standard of 50 microvolts for S9. It does indeed on 20 meters. Another transceiver I was testing in a price class above that of the Corsair II required 300 microvolts to read S9.

As with the original design, the low-noise design of the transceiver creates the impression of even relatively weak signals "popping" out of a quiet background as one tunes across a band. It definitely will be pleasing to an operator who spends hours behind a transceiver searching for rare DX.

I rarely had to deactivate the RF amplifier stage (done by means of a pull-switch on the RF gain control) to avoid overload conditions even when encountering strong broadcast QRM on some bands. However, even the best designs can "cave in" under extreme conditions, so it's nice to know the switch is there. It's also nice to see that separate RF and AF gain controls are retained.

As for combating QRM, the optional filters, the standard notch and passband tuning, and the new bandpass tuning features provide many possibilities. Since none of them are on ganged controls, they are all easy to manipulate. The offset tuning (selectable ±1.5 or 4 kHz) is also extremely useful, and it can be used for either receive or transmit offset. The new bandpass filter control, although centered on 750 Hz and presumably intended for CW reception, was also very helpful on SSB reception. The passband tuning acts as a variable bandwidth feature on SSB (either with the standard 2.4 kHz or optional 1.8 kHz SSB filter) and functions very smoothly, although I would have preferred that the tuning range be spread over more of the potentiometer rotation. If one of the optional CW filters is installed, the passband tuning no longer changes the bandwidth, but the effect is produced of having a BFO control so stations close together within the narrow bandwidth of the filter can still be distinguished by their pitch. All in all, I would say the Corsair II provides very balanced features on receive for both the CW and SSB operator. For casual operating (however one defines that), the optional filters are not necessary. For serious DX or contest operating on a crowded band, one or more of the optional filters becomes a very logical investment.

On the transmit side, excellent reports were obtained on both CW and SSB, although my CW ability is really below the capabilities of the transceiver. Using either mode tune-up quite simple. The mode switch is placed in the "lock" position and the drive control advanced until the ALC LED lights. While doing this, any external accessory, such as an antenna tuner, can be adjusted. When operating CW, tune-up is then complete. When operating SSB, one has to double-check that the ALC LED only lights on voice peaks and, if not, advance or retard the drive control (now acting as a microphone gain control) accordingly. One can use the panel meter to check various parameters on transmit, but once initially set up, the ALC LED "tells it all." Once one gets used to operating the unit, one can even sense from the LED if the speech processor is correctly adjusted.

For CW operation one has all sorts of possibilities to key the unit. An external electronic keyer or straight key can be used, or one can use the internal keyer by connecting an external paddle. The internal keyer worked as smoothly as any I have ever tried. The use of the built-in keyer memory requires a simple, external switch connection to set the memory for either programming or playback. Forty characters, including pauses, can be recorded. In playback, the speed is set at that of the front-panel keyer speed control.

Full or semi break-in operation is available. I'm sure I couldn't "exercise" the Corsair II fully on QSK, but at 20 wpm plus the full break-in seemed to work perfectly. Considering that the receive recovery time is 30 ms and that a dot has a length of 30 ms at 40 wpm, the upper speed limit for full QSK must surely be at least 40 wpm. The 30 ms recovery time also means the Corsair II should be fully AMTOR compatible, although that mode was not tested. Naturally, the Corsair II has all the necessary features to operate full QSK with Ten-Tec's TITAN linear amplifier. The built-in sidetone is adjustable for volume and pitch by thumb-wheel controls reached via an opening in the bottom cover.

On SSB, consistent reports were received of full, clean modulation using Ten-Tec's Model 214 electret microphone. The speech processor deserves extremely high marks for a purely AF type. Comparison reports under medium to weak signal conditions (roughly S5 or below) indicated that the use of the pro-

cessor added about an "S" unit to the received signal. Many stations preferred that the processor be left in at all times. I couldn't find any fault with the processor—indeed it deserves great praise—but I did sort of feel that an opportunity was lost with the Corsair II to offer the user who also desires true RF-clipping-type processing a choice of processing methods. After all, an 8-pole SSB filter sits unused in the set during transmit, which would seem ideally applicable to filter a clipped SSB IF signal. I suspect the good folks at Ten-Tec can't accept the idea that *moderate* RF clipping produces better results than involved AF processing schemes.

Accessories

Besides the optional IF filters, the main accessories available are the Model 260 power supply, Model 263G remote VFO, and the Model 425 TITAN linear amplifier.

The 260 power supply is a fully regulated, overcurrent and overvoltage protected unit. It also contains a front-panel facing ceramic magnet speaker. It is a ruggedly constructed unit with a large heat sink on the rear panel for the pass transistors, and two jacks on the rear panel for accessories needing 12 VDC. A bottom-panel switch provides for 110 or 220 volt primary operation. The front-panel on/off switch is also a circuit breaker which can easily be reset if a quick overload takes place during tune-up, for instance. The 260 was used when testing the Corsair II, and it is a highly recommended unit. By the way, Ten-Tec does highly recommend that their Model 1140 circuit breaker be used in the 12 volt line to the transceiver if it is powered from a power supply other than the 260 or directly from a 12 volt battery. The breaker ensures a quick enough overcurrent response to protect the final amplifier transistors. The TITAN linear amplifier was covered in a previous review article. It interfaces, of course, fully and instantly with the Corsair II to develop a full legal-power-input station with full QSK on CW.

Owner's Manual

The manual for the Corsair II is, first of all, spiral bound. It's a small point, but it is one of the few manuals around that one can lay flat for page-by-page usage. The manual is easy to read and starts off with basic hookup information, condensed step-by-step operating instructions for those who are hell-bent to get the transceiver on the air a few minutes after hooking it up, detailed operating instructions so one can really appreciate how to use the transceiver after one calms down, and then finishes up with an alignment and service section. The latter section contains a block diagram, a main chassis wiring diagram, and schematic diagrams for each PC board to include voltage-level charts. Alignment instructions are also given for each PC board where such work is user-possible. Given the information supplied, an experienced amateur, even with only what today would be considered basic test equipment, can perform a considerable amount of troubleshooting and alignment work on the transceiver. Only the counter and logic boards would be beyond field service.

The Corsair II which was tested worked perfectly from the day "go," so I can't comment personally about any factory service work. But other amateurs with whom I have discussed Ten-Tec's service response continue to rate it as outstanding.

Summary

I think the point has been adequately made that the Corsair II is not the original Corsair with a few factory updates. It is a newly redesigned Corsair both inside and outside. The transceiver has sophisticated operating features, but is still very straightforward to operate. It makes sense that Ten-Tec has expressed an intention to continue to produce the Corsair line for those amateurs who obviously prefer its design philosophy and attention to details in execution of the design.

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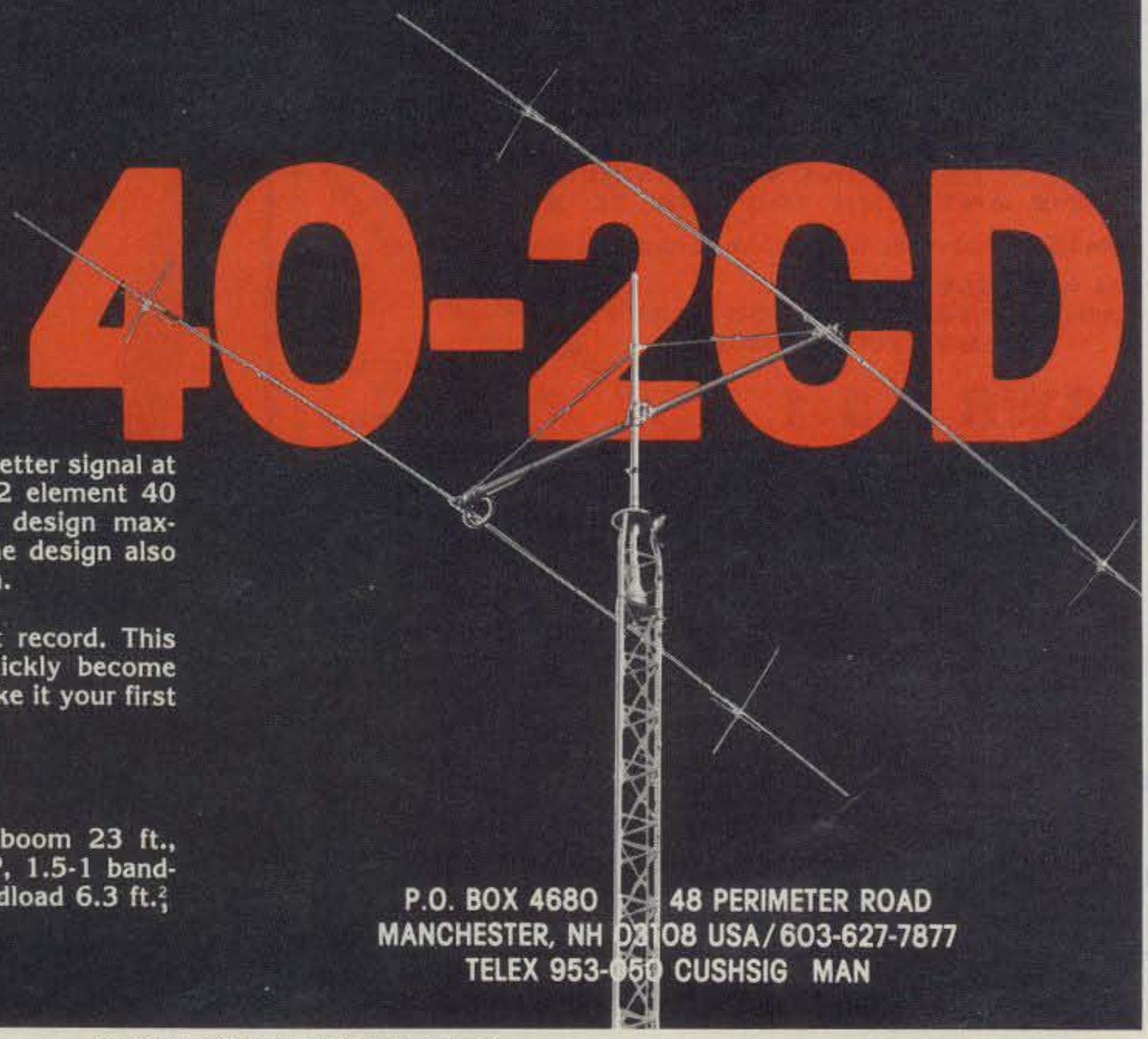

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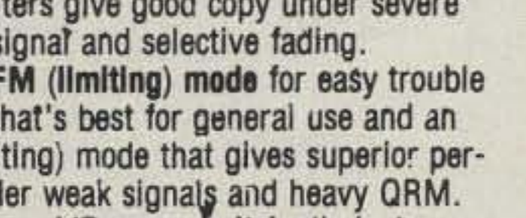
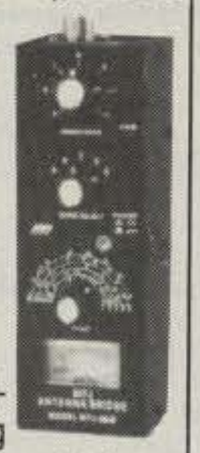


MFJ ANTENNA BRIDGE MFJ-204B $79.95



Now you can quickly optimize your antenna for peak performance with this portable, totally self-contained antenna bridge that you can take to your antenna site—no other equipment is needed.

You can determine if your antenna is too long or too short, measure its resonant frequency and antenna resistance to 500 ohms. It's the easiest and most convenient way to determine antenna performance available today to anyone. There's nothing else like it and only MFJ has it. Built-in resistance bridge, null meter and tunable oscillator-driver (1.8-30 MHz). Uses 9 V battery. 4 x 2 x 2 inches.

REMOTE ACTIVE ANTENNA

The authoritative "World Radio TV Handbook" rates the MFJ-1024 as "a first-rate easy-to-operate active antenna ... Quiet, with excellent dynamic range and good gain ... Very low noise factor ... Broad frequency coverage ... the MFJ-1024 is an excellent choice in an active antenna"

54 inch remote active antenna mounts outdoor away from electrical noise for maximum signal and minumum noise pickup. Often outperforms long-wire hundreds of feet long. Mount anywhere-atop houses, buildings, baiconies, apartments, ships.

Use with any radio to receive strong clear signals from all over the world. 50 KHz to 30 MHz. High dynamic range eliminates intermodulation. Inside control unit has 20 dB attenuator, gain control. Switch 2 receivers and auxiliary or active antenna. "On" LED. 6 x 2 x 5 in. 50 ft. coax. 12 VDC or 110 VAC with MFJ-1312, $9.95.

MFJ-1024 **$129.95**

200 WATT VERSA TUNER

MFJ-901B **$59.95**

MFJ's smallest 200 watt Versa Tuner matches coax, random wires and balanced lines from 1.8 thru 30 MHz. Works with all solid state and tube rigs. Very popular for use between transceiver and final amplifier. Efficient air-wound inductor gives more watts out. 4:1 balun, 5x2x6 in.

ROLLER INDUCTOR TUNER

MFJ-989B **$329.95**

Meet the "Versa Tuner V", the compact roller inductor tuner that lets you run up to 3 KW PEP and match everything from 1.8 to 30 MHz.

Designed to match the new smaller rigs, the MFJ-989B is the best roller inductor tuner produced by MFJ. Our roller inductor tuner features a 3-digit turn counter plus a spinner knob for precise inductance control for maximum SWR reduction. Just take a look at all these other great features! **Built-in 300 watt, 50 ohm dummy load, built-in 4:1 balun and a built-in lighted cross-needle meter** that reads SWR and forward and reflected power all in one glance. Accuracy ±10% full scale. Meter light requires 12 VDC. 6 position antenna switch. 10¾ × 4½ × 15 inches.

MFJ "DRY" DUMMY LOADS

MFJ-262 **$64.95**

MFJ-260 **$26.95**

MFJ's "Dry" dummy loads are air cooled—no messy oil. Just right for tests and fast tune up. Non-inductive 50 ohm resistor in aluminum housing with SO-239. Full load to 30 seconds, de-rating curve to 5 minutes. **MFJ-260 (300 watt)**, SWR 1.1:1 to 30 MHz, 1.5:1, 30-160 MHz, 2½x2½x7 in. **MFJ-262 (1 KW)**, SWR 1.5:1 to 30 MHz, 3x3x13 inches.

MFJ ELECTRONIC KEYER

MFJ-407 **$69.95**

MFJ-407 Deluxe Electronic Keyer sends Iambic, automatic, semi-auto or manual. Use squeeze, single lever or straight key. Plus/minus keying. 8 to 50 WPM. Speed, weight, tone, volume controls. On/Off, Tune, Semi-auto switches. Speaker. RF proof. 7 x 2 x 6 inches. Uses 9 V battery, 6-9 VDC or 110 VAC with AC adapter, MFJ-1305, $9.95.

ORDER ANY PRODUCT FROM MFJ AND TRY IT—NO OBLIGATION. IF NOT SATISFIED, RETURN WITHIN 30 DAYS FOR PROMPT REFUND (less shipping).

• One year **unconditional** guarantee • Add $5.00 each shipping/handling • Call or write for free catalog, over 100 products.

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MFJ ENTERPRISES, INC.
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Call 601-323-5869 in Miss. and outside continental USA Telex 53-4590 MFJ STKV

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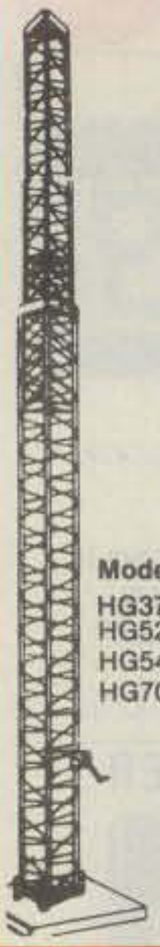
ANTENNA/TOWER SALE!



hy-gain

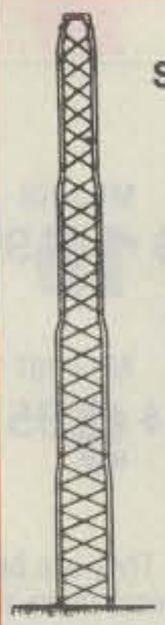
CRANKUP SALE!

All Models Shipped Factory Direct—Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
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.!



ROHN

Self Supporting Towers On SALE! FREIGHT PREPAID

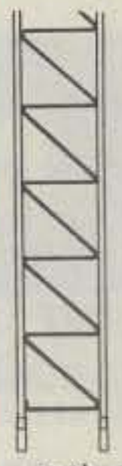
- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	164	$329
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.**

ROHN

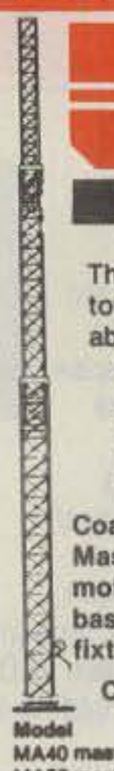
Guyed Tower Packages



- **World Famous Rohn Quality and Dependability**
- **Rugged high wind survival-provides safe installation**
- **Multi purpose towers satisfy a wide range of needs**
- **Complete packages include: guy hardware, turnbuckles, guy assemblies, w/torq bars, concrete base, rotor plate and top section per manufacturers specs.**

Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

	Model 25G	Model 45G	Model 55G
50'	$ 579	1079	1439
60'	639	1209	1609
70'	689	1329	1759
80'	849	1479	1929
90'	919	1749	2089
100'	989	1899	2259
110'	1189	2019	2639
120'	1259	2179	2819



US TOWER CORPORATION

These rugged crankup towers and masts now available from Texas Towers!

Check these features:
- All steel construction
- Hot dipped galvanized
- Totally self-supporting-
- No guys needed

Coax arms, Thrustbearings Masts, Motor drives, Remote controls, Hinged bases, Rotor bases, & Raising fixtures also in stock.

CALL FOR SALE PRICES!

Model	Min. Ht.	Max. Ht.	Ant. load*	Sale price
MA40 mast	21'	40'	10 sq ft	$ 549
MA50 mast	22'	50'	10 sq ft	899
TX438	22'	38'	18 sq ft	829
TX455	22'	55'	18 sq ft	1249
TX472	23'	72'	18 sq ft	2059
HDX555	22'	55'	30 sq ft	1879
HDX572	23'	72'	30 sq ft	3229

Note - US Towers Shipped Freight Collect From Visalia, CA Factory

***Note-towers rated at 50 mph to EIA specifications**

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

9086

$.39/ft $379/1000 ft

- Same specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HARDLINE/HELIAX™

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket	$.79/ft
½" LDF4-50 Andrew Heliax™	$1.79/ft
⅞" LDF5-50 Andrew Heliax™	$3.99/ft

select connectors below.

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	5.8
9086	50	.4	.64	1.7	3.1
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™ CONNECTORS

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

COAX CONNECTORS

Amphenol Silver PL259	$1.25
UG21B N Male	$2.95
9086/9913 N Male Connector	$4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga. $.10/ft 16ga. $.09/ft
¼ mile 18ga copper-clad steel wire $30
Dog bone end insulator ..... $.79 ea.

Van Gorden

1:1 Balun ..... $11 Center Insulator $6
Dipole Kits D80 $31.95/D40 $28.95
Short Dipole Kits SD80 $35.95/SD40 $33.95
All-band Dipole w/ladder line $29.95
G5RV all band antenna $49.95

ALPHA DELTA

DX-A 160-80-40 Sloper	$49

CUSHCRAFT

A3 3-el Tribander	$229
A4 4-el Tribander Beam	$299
A743 & A744, 30/40 mtr KIT for the A3 & A4 ea	$79
R3 20, 15, 10mtr Vertical	$275
AV5 80-10mtr Vertical	$109
D40 40mtr Dipole	$159
40-2CD 2-el 40 mtr Beam	$299
A50-5 5-el 6 mtr Beam	$85
215 WB NEW 15-el 2 mtr Beam	$85
230 WB NEW 30-el 2 mtr Beam	$229
4218 XL 18-el 2 mtr Beam	$105
3219 19-el 2 mtr Beam	$99
220B 17-el 220MHz Beam	$99
424B 24-el 432MHz Beam	$85
ARX2B 2 mtr Vertical	$39

hy-gain — **Limited Quantities purchased at old prices. Call for current prices**

Discoverer 2-el 40-mtr Beam	
Discoverer 3-el Conversion Kit	
EXPLORER-14 SUPER-SPECIAL	
QK710 30/40 mtr. Add-On-Kit	
V2S 2-mtr Base Vertical	
V4S 440MHz Base Vertical	
TH5MK2S Broad Band 5-el Triband Beam	
TH7DXS 7-el Triband Beam	
TH3JRS 3-el Triband Beam	
205BAS 5-el 20-mtr Beam	
155BAS 5-el 15-mtr Beam	
105BAS 5-el 10-mtr Beam	
204BAS 4-el 20-mtr Beam	
64BS 4-el 6-mtr Beam	
12 AVQ 20-10 mtr vertical	
14 AVQ 40-10 mtr vertical	
18AVT/WB 80-10mtr Vertical	
18HTS 80-10 mtr Hy-Tower Vertical	
23BS 3-el 2 mtr Beam	
25BS 5-el 2 mtr Beam	
28BS 8-el 2 mtr Beam	
214BS 14-el 2-mtr Beam	
2BDQ 80/40 mtr Trap Dipole	
5BDQ 80-10 mtr Trap Dipole	
BN86 80-10 mtr KW Balun W/Coax Seal	

CALL FOR SPECIAL PRICES!

HUSTLER

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

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6V 80-10 Mtr. Vertical Antenna $129. Delivered (Cont. USA)

- Full Legal Power 80/10 Meters
- Optional Stub Tuned Radial Kit Model STR II $29
- Optional Roof Mounting Kit Model RMK II $49 (includes STR II)
- Optional 160 Meter Resonator Kit Model TBR 160 $49

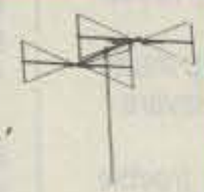
HF2V 80/40 Meter Vertical Antenna $129 Delivered (Continental USA)

- Optional 160 Meter Resonator Kit Model TBR 160 $49

HF6V HF2V

Free Shipping On Butternut Accessories Also When Purchased With Antenna

HF4B "Butterfly" $189. (del. cont. USA)



- Covers 10, 12, 15, 20M
- Compact Beam Design
- Max. Element Length of 12.5'
- Light Weight, Only 17 lbs.
- Use with TV Rotor

KLM

KT34A 4-el Broad Band Triband Beam	$Call
KT34XA 6-el Broad Band Triband Beam	$Call
2m-14C 14-el 2-mtr Satellite Antenna	$Call
2m-16LBX NEW 16-el 2-mtr Beam	$Call
2m-22C NEW 22-el 2-mtr Satellite Antenna	$Call
132-30LBX NEW 30-el 432 MHz Antenna	$Call
435-18C 435 MHz Satellite Antenna W/CS-2	$Call
435-40CX 435 MHz Satellite Antenna W/CS-2	$Call

ROTORS

Alliance HD73 (10.7 sq ft rating)	$119.95
Alliance U110 (3 sq ft rating)	$49
Telex CD 45II (8.5 sq ft rating)	$Call
Telex HAM 4 (15 sq ft rating)	$Call
Telex Tailtwister (20 sq ft rating)	$Call
Telex HDR3000 Heavy Duty (25 sq ft rating)	$Call
Kenpro KR500 Heavy Duty Elevator Rotator	$189
Kenpro KR5400 AZ/EL Rotor Package	$319

ROTOR CABLE

Standard 8 cord cables $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWERS

10 ft Stack Sections
20G $39.50 45G $112.50
25G $49.50 55G $149.50

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

Foldover Towers	Model	Height	Ant Load*	Price
	FK2548	48 ft	15.4 sq ft	$899
	FK2558	58 ft	13.3 sq ft	$949
	FK2568	68 ft	11.7 sq ft	$999
	FK4544	44 ft	34.8 sq ft	$1199
	FK4554	54 ft	29.1 sq ft	$1299
	FK4564	64 ft	28.4 sq ft	$1399

25G Foldover Double Guy Kit	$249
45G Foldover Double Guy Kit	$269

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.
All Foldover Towers Shipped Freight Prepaid Continental USA! Foldover Prices 10% Higher West of Rockies.

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	$.15/ft
1/4 EHS Guywire (6650 lb rating)	$.18/ft
5/16 EHS Guywire (11,200 lb rating)	$.29/ft
5/32 7 × 7 Aircraft Cable (2700 lb rating)	$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32")	$.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 × 9EE (1/2" × 9" Eye to Eye Turnbuckle)	$9.95
1/2 × 9EJ (1/2 × 9" Eye & Jaw Turnbuckle)	$10.95
1/2 × 12EE (1/2" 12" Eye & Eye Turnbuckle)	$12.95
1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle)	$13.95
5/8 × 12EJ (5/8" × 12" Eye & Jaw Turnbuckle)	$16.95
3/16" Preformed Guy Grip	$2.49
1/4" Preformed Guy Grip	$2.99
6" Diam - 4 ft Long Earth Screw Anchor	$14.95
500 D Guy insulator (5/32" or 3/16" Cable)	$1.69
502 Guy Insulator (1/4" Cable)	$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod	$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.49/ft
HPTG6700 Guy Cable (6700 lb rating)	$.69/ft
9901LD Cable End (for 2100/4000 cable)	$8.95
9902LD Cable End (for 6700 cable)	$9.95
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	$69	$89
.18 in Wall	$39	$69	$99	$129
.25 in Wall	$69	$129	$189	$249

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(Antenna/tower product prices do not include shipping unless noted otherwise)

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TS-940S LIST $2249
NEW Top-of-the Line HF Transceiver
- **100% Duty Cycle**
- **40 Memory Channels**

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TS-440S NEW! LIST $1199
CALL FOR SPECIAL SALE PRICE

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TS-811A LIST $1049
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TW-4000A LIST $599
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TR-751A LIST $599
All Mode 2m Mobile

COMPACT 2M FM MOBILE

TM 2570A (70W)	**LIST $559**
TM 2550A (45W)	**LIST $469**
TM 2530A (25W)	**LIST $429**
TM 3530A (220MHz)	**LIST $449**

CALL FOR SPECIAL PRICE

TR2600A - 2mtr
TR3600A - 70cm
High Tech HT XCVRS

NEW Ultra-Compact HT XCVRS
TH21AT 2mtr
TH31AT 220 MHz
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CALL FOR SPECIAL PRICES— SAVE $$$!!

ICOM

IC735 NEW General Coverage HF Transceiver Full Featured Ultra Compact · Economical
LIST PRICE $999
CALL FOR SPECIAL PRICE!

IC-751A New Full Featured HF Transceiver. Top of the Line.
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CALL TODAY FOR LOW TEXAS TOWERS/ICOM PRICE!

IC271A LIST $859 **IC271H LIST $1099**
IC471A LIST $979 **IC471H LIST $1339**
IC 1271A LIST $1229
CALL TODAY FOR SPECIAL LOW ICOM PRICES!

IC-27A LIST $429 **IC-27H LIST $459**
IC-28A LIST $429 **IC-28H LIST $459**
IC-37A LIST $499 **IC-47A LIST $549**
CALL TODAY FOR SPECIAL ICOM PRICES!

IC3200 NEW 2M/70cm Dual Band Xcvr LIST $599
CALL FOR SPECIAL PRICE!

IC02AT - 2mtr
IC04AT - 70cm
High Tech HT XCVRS

IC2AT - 2mtr
IC3AT 220 MHz
IC4AT 440 MHz
ALL IN STOCK— CALL FOR SPECIAL PRICES!

ASTRON POWER SUPPLIES

Heavy Duty - High Quality - Rugged - Reliable

- Input Voltage: 105-125 VAC Output: 13.8 VDC ± .05V
- Fully Electrically Regulated 5mV Maximum Ripple
- Current Limiting & Crowbar Protection Circuits
- M-Series with Meter-A-Series Without Meter

Model	'Cont. Amps	ICS Amps	Price
RS4A	3	4	$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

YAESU

FT 767 GX HF/VHF/UHF
LIST $1895 CALL FOR SALE PRICE

FT-757GX LIST PRICE $995
CALL FOR SPECIAL SALE PRICE!

FT2700RH NEW 2m/70cm Dual Band Transceiver Full Duplex-Cross Band Operation LIST $599
CALL FOR PRICE-SAVE $$!

FT 209/709 RH
NEW HIGH Tech HT's
5W Output

New! FT727 RH
2m/70 cmHT
- **5w Output**
- **10 memories**
- **Battery saver**

Call For Sale Prices

NEW PACKRATT Model PK-64 Packet Controller $219.95

New PK-64 Packet Controller	**$219.95**
HF Modem Unit	**$99.95**
PK232 Packet Controller	**$289.95**
PK80 Packet Controller	**$219.95**
CP1-64 Computer Patch	**$219.95**
Isopole 144,220,440	**CALL**

MIRAGE AMPLIFIER SALE!

B3016
ONLY $229!

Model	Band	Pre-amp	Input	Output	Sale Price
A1015	6M	Yes	10W	150W	$289
B23S	2M	No	2W	30W	$ 99
B23A	2M	Yes	2W	30W	$129
B215	2M	Yes	2W	150W	$259
B108	2M	Yes	10W	80W	$159
B1016	2M	Yes	10W	160W	$259
B3016	2M	Yes	30W	160W	$229
D24	440	No	2W	40W	$219
D1010N	440	No	10W	100W	$319

ALPHA SALE

Model	LIST	SALE
76A	$1985	CALL
76PA	$2395	CALL
76CA	$2695	CALL
374A	$2595	CALL
78	$3495	CALL
77DX	$5695	CALL

Sale Prices Too Low To Print
CALL & SAVE $$!

AMERITRON

AL80A NEW 1000W 3-500Z Amplifier $699
AL-84 600W PEP Output (4-6MJ6 Tubes).....$399
RCS-4 4 Pos Remote Antenna Switch....$119.95
RCS-8V 5 Pos Remote Antenna Switch...$119.95

TEN-TEC SALE!

NEW CORSAIR II
CALL FOR PRICE AND DELIVERY INFORMATION

425 Titan New 3KW Amplifier In Stock- Call For Special Price

ALINCO

ELH-230D With GAasFET Preamp SALE $89.95

ELH-230G $59.95 **ELH-730D $149.95**
EHH-260D $129.95 **ELH-730G $119.95**

ALR-206T
- **2M Mobile**
- **Covers MARS/CAP**
- **Programmable Offset**
- **25wHI-5wLO**
- **Lithium Backup**

ALM-203T
- **2 Meter H.T.**
- **Built-In Sub Audible Tones**
- **3W Output**
- **Battery Save Function**

Kantronics

KPC-2 Packet Controller
List $219.00 SALE $199.95

KPC 2400....	**LIST $329**	**SALE $299.95**
2400 Modem	**LIST $199**	**SALE $149.95**
UTU Terminal	**List $199**	**SALE $189.95**
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FREE SHIPPING-UPS SURFACE (continental USA) (most items, except towers/antennas)

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The American Radio Relay League
225 Main St. Newington, CT. 06111 USA CQ

Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

How To Get Started In Amateur Radio— Part II of III

Last month's column covered introduction, licenses, written examination preparation, and code.

Clubs and Courses

If you have an amateur radio club in your area, you should find out if it conducts licensing courses. If so, I advise you to attend a club course. Some clubs conduct very effective licensing programs. All courses should be helpful to newcomers. Clubs can conduct activities that are beyond the capability of an individual amateur. It is a good idea to join a local radio club and to be an active member, whether or not it conducts licensing courses. If no licensing program exists at your local club, you may be successful in initiating one. If you are unable to locate a nearby club and/or course, the American Radio Relay League's Clubs and Training Department may be able to provide assistance. Write to them (at 225 Main Street, Newington, CT 06111) and tell them what you want. Be sure to give them your postal zip number, plus the postal zip number of each nearby area to which you would be willing to travel for a club and/or class.

Examinations

Novice exams (as such) are not part of the Volunteer Examiner Coordinator (VEC) Program that provides Technician through Extra class test sessions. The Novice exam is conducted by a single unrelated volunteer examiner holding at least the General class license. This test may be presented in any form selected by the examiner. It may be multiple choice (most popular), yes or no, true or false, fill in the blank, or essay. The April and May 1985 issues of *CQ* cover amateur radio examinations in detail.

A current typical Novice "written" exam contains 20 questions and each question has a selection of four possible answers. Only one of the answers is completely correct in each group of four answers. Answers such as "all of the above" and "none of the above" require three bits of knowledge (instead of one), and they are no longer used in amateur tests. The license candidate selects one answer for each of the 20 questions. A passing grade is 75% or better; one must answer at least 15 questions correctly to qualify for the Novice license.

2814 Empire Ave., Burbank, CA 91504

Meet 5-year-old Jill Kristine Dietrich, KA9VGW, of Bremen, Indiana. She may be the youngest female to ever achieve an amateur radio operator's license, and she is probably the youngest amateur currently on the air. She is a kindergarten student. Jill has been interested in amateur radio since she was three years old. Her father (Jeff, WB9ZHV) shares a fine station with Jill. It includes a Kenwood TS-520S transceiver, Heath keyer, Dentron antenna tuner, 40 meter vertical antenna, and a Hy-Gain TH6-DXX triband Yagi-Uda beam antenna. Her first contact was with KA0WGQ in Flatriver, Missouri. Jill has contacted amateurs in nine states so far. She is studying to upgrade to the Technician license. Jill's other interests include coloring, bike riding, camping, and piano playing.

One does not have to be a mathematics expert to earn a license. Most of each test (seven questions) is about rules and regulations. However, electronics is really mathematics put to practical uses, and it is in the amateur's best interest to acquire a good knowledge of electrical and electronic fundamentals. If possible, study and practice code with someone else who is interested in amateur radio.

When you are ready to take the Novice license exam, locate an unrelated General (or higher) class licensee who is at least 18 years old and is willing to serve as your volunteer examiner. It is common for amateur radio clubs to regularly conduct licensing courses and one (or more) of their instructors conducts Novice exams. A visit to your local electronics stores will probably provide leads to clubs and individual amateurs who provide this type of service. If you have an antenna installation in your area which leads you to believe a neighbor is an amateur, there is nothing wrong with going to that residence to seek help. If your neighbor is a licensed amateur, he/she will probably be glad to help you directly, or by telling you where you can go to take a Novice exam. If you are going to be examined by a club licensing instructor, she/he probably has a supply of the necessary form (610) on hand. If some other amateur is going to serve as your volunteer examiner, you should obtain the FCC Form 610 yourself and have it with you when you go to take the Novice exam. If you do not know the address of your local FCC office, it is usually easy to find in your nearest major city telephone directory; just look for Federal Communications Commission in the United States Government listing. Simply telephone or write your request for a Form 610 Application for individual Amateur Radio Station and/or Operator License. If all else fails, send your request (with the usual self-addressed and stamped envelope) to me, and I'll send a Form 610 to you.

The Novice examination procedure is simple. Once you have obtained the Form 610 Application and located a volunteer examiner, arrange an examination date, time, and location that are suitable and mutually safisfactory to both your examiner and yourself. The examination site should be comfortable, well lighted, and free of distraction. The first part of the exam is the code receiving and sending tests, and the second part is the written test. The examiner may decide to just administer a receiving test. The code receiving test is administered first, since there is very little possibility that anyone will fail a sending test and pass a receiving test at the same speed. Almost everyone can send code faster than they can receive it. The code receiving test is a 5 minute long run at 5 words per minute. Since each 5 letters counts as a "word," the Novice code test is actually 125 letters in 5 minutes. Just letters in the alphabet should be included in the Novice code receiving test, and the text must be forward-reading material, such as one would read in a magazine or newspaper article. The volunteer examiner can require the applicant to pass either the "one minute out of five" or the "code

comprehension" type test. A passing run in the first case is simply any 25 consecutive correctly copied letters out of the 125 total letters in the test. If a "code comprehension" test is used, the applicant must correctly answer at least 7 of 10 questions related to the text material.

If one passes the code receiving test, the code sending test may be administered. The code sending test includes all the numerals (one through zero), four worksigns (AR, end of message; BT, paragraph/break; SK, end of work; and K, answer), four punctuation marks (?,./), and all the letters of the alphabet. The applicant is required to "transmit by key" at a rate of at least 5 wpm. It should be noted that each numeral, worksign, and punctuation mark has a two-unit value, whereas each letter has a one-unit value. A passing sending test is simply any 25 consecutive correct units sent at a rate of 5 (or more) wpm during the 5 minute test run. The examiner may take an article from some publication and tell the applicant to send everything included in the article. The examiner usually strikes out punctuation marks which the applicant is not required to know and adds worksigns which are required, but would not appear in newspaper or magazine articles. If the code tests are passed, the volunteer examiner will administer the "written" test. The applicant should supply a stamped and addressed envelope for mailing the completed Form 610 to the FCC. The volunteer examiner must retain the "written" test for one year.

The volunteer examiner should not discuss questions or answers with the candidate. When the FCC has processed the received Form 610, they mail the Novice license directly to the sucessful candidate, using the mailing address shown on the submitted Form 610. It may take just a few weeks to get a new license, but it is more likely to take 8 to 12 weeks now. It is common to first learn your new callsign by seeing it on address labels of companies trying to sell their amateur-radio-related products to you.

Any applicant for any class of amateur radio license who holds a first class radiotelegraph operator's license (or has held one within five years) is not required to take a code test, since she/he has already passed a code test above the maximum code speed (20 wpm) associated with any amateur license code test. Similarly, anyone who holds a second class radiotelegraph operator's license (or has held one within five years) is not required to take a code test when applying for any license below the Extra class license, since she/he passed a 16 wpm code test to get that commercial license, and the code test requirements for Novice/Technician and General/Advanced licenses are 5 wpm and 13 wpm, respectively. However, commercial licensees are required to pass "written" exams related to amateur licenses because the rules, regulations, and frequencies are different between th commercial and amateur services.

Callsigns

American Novices are issued two-by-three type callsigns, which means there are two letters in the prefix and three letters in the suffix of each callsign. A typical Novice callsign is KB6OTI. The two-letter prefix is KB, with the first letter showing it is an American station (A,K,N, and W are U.S.A. callsign first letters). The 6 between the prefix and suffix shows that this callsign was issued to someone living in California at the time her/his application was submitted. The OTI suffix completes the specific identification of this particular station. The FCC refers to Novice callsigns as group D callsigns.

You do not have to change callsigns when you upgrade to a higher class license. If you like the callsign you have, do not check block 2E on FCC Form 610 when you apply to upgrade. However, if you do want to change to an "appropriate" callsign when you upgrade, be sure to check box 2E (Change Call Sign). Technician and General callsigns are one-by-three, such as N6OJT. Advanced callsigns are two-by-two, such as KI6EC. Extra class callsigns are two-by-one, such as WS6V. If you are lucky enough to receive a callsign you like, it is wise to keep it.

One is not required to change her/his callsign when one moves to a different callsign district, but it is a good idea to do so to minimize confusion. As an example, KB4TGF might move to California (sixth district) and decide not to change her/his callsign. Other amateurs would swing directive antennas to the southeast corner of the country to work KB4TGF, rather than the correct west coast direction.

Privileges

Power. The Novice licensee is permitted to run as much as 200 watts (peak envelope power) output power. This is more than enough power to enable one to have solid contacts with amateurs throughout the world. Stated realistically, I operate 2 to 20 watts output power and regularly work amateurs all over the world. When operating in any Novice band, every class of licensee (Novice through Extra class) is limited to 200 watts (PEP) output power. Basically, General through Extra class licensees are permitted to use up to 1500 watts PEP maximum output power outside the Novice bands.

Modes. Novices are limited to radiotelegraph (code, A1) communications. This enhances the probability that they will increase their code proficiency to the point where they can pass the 13 wpm General/Advanced code test. As one upgrades to higher class licenses, one is granted authority to operate more sophisticated modes as well as additional frequency segments. Higher class licensees are authorized to operate several voice modes (amplitude modulation, phase modulation, single sideband, etc.), radioteletype, facsimile, and television. Space communications have been available to amateurs since 1962. Modern OSCARs (Orbiting Satellite Carrying Amateur Radio) are very sophisticated, but they are easy to use.

Bands. Novices share the use of four bands (frequency segments) that are approximately centered within overall bands. As an example, the 80 meter Novice band is 3700 to 3750 kiloHertz, whereas the entire band is 3500 to 4000 kiloHertz. Two of the Novice bands (10 and 15 meters) are best for long-distance communications during the day; however, 10 meter activity is now at the low point of the 11-year sunspot cycle. The other two Novice bands (80 and 40 meters) provide optimum long-distance communication opportunities during the night. The frequency limits of the Novice 80, 40, 15, and 10 meter bands are 3700-3750 kHz, 7100-7150 kHz, 21.1-21.2 MHz, and 28.1-28.2 MHz, respectively.

Novice bands are not for the exclusive use of Novices. They are simply segments of the overall bands wherein Novices are permitted to operate. Novice bands are really Novice, Technician, General, Advanced, and Extra class bands. It is not reasonable to be upset from hearing a couple of higher class licensees in contact with each other in a Novice band; such operation is normal and correct. Most higher class licensees operating in Novice bands automatically send code slower when they contact a Novice or Technician. One-way contacts are not productive; one must slow down to the receiving capability of the less proficient code operator. Do not hesitate to ask a fast operator to send more slowly; the proper Q-signal for this is QRS.

Novice band operation is not limited to fixed locations. Novices are allowed to operate mobile (auto, airplane, balloon, motorcycle, bicycle, etc.), portable, and from temporary locations.

Equipment and Accessories

Modern amateur radio equipment and accessories are much more useful and sophisticated than their older counterparts. The separate transmitter and receiver combination has been replaced by the transceiver, which combines both functions within a single cabinet. The transceiver is primarily designed to provide mobile voice communications. Some transceivers are just marginally suitable in regard to code operation. Most of them do not come with a suitably narrow code filter as standard equipment, requiring one to obtain and install one for satisfactory operation. Also, the time delay between transmit and receive

modes is usually too short, letting the equipment constantly cycle between transmit and receive modes when sending slow code and using a transceiver's automatic changeover system (VOX). The mobile design does not harm anything, although it must increase the price. However, most transceivers are not operated mobile; they are primarily operated from fixed locations where they are powered by 117 VAC input.

There is a wide variety of accessories on the market. Modern elecronic keyers, telegraph paddles, VSWR/power meters, antenna tuners, clocks, antenna rotators, and other accessories are plentiful and most are excellent. I consider amateur radio equipment and accessories to be adult toys. Get the best items you can afford. Poor items are a bad investment at any price.

Cost. Remember that a transceiver is a combination transmitter and receiver; do not expect it to be priced at the level of either one.

I push my students to get an efficient and versatile initial station because it has been my experience that good operating results usually keep the beginner enthused enough to progress to a higher class license. Naturally, it is easier to get good performance from excellent equipment and accessories than from junk items. However, as the father of seven children, I do understand that it is not always possible to spend a lot of money on something like an amateur station. It has been my experience that most of my students spend about $600 to $1500 on their initial stations, depending on whether they purchase used or new gear.

It is my observation that the quickest route to the General license is to get on the air as a Novice with good equipment and to do a lot of operating. I do not like to have Novices spend a lot of time building kits; I want them operating and studying in their spare time.

Used equipment usually provides the best value. A benefit associated with club membership is that no fellow club member would be likely to intentionally sell another member a defective piece of gear. It is generally safe to buy used gear from active local amateurs. If you are going to purchase used equipment from a store, you should only deal with an organization which allows you to return unsatisfactory items at full refund or (mor commonly) full allowance towards other gear. You are advised to avoid equipment which has been stored for a long time, particularly if it was stored in a garage, shed, covered patio, or cellar.

As is true in most fields, amateur radio gains some new companies each year and loses others. A simple way to get a list of the organizations presently manufacturing and distributing amateur radio equipment, accessories, and related items is to extract names, addresses, and telephone numbers from recent issues of *CQ, Ham Radio, QST, Worldradio News,* and *73*. Some outfits advertise in more than one of these publications, whereas others just run their ads in one publication. There is an advertisers' index among the last few pages of each magazine. This index makes it easy to locate each company's ad. It takes a lot of effort to maintain a current list of the organizations associated with our Amateur Radio Service. It is more practical to just use the latest publications to obtain specific required information as it is needed.

If you do not know where electronic parts and equipment stores are located in your area, it is usually easy to find them by using your telephone directory's yellow pages. Incidentally, store salespeople are not always a source of dependable information, and they do not have time to educate you in electronics while they are waiting on customers. If you are lucky enough to find a helpful salesperson, please do not abuse this opportunity to obtain assistance.

Antennas and towers are separate from the considerations related to the inside station. These external installations can be very expensive. The prospective amateur should check to find out whether or not there are restrictions against erecting antennas where she/he resides. A license is not much good if one cannot operate. Most new amateurs erect a 40 meter dipole which allows them to operate on 40 and 15 meters. If you have plenty of room, put up an 80 meter antenna because 80 meters is the best Novice band during the evening. If you want to work DX (long distance) contacts, a simple 15 meter monoband Yagi-Uda, quad, or delta loop directional antenna will do the job at relatively low cost. The beam antenna can be mounted on a sturdy push-up TV mast, and it should be used with a suitable rotator to provide direction selection. A directive antenna is almost a necessity for consistent long-range (DX) contacts. A good antenna is more important than high power.

This concludes the second part of this three-part article. The concluding part covers operating, QSL cards, and printed material.

Photographs Wanted

Photographs of Novices in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter are important.

73, Bill, W6DDB

Awards

a monthly feature by
DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for October is:

Rob March, VE7OR
All Counties #505, 2-22-86

"I was born here in Victoria on February 19, 1939 and have lived here all my life. I have done some traveling, eleven countries in Europe and a few trips to Mexico, but never could find a more beautiful place to settle down. After finishing school I spent a short stint in the R.C.A.F. (Royal Canadian Air Force). Then in 1960 I made the big move and got married. We have one married daughter, Monica, and two sons, Aaron and Shawn, all out on their own now. We also have one beautiful granddaughter, Dawn. During the first few years of marriage I worked in various positions in the logging and lumber industry here on the island, but about 15 years ago I got into the paint contracting business, where I am at present.

"I began amateur radio back in June of 1968 after spending three years as a shortwave listener. One day, tuning across the bands I came across a couple of hams chatting, and I decided right then and there that amateur radio was for me. I didn't know there were radio classes here in town, so I just struggled with a couple of books and practiced CW on my own. Well, after about six months I wrote and passed the test. My first contact was with WN7IRD, now WA7IRD, Willie, USA-CA #29, on 40 meter CW.

"In Canada we must operate only on CW for the first six months, but I stayed on CW for the next two years before getting my advanced ticket.

"My first rig was homebrew, crystal controlled, using a 6L6 tube. The receiver was an old Navy Surplus CSR-5, and with that setup I managed to work all states and a few countries. Since that time I guess I've changed the equipment ten or more times. I'm now using an FT-707, SB-200, and a three-element Yagi up 45 feet. I've participated in most areas of amateur radio—building, antennas, contests, DXing, etc.—but nothing as interesting and as much fun as County Hunting.

"On January 23, 1983 I ran across the County Hunters and worked my first county, Angelina County, Texas, with K5KZL. Then the bug took over. At that time I was using my old call, VE7AZV, but three days later I got my present call. In the summer of 1984 we took a trip down

333 South Lincoln Ave., Mundelein, IL 60060

Rob March, VE7OR, USA-CA All Counties #505, 2-22-86, displays his award in Victoria, B.C., Canada

to Post Falls, Idaho to visit my brother. That was my first chance at giving out some counties, and I really enjoyed being 'on the other end,' even sweating it out on a county line when the temperature was at 100 degrees.

"While in Post Falls we visited with some other county hunters and had some very enjoyable get-togethers. The following year we returned to Coeur d'Alene for the County Hunters Convention and had a great time meeting all the County Hunters with whom we had made friends on the net. We spent much of the time with KG5J and WB6FJU and their XYL's and will have lasting memories of a most enjoyable time together.

"Al, KG5J, went to the very last county for me. I think my most memorable experience in County Hunting was after I sent in my application to the Custodian. I came upon the County Hunters Net while I was demonstrating amateur radio to some of my friends and was informed that I now had USA-CA All Counties #505. Well, I never expected the response that followed. All the County Hunters congratulated me, and with the company in the shack it was twice the thrill.

"Other than the radio, my hobbies are motorcycling, sailing, camping, and our German Shepherd 'Cobber,' who goes everywhere with us, except on the bike. My wife and I really enjoy gardening, so during the summer months she putters in the garden while I operate the radio out on the patio. It is really a great way to get a tan! Our biggest dream is to own a cruising sailboat with Ann at the helm and me working the counties M/M.

"We live here on an island and very seldom get to the mainland, so I don't really have much opportunity to put out counties.

"Yes, I am going to start over. In fact, the first mobile contact I had for the 'second time around' was Armadillo County, Texas. I also have a good start on an RTTY endorsement. I have had many hours of enjoyment and a few of aggravation on the net and made many friends, so expect me to be around for a few more years. I'm really proud of my All Counties #505 and want to thank everyone who helped me win this coveted award. 73, Rob, VE7OR."

Special Honor Roll

William J. Webb, KX1A (ex. WB1GOO)
All Counties #513, 6-2-86

Honor Roll

3000		500	
KX1A	546	GU2ASO	2112
		DK7SU	2113
2000		N4ILG	2114
W3IJT	673	LU1DOW	2115
		LZ1YE	2116

The total number of countries for credit for the United States of America County Award is 3076. The basic award fee for subscribers to *CQ* is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA record book, which may be obtained from *CQ* Publishing Company, 76 North Broadway, Hicksville, NY 11801, U.S.A. for $1.25 each. To qualify for the special subscriber rate please enclose a recent *CQ* mailing label. To obtain a complete copy of the rules for the *CQ* USA-CA Program send a business-size, number 10 envelope with 22 cents postage to the USA-CA Custodian, 333 South Lincoln Ave., Mundelein, IL 60060, U.S.A. DX stations must include extra postage for airmail reply.

Awards Issued

William J. "Bill" Webb, KX1A (ex. WB1GOO), finished them all and qualified for USA-CA 3000 #546 and USA-CA All Counties #513, Mixed Band and Mode, 6-2-86.

George A. Dessert, W3IJT, sent for USA-CA 2000 #673, All SSB, 6-4-86.

USA-CA 500 certificates went to:

George Henry Smith, GU2ASO, USA-CA 500 #2112, Mixed, 6-2-86, #2 to Guernsey.

Fritz Rainer, DK7SU, USA-CA 500 #2113, All CW, 6-3-86.

Alfred Blake, N4ILG, USA-CA 500 #2114, Mixed, 6-7-86.

Hector A. Villafane, LU1DOW, USA-CA 500 #2115, All CW, 6-24-86, #3 to Argentina.

Antanas Petrov Kolev, LZ1YE, #2116, Mixed, 6-25-86.

Awards Available

The Danish Underground Radio Award. This is a new award issued by the Museum of Denmark's Fight for Freedom 1940–1945. The award is patterned after the armlet which the Danish fighters for freedom used after the 5th of May 1945.

The Danish Underground Radio Award issued by The Museum of Denmark's Fight for Freedom 1940–1945.

Amateur radio station OZ5MAY is using WW II clandestine radio sets exclusively. The sets were partly built in Denmark, partly supplied by parachute to the Danish Resistance Movement from SOE in England. The rules for the award are as follows.

OZ: Contact with OZ5MAY on 3 different bands or on 3 different days representing at least 2 different bands. One contact less is acceptable if you visit the Museum of Denmark's Fight for Freedom, which is the QTH for OZ5MAY.

EU: Contact with OZ5MAY on 2 different bands or on the same band on 2 different days. One contact less is acceptable if you visit the Museum of Denmark's Fight for Freedom, the QTH for OZ5MAY.

DX: Make one contact with OZ5MAY.

Send log info and fee of 6 IRC's to Award Manager: Allis Andersen, OZ1ACB, Kagsaavej 34, DK-2730 Herlev, Denmark.

Union des Radio-Club (U.R.C.A.). These are *new rules* from the U.R.C.A. This award is available to licensed amateurs and for SWL's (heard basis) who can demonstrate having participated in or heard two-way contact with the maximum number of Radio Club stations worldwide. All bands and modes are acceptable. Please request endorsement for band and mode at time of application for the awards. Contacts after January 1, 1986 are valid. This award is issued in three (3) classes:

HF Class I—100 confirmed QSO's. A minimum of 30 French Radio-Club stations plus 70 worldwide Radio-Club calls. At least one in each of six continents.

HF Class II—80 confirmed QSO's. A minimum of 20 French Radio-Club stations plus 60 worldwide Radio-Club calls. At least one in each of 5 continents.

HF Class III—50 confirmed QSO's. A minimum of 10 French Radio-Club stations plus 40 worldwide Radio-Club calls. At least one in each of 4 continents.

The valid continents are North America, South America, Europe, Asia, Africa, and Oceania.

One continent may be substituted by a "joker." Each joker is also equal to 3 French Radio-Club stations and FF6URC for 5.

The "joker" calls are: F1 or FC1QY, F1 or FC1CQQ, F1 or FC1GKF, F1KCE, F1 or FF1URC, F5 or FE5SP, F5 or FE5XM, F6 or FE6BUG, F6 or FE6DLA, F6 or FE6DZS, F6 or FE6EBN, F6 or FE6EMA, F6 or FE6EVT, F6 or FE6EYS, F6 or FE6FNA, F6 or FE6GHT, FD1JCH, FC1JLJ, FD1LAL, F6KCE, F6URC, SWL FE1107 or F11ADB.

VHF Class I—75 confirmed QSO's with any Radio-Club stations.

VHF Class II—50 confirmed QSO's with any Radio-Club stations.

VHF Class III—30 confirmed QSO's with any Radio-Club stations.

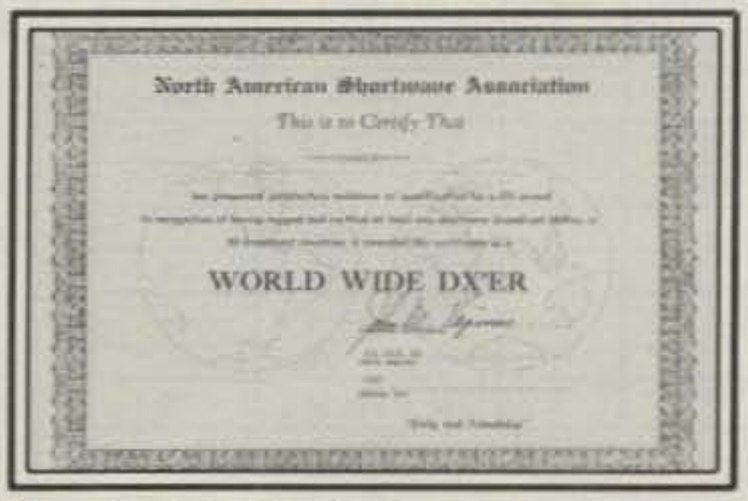
Do not send QSL cards. A list showing full details of logged contacts, verified and confirmed by your local club official or by two licensed amateurs, is enough.

The charge for each award (Class I, II, or III) is $4.00 US or 12 IRC's. Send application and fee to: URC Diplome Manager, B.P. 73-08, 75362 Paris Cedex 08, France; or to Mr. J.-P. Lehembre, F6FNA, 8, rue de Verdun, 77270 Villeparisis, France.

Note: Lists of all applicants will be published in the French magazine *Ondes Courtes Information* each year in December. The best Radio-Club score in Class I will receive *OCI* magazine free for one year. The second and third will receive another award.

All French military Radio-Clubs in RFA (FFA) are valid for French Radio-Clubs. The first suffix K calls with three suffixes are French Radio-Clubs—i.e., F6KCP, F6KAW, F6KMX, etc. Since January 1, 1986 the French RC prefix is FF.

North American Short Wave Association. The North American Short Wave Association (NASWA), the largest Short Wave Broadcast DX Club in North America, has



The World-Wide DX'er Award, one of many awards offered by the North American Short Wave Association.

No. 67-68

prepared a new booklet listing details of their Award Program and Radio Country List. The program consists of over 50 different custom certificates. Until quite recently only NASWA members were eligible. However, the Association has now instituted a major policy change opening up the program for non-members.

The awards are most reasonably priced at $1.00 each in North America and $2.00 elsewhere. The 16-page booklet, which contains the Radio Country list and all details of the awards program, is $2.00 in North America and $3.00 elsewhere. Overseas delivery is by airmail.

To order the booklet and for further details of the NASWA Awards program write to: John M. Kapinos, NASWA Awards Chairman, 86 South Quinsigamond Avenue, Shrewsbury, Massachusetts 01545 U.S.A.

Worked Arctic Circle Award. Sponsored by the Radio Club of the Arctic Circle, OH9AB, the award is issued to amateurs and SWL's of any country. The rules are as follows:

1. OH applicants need 15 points, and others need 6 points.
2. OH9AB gives 2 points and members 1 point.
3. There are no band or mode limits.
4. The same station may be worked once on each band.
5. All contacts after January 1, 1979 may be used.

The VU-1000 Award sponsored by the Japan Amateur Radio League.

To apply for the award, please use a GCR list and send a fee of 10 IRC's for return postage to: OH9AB, P.O. Box 50, SF-96101 Rovaniemi 10, Finland.

VU-1000, SWL-VU-1000, Japan Amateur Radio League. The VU-1000, SWL-VU-1000 Award may be claimed for having contacted (heard) and received a QSL card from each of at least 1000 different amateur radio stations on 50 MHz, 144 MHz, and/or 430 MHz. For contacts with an additional 1000 stations, VU-2000, 3000, etc., will be issued. A list of QSL cards should be arranged in alphabetical order of prefix and then suffix. Only contacts made on or after July 29, 1977 will be acceptable. Endorsements are available for 50 MHz, 144 MHz, 430 MHz, CW, RTTY, SSTV, ATV, and FAX.

Send QSL card list accompanied by statement from applicant's national society or from two amateurs other than the applicant that the QSL cards of the contacts listed are in possession of the applicant and that the items of the cards are correctly listed. If such a statement is not available, the applicant must submit all QSL cards concerned.

A fee of 8 IRC's will be charged, along with an additional 2 IRC's for airmail delivery. If QSL cards are submitted, sufficient funds for return postage will also be required.

Only contacts with amateur stations authorized by the administration will be acceptable. Contacts with the Far East Military Stations (signing KA prefix) in Japan will not be acceptable.

All contacts must be made on land (river/lake) within a same call area, or if no call area exists, within the same country.

Address application and all correspondence to: Japan Amateur Radio League, Award Section, 1-14-2 Sugamo, Toshima, Tokyo 170, Japan.

The Heard All Continents (HAC) Award, offered by the Japan Amateur Radio League, is a special award for having heard six signals for amateur radio stations of six continents.

Heard All Continents (HAC). This award is offered to SWL's only by the Japan Amateur Radio League and may be claimed for having heard and received a QSL card from an amateur station located in each of the 6 continents. The continental boundaries for IARU's WAC are standard, with a few exceptions in Asia which are shown in the Asian Countries List. Contacts must be on or after July 29, 1977. All other conditions are the same as for the VU-1000 Award.

Notes

I hope things are going well where you are and that the fall season is off to a good start.

73, Dorothy, WB9RCY

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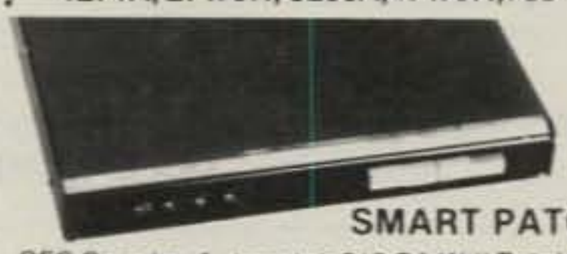

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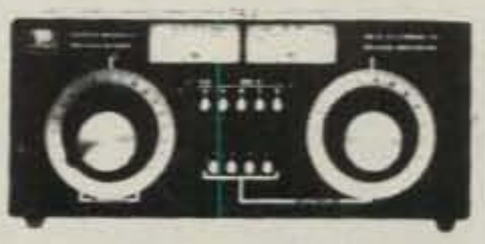

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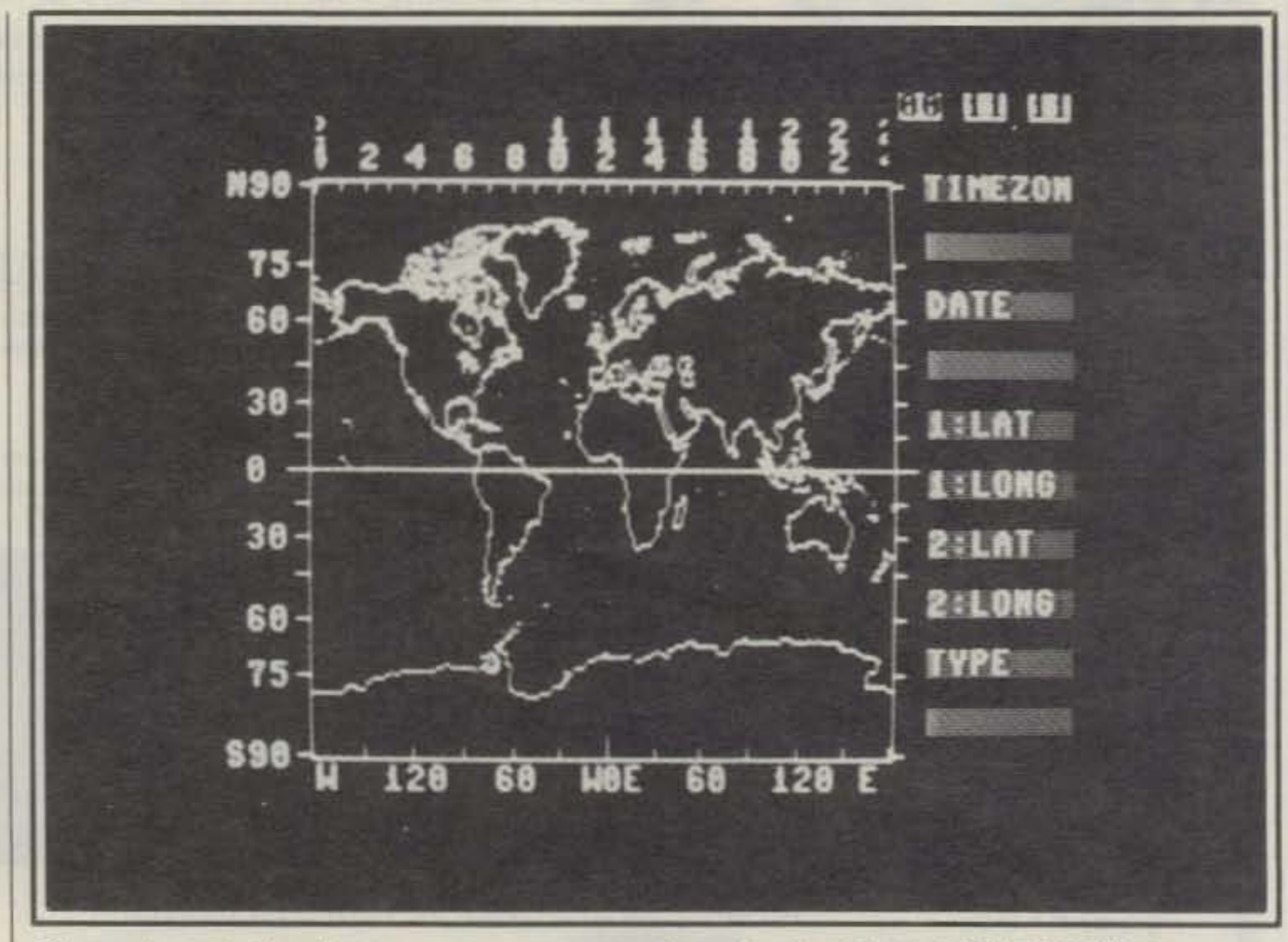
Antennas & Accessories

a monthly feature by
KARL T. THURBER, JR., W8FX

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Hamshack Computers: Part III

This time W8FX continues his examination of the personal computer in the hamshack with Part III. In the first two installments he looked into computer selection and practical installation guidelines and techniques. This time he delves into the heart of the matter: day-to-day operation.
—K2EEK



Shown here is the display screen map produced by the Xantek DX EDGE™. In operation, the program draws "grayline" propagation curves used in chasing sunrise and sunset DX. (W8FX photo)

Last month we continued our multipart series on the personal computer in the hamshack. We indicated that over the coming months we would cover topics such as computer selection, installation, operation and maintenance, and software. We kicked off the series with a look at computer selection criteria and some specific suggestions. In last month's column we launched into a discussion of computer installation tips and techniques. We covered the basics, some installation details, furniture and flooring, ventilation, area cleanliness, and accessories and supplies. Fig. 1 in last month's column summarized the various installation "do's and don'ts" which we discussed in the article.

This month we follow up with some general operating tips, hopefully useful across the broad spectrum of computers in hamshack usage. We had originally planned to cover computer care and maintenance this month, as well, but that topic is such a broad and important one that we decided that it should "stand alone" next month.

Computer Operation

Hamshack Computer Uses. We have frequently mentioned that computers are "naturals" for many specialized ham applications. The uses are many, and they include regular and contest logging and dupe-checking; Morse code and RTTY communications; code practice and instruction; antenna design and beam aiming; propagation forecasting assistance; contact tracking; and many other specialized applications.

At the risk of perhaps being too simplistic, it's nevertheless a good idea to review some of the basic hamshack uses for the PC before discussing specific operating suggestions and techniques. So let's do that by examining some of the real, live computer tasks possible and practical in your station.

1. *Accomplishment Tracking*. Many hams are serious certificate and awards collectors. Attainment of radio amateur awards is complicated by the fact that many are available with different frequency bands, power levels, modes of operation, and other specialized criteria applying to them. Many logging and database programs have features that allow summarizing of one's contacts by such specialized criteria. For example, it's possible to print out a band-by-band summary of one's country, state, or continent contact status, as well as a summary of remaining accomplishments needed and a summary of whether the necessary QSL cards have been received. Such programs surely beat pushing a pencil!

2. *Contact Logging*. Most amateurs keep detailed records of their contacts, even though the FCC has eliminated the legal requirement for most formal logkeeping. Logging is still done for a variety of purposes, if for simply being able to refer back at a future date to a particularly enjoyable QSO. Logging is still important for keeping track of contacts for the special awards which many amateurs seek. PCs lend themselves well to recordkeeping, and especially to fast retrieval of data by date and time of contact, frequency band, radio callsign, name, QTH, etc. Most of the logging programs are set up for convenient, real-time (on-the-air) data entry, so no extra time is required to enter the log data, which can be stored to disk and printed out later on.

A specialized form of logbook program is the contest logger. This type of program allows use of a special type of log that is designed to properly record the on-the-air "contest exchange," and to later print out this data in a mail-ready format that is easily scorable by the contest sponsors. Sophisticated contest logging programs reduce the drudgery of checking for contact "dupes," which carry no contest credit.

Some log and contest programs also can automatically generate QSL (confirmation) cards using the logbook data already recorded. On keystroke command, a day's QSLing chores can be taken care of, with the cards made ready for mailing to a QSL forwarding bureau, or directly to the other stations. This auto-QSL feature is a boon to high-volume contest amateur operations.

3. *Radio Propagation Prediction*. Predicting whether or not radio conditions

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will be good enough to expect to be able to "work" various areas of the world is very important. Using a computer, amateurs can produce timely predictions of HF skywave conditions between any two points on the globe.

Most of the propagation prediction programs use an ionospheric model based on a microcomputer program developed by the Navy for field use by the military. Using a few easily obtainable bits of essential information (the solar flux figure, available over the air from the National Bureau of Standards station WWV; your geographical coordinates; and the coordinates of the distant point), these programs produce a formatted video or printed output of 24 hourly predictions of the MUF (maximum usable frequency) over the path.

Some such programs are no-frills, but others do some fancy things, such as showing an estimate of the LUF (lowest usable frequency) over a path; calculating the distance to the target area or point in kilometers or miles; and providing rotary beam antenna heading information. Some particularly capable propagation programs allow you to "scan the world" to readily see which areas are likely to be well suited for DX to the area, and to track sunrise and sunset on both ends of the signal path, when especially favorable conditions are likely to prevail.

4. *Beam Aiming*. Whether as part of a propagation program or as a stand-along algorithm, it's relatively easy to point your rotary beam antenna in the right direction using a global heading calculating program. Most such programs have you enter the latitude and longitude coordinates of the station with which you want to communicate, along with your own coordinates. They will then output the desired beam heading and distance (short and long path), and often additional information such as time zone differences.

Most of these programs include a self-contained database of country and/or callsign prefix information so that the need to enter actual geographical coordinates is eliminated. Such programs are often available customized for your own location. The same geographical database can be used in both propagation and beam-heading programs, so the two types are frequently combined in a single package.

5. *All-Around Recordkeeping*. Most amateurs keep records of some nature, and these lend themselves to database management programs of all sorts. Any kind of task that requires data collecting, sorting, searching, and tracking should lend itself to database management, thus allowing the operator to devote more time to the more productive aspects of the hobby.

Practical database activities include tracking QSL cards sent and received; indexing magazine articles; inventorying

One of the frequency information screens from Multisat, an amateur satellite tracking program offered by Spectrum West. (W8FX photo)

hamshack equipment for replacement purposes; generating component lists for construction projects; and maintaining the membership list for an amateur radio club. Most amateurs can think of a host of practical applications I haven't even considered!

6. *Antenna Design, Construction, and Measurement*. Ham antennas are usually designed using stubby pencil and calculator. But, it's also possible to do your figuring on your computer. With antenna calculation programs it's fairly simple to plan and calculate the correct dimensions and wire sizes for all sorts of antennas, including dipoles, quads, Yagis, inverted Vees, and verticals. Some such programs include construction data for log periodics, phased verticals, and even stacking harnesses for VHF and UHF arrays. Some programs even include determination of ERP, as well as predicted gain, while others simplify use of the Smith Chart that electrical engineering students learn to hate! While the average ham may not really need an antenna design program, such programs nevertheless offer the experimenter some nice "what if" possibilities.

7. *Circuit Design and Electronic Calculation*. Amateurs who are electronic experimenters and equipment builders make use of a wide range of calculations. The computer can readily be programmed to handle the most commonly used formulas. Programs are available, including some in the public domain, which facilitate calculations involving Ohm's Law; power supply design; resistor or capacitor combinations; resonant frequency; filter, stub, and trap design; series and parallel inductors; and solid state dynamics.

8. *Satellite Tracking*. Communication through the amateur radio satellites is one of the current "hot" areas in ham radio. Since 1961, when the first OSCAR was launched, amateurs have been able to communicate over thousands of miles using VHF and UHF—wavelengths traditionally considered useful mostly for relatively short, line-of-sight distances. A new era dawned in mid-1983, when the first Phase III satellite, OSCAR 10, was launched. This satellite is distinctive in that its highly elliptical orbit allows properly equipped amateurs to communicate through it on a 10- to 12-hour basis over intercontinental distances. However, to effectively use satellites such as OSCAR 10, it's necessary to have some means of precisely locating the satellite and determining the times when it's within range. This can best be done using a computer.

Numerous computer programs are available which allow simple and rapid antenna positioning. For example, the Amateur Satellite Corporation (AMSAT) offers inexpensive programs for most popular PCs. These provide accurate access schedule and tracking information on satellites in both circular and elliptical orbits using "Keplerian" orbital information available from AMSAT or NASA. The programs determine the times when a satellite will be above the horizon, and they also provide needed information for aiming a directional antenna at the satellite for optimum communications, as well as other important information.

9. *Station Control*. We've only dented the surface so far in this area, but some

Even the smaller, less-expensive computers such as the Timex-Sinclair Series have good potential for amateur radio applications. Shown here is one of the "mission control panels" from the GM4IHJ satellite tracking program for the Timex 2068 or Sinclair Spectrum computers. (Photo via WA6DLI)

amateurs are experimenting with computer control of their hamshacks, particularly for the "smart" control of various transceiver functions.

At least one manufacturer, the Heath Company, produced a computer-compatible HF transceiver, the SS-9000. This transceiver contained a "smart" control circuit that assists a serial interface in maintaining communication protocol between operator requests and the internal circuits within the transceiver. The controller allowed communication between a video terminal, ASCII teletypewriter, or computer. Although the Heath H-89 computer is the one the company had in mind to interface with the new transceiver, connecting the unit to other PCs is a possibility.

Interfacing computers to external radio equipment is quite practical. For example, Bearcat Electra introduced a very capable scanner radio for the Commodore 64 and other PCs, which enabled some very complex, user-programmable scanning and search patterns. Other programmers have developed software routines that control the scanning pattern and other frequency-related characteristics of receivers and transceivers in ICOM's line, and other units that lend themselves to external microprocessor control.

10. *Morse Practice and Instruction*. Various approaches are taken in Morse code practice software, but most promote a sense of letter and sound association. Typical Morse programs include features such as programmed, progressively more difficult learning of individual Morse characters; automatic generation of random code groups at a specified speed; screen displays of quizzes and tests; and user-definable messages and practice groups offering immediate performance feedback. For the beginner, computer-generated Morse code practice is probably superior to over-the-air code practice sessions, as the latter are subject to interference, static, and noise. Interestingly, however, several commercial on-the-air Morse simulation programs have been developed which even include internally generated QRM and other annoyances. Such features give one challenging practice in copying under difficult conditions, especially helpful when trying to build real-world experience to upgrade one's license.

11. *RTTY/CW Communications*. Cumbersome and noisy mechanical Teletype™ units have largely been replaced by silently efficient computers and video screens. PCs are particularly popular as the heart of state-of-the-art RTTY setups, the only extras required being an appropriate software program and an interface or terminal unit to connect between the computer and the transceiver. Fortunately, a detailed technical knowledge of computer operation isn't necessary to get on the air on RTTY either.

While there is considerable variation in the available software and interfaces, most RTTY packages include features such as the option to use Baudot or ASCII code at different data rates; split-screen receive and transmit operation; user-definable "canned" messages; and a type-ahead buffer that allows one to continue typing while still listening to the other station's transmission.

"Manual Morse," or CW, has benefited by the computer revolution, too. Many stations now use keyboards rather than straight keys or keyers to exchange messages with one another. The features of computer Morse programs resemble those provided by RTTY programs, though the cost of CW software is less than that for RTTY, and simpler interfaces are required.

Combining RTTY and CW in a single package is a natural evolution, and several offer both communications modes. One limitation you should be aware of: using your computer for on-the-air RTTY or CW work generally precludes its simultaneous use for logging or other hamshack and household chores!

12. *AMTOR and Packet*. A fairly new development is AMTOR, or Amateur Teleprinting Over Radio. This is an RTTY-like communications mode which has a handshaking feature that minimizes errors caused by noise, static, and interference. HF mailbox or bulletin-board operation using AMTOR makes good sense, especially since the sending station is assured that his message is being received correctly. AMTOR's virtually error-free transmission characteristic offers the exciting possibility of reliable exchange of computer programs over-the-air.

Packet radio is an even newer and more exciting mode of highly reliable digital communications. This is a high-speed, digital, and error-free handshaking communications mode which is similar to RTTY and AMTOR. While similar to these two modes, packet is different in that communications data is sent at a much higher speed, and in a sort of "connected" or telephone-like, virtually interference-free mode. Each station must have special equipment, including what is known as a terminal node controller (or TNC) plus appropriate software and hardware, to use packet. Despite some initial expense in setting up one's station, packet holds exceptionally great promise to be the communications mode of the future.

13. *Other Applications*. There are many other uses for the computer in the hamshack. If you purchased your PC strictly for radio activities, its potential will not be fully exploited unless you use it to help with home and household chores—the area of personal productivity. These chores could include maintaining personal finance and tax records; tracking investments; organizing recipes; preparing and maintaining a household budget; and telecomputing—to name just a few practical applications.

Using the two hobbies, computers and ham radio, in tandem makes good sense and is bound to make each more interesting and enjoyable. With the cost of the personal computer—even very capable ones on the way down to the very attrac-

tive levels—it's even practical to dedicate (hardwire) one computer for hamshack activities, leaving a second computer for conventional household computing tasks.

Operating Tips and Suggestions. We've indicated some of the things that can be done with the hamshack PC. However, the first few months of computer ownership can be very demanding in terms of equipment familiarization, poring over sometimes not-too-helpful hardware manuals, and studying often cryptic and poorly written software users' guides. To be sure, there is a good deal of wheel-spinning involved in setting up and productively using a computer system. Now we would like to present a potpourri of operating tips and suggestions that should help facilitate the use of a computer in your station.

1. *Organize, Label, and Catalog Your Software*. The idea is to make sure that your software is readily available when you need it. When you're just starting out with a computer, keeping track of a few disks is no big problem. But as your software collection grows, and especially if it includes programs and data in several different areas in addition to hamshack programs, then it's important to scope out how you will keep track of all of those pesky floppies.

Use some sort of disk organizer or caddy, possibly using different enclosures to house various categories of software as your collection grows. Make each disk's label meaningful, showing clearly what program(s) or data the disk contains, and important information such as program version or backup status. Some users find it helpful to print out a directory listing of the files contained on the disk right on the paper sleeve, or in a separate loose-leaf binder. If your software collection grows to be very large, then you may want to purchase a disk cataloging program that can keep tabs on it.

2. *Back Up Important Programs and Data*. Oh, if I had only taken a few minutes to make a backup! Despite one's best intentions, it's a fact that disk disasters do occur. Thus, it's imperative to back up key program disks, or if they are not copyable, then to obtain suitable backups from the manufacturers. Many manufacturers will sell you backup disks for a small fraction of the original software cost, if you are a registered owner of the program. As a consequence, it's important, upon purchase of a software package, to return the warranty card. This is significant not only for obtaining program backups, but also to get on the firm's mailing list to be advised of program enhancements and new products.

It's also necessary to back up disks containing valuable file data. This is especially important in the case of logging and contest programs, particularly if a paper record has not been made of the contacts made. If it's data that you use and update regularly, you may wish to use a "grandfather system," in which three copies of data disks are maintained, so that at all times three generations of data are available in case of a system crash or damaged disk. No need to go overboard, but it's hard to appreciate the need for a disk backup until you need one but then don't have it!

3. *Make Use of Available Utility Programs*. Such programs are often ignored by first-time computer users who consider them more suited to the advanced programmer or computer "hacker." However, it's wise to become familiar with useful utility programs for your computer, as these may effectively extend the power and flexibility of your system, allowing it to "do tricks" which its manufacturer never thought of.

A popular PC will spawn literally thousands of utility programs in its wake. While many will be of limited usefulness to you, others can do things such as help you to reorganize disk data, reclaim program or data files from "hopelessly" damaged disks, transfer floppy disk-based programs to a hard disk drive, convert data from one file format to another, and the like. Indeed, many PC users consider their utility programs the most important software they own.

4. *Take Care of Your Disks*. In fact, treat them as honored guests in your hamshack. To properly preserve them, it's important not to eat, drink, or smoke around them (or your computer, for that matter). You shouldn't leave your disks lying around a TV, telephone, or other magnetic source, or in a spot where they may be subjected to temperature extremes or direct sunlight. Be especially careful not to touch or to scratch the disks' delicate magnetic surface coating. Don't write on the disks with a ballpoint pen or pencil; use a soft felt-tip pen instead. Don't paperclip anything to them.

Be sure to minimize the disks' exposure to foreign particles, static electricity, and dust, and never insert a dirty or gummed-up disk in your drive. The disks are best protected by storing them vertically in their paper sleeves, preferably inside a disk caddy. And, if you loan your program disks to others, ensure that they know how to use and properly take care of them.

5. *Take Care with the Interconnections*. When it comes to connections, computers are sensitive little devils. If, for example, a particular board or chip expects 5 volts and you feed it 12 volts, goodby component! Many amateurs have had the costly and frustrating experience of connecting up add-on devices to their computer ports, or installing internal modifications, which have literally caused their machines to go up in smoke. Triple-check pinout connections before hook-

ing up peripheral attachments such as modems, RTTY and packet terminals, keying devices, and the like.

Keep all computer and interface connectors and "cards" clean and firmly seated to help ensure reliable, trouble-free operation. Don't physically disconnect peripherals while they or the computer is powered-up, as power surges or temporarily crossed pin connections can cause extensive damage to both. In most situations it's best to turn on peripherals before powering-up the computer and to turn off the computer before turning off peripherals (but consult your users' manuals for the specific turn-on/turn-off sequence recommended).

A tip: Unplug your computer's power supply, if it's one of those black boxes that plugs into the wall, whenever the system isn't in use. Why put lots more hours on the power supply than on the computer itself?

6. *Pamper Your Computer Equipment*. Computer gear is, by and large, more delicate than ham gear. Thus, a few special precautions are in order when working with computers on a daily basis.

We have already mentioned that you shouldn't smoke, eat, or drink around the computer system. You should keep your computer equipment clean, preferably covering computer equipment when it's not in use, keeping unnecessary windows closed, if possible. Vacuum the computer system frequently, paying special attention to the keyboard, printer, and disk drives.

In some computer systems the disk drives constitute the weakest link in the system and so deserve special care. Many drives are tempermental, particularly with respect to head alignment and overheating. It's wise to avoid jarring the disk drives unnecessarily, or to keep them up and running for many long hours with poor ventilation. If your drives run warm, you can help increase their lifespan by using a small fan to direct airflow on the drives to minimize the chance of overheating. This can be a major problem in ham computer systems that are kept running for long stretches in contests or in bulletin-board-style operations. While most drives don't require frequent cleaning, heavy drive use may necessitate occasional cleaning of the head with isopropyl alcohol and a cotton swab. If you're squeamish about taking your drive apart, a commercial disk-head cleaning kit that contains a specially treated cleaning disk may be used.

7. *Be Ready to Cope with RFI*. Computer RFI comes in two unpleasant forms. The more common one is that of the computer generating a good deal of RF hash, such that working weak-signal DX is difficult or impossible. The other one is that of your transmitted RF getting into the computer's innards, thereby upsetting its operation. Both are very real problems. Computers produced before the FCC set RFI standards for PCs in 1981 are particularly troublesome. For such computers, wholesale shielding and brute-force filtering of all cables is often required if the system is to coexist with the ham gear. On newer computers RFI problems are less severe, and the machines have better shielding.

If you suffer computer RFI in one form or another, standard RFI suppression techniques can be applied. Some things you can do to minimize RFI problems include placing the computer on an AC circuit separate from the ham gear, moving the computer to a different position in the hamshack, filtering the PC's AC lines, and filtering or shielding the peripheral cables. Using an antenna located high and far from the hamshack and fed with coaxial cable helps.

8. *Safeguard Computer Equipment Records*. For the unthinkable disaster or theft, be sure to have records on your computer system as good as those you maintain for other household possessions. For replacement and insurance purposes, it's wise to have complete, accurate receipts, records of model and serial numbers, and original as well as replacement cost information on key computer items. You should have hardcopy (paper) copies of this data, preferably at least two copies, one at home and the other in your safe deposit drawer or other safe place.

The computer itself makes an excellent vehicle for tracking just such data. General-purpose databases can be used to handle such asset and inventory records with ease, or a specific household inventory program can be purchased for the purpose. Just be sure to have hardcopy files as well, and backup critical disk data such as these. Be certain, too, to keep the users' manuals for the PC and all peripherals and software together where you can get to them easily. (Even consider reading them from time to time!)

As you become increasingly familiar with your computer and its hamshack uses and applications, you will undoubtedly develop an "operating style" of your own. In the meantime, the few operating tips and suggestions we've presented should help you on your way to productive PC employment.

Wrapping It Up

This month, in the third of our hamshack computer series, we have focused on computer operation. To this end we reviewed the major uses for the computer in the hamshack, and we provided a number of hopefully useful operating tips and suggestions. Next time we'll get into some aspects of computer care and maintenance; wrapping up the series will be a discussion of PC software. See you then.

73, Karl, W8FX

VHF

a monthly feature by
STEVE KATZ, WB2WIK

PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

The 1986 World-Wide VHF WPX Contest

When this reaches print, the second annual *CQ* VHF WPX Contest will be about nine weeks past. As of this writing, it is only one week past, but we're already getting excellent feedback. It seems this contest, like last year's, was a success—probably a bigger one, since we received 65 logs in the first 7 days after the contest. If this is any indication of how things will be, we'd better be prepared for an avalanche of logs!

Here in the northeast, conditions were only average on the bands above 144 MHz; however, the 50 MHz band played tricks all weekend, producing "spot" openings to various places all over North America. We had single-hop and double-hop *E*-skip to everywhere except W6-land (darn it!) and worked 81 prefixes—not to mention 100 grid squares—on 6 meters in the 48-hour contest period from our SCORE multi-op station, KC2PX. Our mighty little group sweated through the muggy weekend to make about 708 QSO's and 201 PX's on 5 bands, for a total preliminary score of 164,217. This is up a few Q's and down a few PX's from last year, resulting in a score that is 3.6% lower than our 1985 showing. While there was clearly more activity this year than last, we didn't have the extended tropo session on 144 MHz this year that we en joyed all through Friday night in the 1985 contest. And while we had *E*-skip on 6, it wasn't as strong as in the 1985 contest. *C'est la vie.*

At club station KC2PX we relaxed our 50 MHz efforts a bit this year (compared with our NV6O/2 effort in 1985) by using a simple IC551D driving a 4-1000 amp and two 7-element KLM beams installed on separate towers for rapid direction switching. Last year we had this elaborate 6 meter rig based on a Collins KWM-380 and muTek transverter, and we used *three* 7-element KLM beams, including a pair stacked on the same tower for gain. Needless to say, last year's station worked a bit better, and netted us 257 Q's and 87 PX's on 50 MHz alone. But we don't feel too badly about making 234 Q's and 81 PX's, and I think we were competitive with other "home stations" in the northeast.

Our 2 meter QSO total was up this year from last, despite poorer band conditions. This was due primarily to our "killer" FM station (500 watts output to a pair of 4-element beams at 60 feet), which helped us bag about 100 QSO's on 146.52 simplex. The SCORE 2 meter weak-signal mode station played well, too; a pair of 3CX800A7's at 1.5 kw output to a pair of 19-element "Boomers" created a pretty big bang on the band. At KC2PX our 220 MHz QSO total more than doubled from last year, and we snagged six more PX's on the band. Seventy and 23 cm played about the same in '85 and '86.

I'm very anxious to find out how others did. If you have an unusual anecdote relating to the VHF WPX Contest, please jot me a note so we can all share in your experiences. I was happy to hear the big station at W1VD, operated by K1JX, on the air for the WPX. Clarke did very well, I'm sure, and he sounded tired by the end of the contest. John, W1XX, who operated station NA1L to last year's first place in the single-op/multi-band category, had a multi-op station running from Mt. Equinox, VT, a reknown VHF contest location. They may have taken the category nationally.

We've heard rumors of some *very* big scores from Europe, and I can't comment on this yet, but shall be anxious to see how the big stations did. You may remember that F6KAW/p, a portable group operating just 144 MHz, had the world's highest score in the 1985 VHF WPX. Did they do it again?

A friend and fellow VHF WPX Contest Committee member, N6NB, came east for the contest with plans of setting up a modest multiband QRP station atop Pack Monadnock Mountain in southern New Hampshire. K1KA had laid all the groundwork by securing permission for Wayne to operate from the famous contest site, and Wayne flew in on Thursday to ready for his drive to New England. Harold, KB2M, offered Wayne the loan of a dozen or so pieces of low-powered solid-state gear which would hopefully make things go smoothly. Wayne visited my home Thursday night, and I loaned him a Bird wattmeter, a clamp-on utility floodlight (for midnight antenna installations), an Astron 20 amp power supply, a few "jerry" cans for gasoline, a large ice chest, and other assorted paraphernalia which should have proven useful.

24 Louis Drive, Budd Lake, NJ 07828

Pete, KT2B, snags a new prefix multiplier on 432 MHz during the second annual Worldwide VHF WPX Contest at multi-op station KC2PX. The rig was an IC-740 driving a Microwave Modules MMT432 transverter, driving in turn a Tokyo Hi-Power 50 watt solid-state amp and then a Henry 2004A running 700 watts output to 4 stacked K2RIW 19-element Yagis. The setup worked fairly well.

Alas, things did not go very well for Wayne. Between the malfunctioning equipment, poorly performing antennas, hordes of mosquitoes, and foggy weather, his motivation to continue operations declined until, on Saturday afternoon, Wayne decided to abandon the hilltop and head for New Jersey. I spoke with N6NB/1 on 2 meters (and three other bands, but that doesn't mean things were going well) on Saturday and invited Wayne to visit our operation at KC2PX and do some operating with us, so his weekend wouldn't be a lost cause. He agreed, and said he'd be leaving New Hampshire as quickly as possible. We should have seen him by about midnight Saturday.

Noontime Sunday came and went, with no sign of Wayne. I began to think he's been eaten by the bears when the familiar rental car, complete with antennas and masts adorning the roof rack, pulled up to my house Sunday night about 10 o'clock. It turns out that Wayne spent most of Saturday night looking for a hotel room to rest his weary head (and other parts), determined that every room in all of New England had been booked since 1977, and ended up driving to the Connecticut/New York border before finding lodging early Sunday morning. I guess not even famous VHF contesters from the west coast get any respect around here.

A Tower Grows in Jersey

W5UN surely has one of the largest 144 MHz antenna systems in the world (remember the picture?), but Mike Crawford, WA2VUN, has undertaken the task of erecting the largest free-standing, rotating antenna system in New Jersey—at least it's the largest one I know of. Mike, a welder and VHF/UHFer who does nothing halfway, decided a year ago to erect a rotatable 100 foot tower with stacked antennas for several bands. He realized his dream this June, with the installation of a Tri-Ex DX86 tower topped with a 24 foot mast and sitting on a rotating base platform. While the DX-86—an 86 foot tall, motorized, 5-section telescoping tower—is a commercially available item, all the other apparatus had to be designed and fabricated from scratch. The results can be seen, to some extent, in the accompanying photographs.

WA2VUN dug a very large hole (by hand—about 5 feet square and 7 feet deep) to contain the 6 or so yards of concrete required to support the monster, and planted a 6 foot tall homebrew base with self-con-

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HOTEL INFO: To guarantee your room, you must **make your room reservations directly with HAM/WEST**, either on this form or by phone (if charging to a credit card), and **make payment in full before October 1, 1986**. Reservations not paid by that time will be accommodated on a *space-available basis only*. Call HAM/WEST at 702-361-3331.

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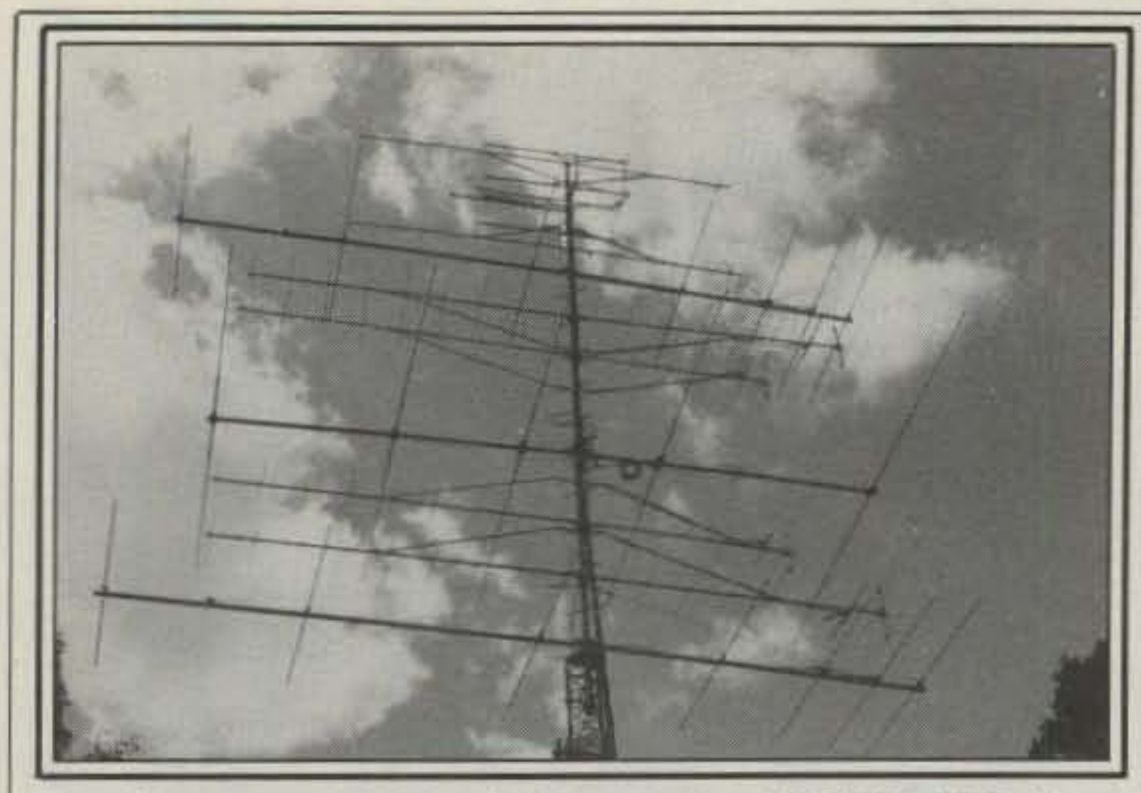
CIRCLE 26 ON READER SERVICE CARD

CIRCLE 25 ON READER SERVICE CARD

CIRCLE 24 ON READER SERVICE CARD



The "Christmas tree" is made of aluminum at WA2VUN, W. Caldwell, NJ. The antennas, and the rather unique tower that supports them, are described in the column.

tained rotating system. The final drive system has about ten times more torque than the heaviest-duty amateur rotator available, and this is coupled to the tower via a heavy-duty chain-drive transmission. The behemoth tower sits atop a large circular platform spaced about a half-inch away from an identical plate containing the roller bearings which make the only mating surfaces for the tower and the base structure.

Tower rotation is controlled by a homebrew rotor box in the shack, and the azimuth position is transmitted back to an indicator in the shack via a selsyn. Tower height is controlled by an "up/down" switch in the shack, and it takes a few minutes for the tower to raise from its nesting height of 28 feet to its extended height, which places the uppermost antenna at 116 feet above ground. Tower rotation is limited to about 380 degrees by limit switches, and rotational speed is one r.p.m. Since the tower is free-standing (no guy wires), antennas may be installed up and down the length of the tower beginning just above roof level.

At the time these photos were taken (mid-July), Mike had already installed the following antennas on *just the mast* above the tower: 92-element F9FT array for 23 cm; pair of stacked 21-element F9FT Yagis for 70 cm; 7-element vertical Yagi for 135 cm FM; pair of stacked 19-element "Boomers" for 2 meters; pair of stacked 17-element "Boomers" for 135 cm; pair of stacked 7-element KLM HD long-boom Yagis for 6 meters; Hy-Gain 105BA 5-element Yagi for 10 meters. This total of 232 elements for 6 bands is only the beginning, since he intends to add 5-element monoband Yagis for 15 and 20 meters, and possibly a 2- or 3-element 40 meter beam as well.

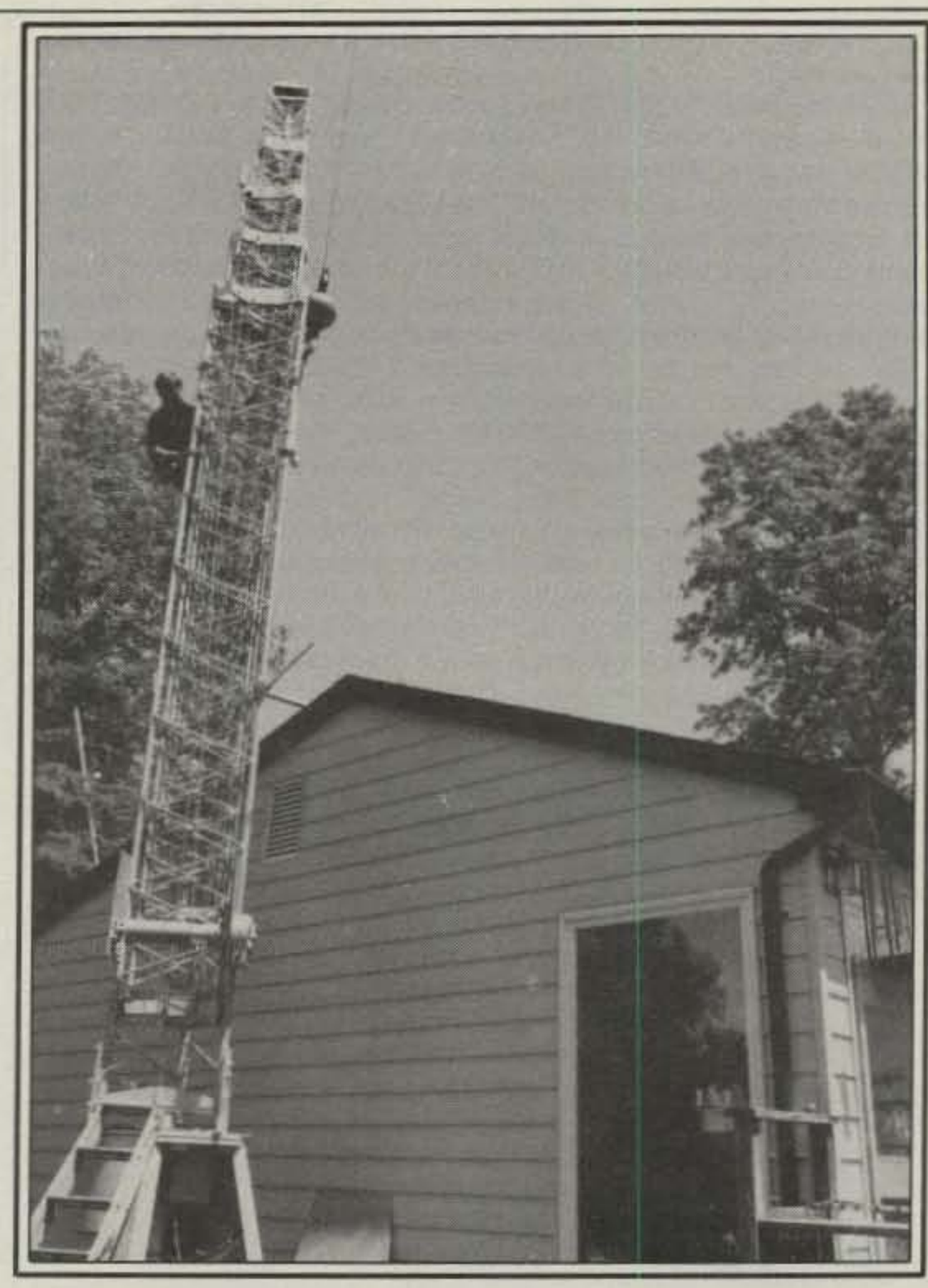
The total system—including base, tower, motors, mast, and antennas—weighs something like two tons. Yet the system occupies a scant 25 square feet of real estate and could truly be built on a city lot. I was present in mid-May when the crane set the tower on its base and then the specially fabricated, climbable mast in the tower; this was a sight to behold. The entire installation, due to Mike's very considerable advance planning, took perhaps 15 minutes.

Last heard, WA2VUN was still in the process of wiring up all the controls into the shack. He was working *E*-skip on 50 MHz, and was overheard telling a station, "Hold on a minute so I can run outside and see where my antennas are aimed. I have this $20,000 antenna system and still have to run outside to see where it's pointed . . . ." By now, I'm sure that problem is solved.

Product Review: The Alinco ALR-206T 2 Meter FM Transceiver

While this column is primarily dedicated to discussions of weak-signal work, no VHF column is truly complete without an occasional excursion to our most popular band and mode: 2 meter FM. Like most active amateurs, I have a 2 meter FM rig in my car, plus a couple of handhelds and a "base" rig tuned to a local calling frequency. Unlike many, however, I live in the New York metropolitan area, which means lots and lots of QRM. Only the most worthy FM transceivers survive the severe co-channel and adjacent-channel interference problems this region offers, and I've been disappointed to find that many modern rigs cannot hack our local RF environment.

For this reason, I continued to use an old Kenwood TR7400A for



Here's Mike, WA2VUN, handing on his new DX-86 motorized tower while the construction crane lowers it onto its custom rotating base.

years after its natural obsolescence. The TR7400A, big and burdensome as it is, has excellent IF filtering which offers sufficient 15 kHz adjacent channel rejection to make it usable in the overcrowded NY metro area, where repeaters occupy every assignable channel and then some. When my trusty old TR7400A was stolen from my vehicle last fall, I was heartbroken—more about the loss of a good rig than about the cost to repair the car.

Then I met Everett Gracey, President of Alinco Electronics, at the Dayton Hamvention. He offered a challenge I couldn't refuse: to try the Alinco ALR-206T transceiver for a while. If I didn't like it, I could return it. This seemed pretty fair, so I took delivery of a factory-fresh ALR-206T a short while later, fully expecting to dislike the tiny radio; after all, it wasn't nearly as big as a TR7400A, so how could its IF filtering be sufficient? And, could a box this small actually put out 25 watts without bursting into flames? (Remember, I'm from the old school. My first 25

The new Alinco ALR-206T is small but powerful, delivering 25 watts output across the entire band. Uncluttered front panel is the result of a design that puts the majority of the operating controls right into your hand.

watt 2 meter transmitter used an 829B—that's a vacuum tube, for you newcomers.)

I received the ALR-206T in May and have had it in operation for about ten weeks as of this writing. Never have I been more pleased with a piece of new gear. After nearly three months of harsh service, only two bothersome quirks have surfaced: The LCD display "blacks out" when left for extended periods in direct summer sunlight, and the microphone cord has a tendency to pull out of the back of its connector, especially if tugged on a lot. Neither of these "problems" are insurmountable, and I feel they're quite common to modern mobile transceivers.

Being a frequent user of a repeater on 146.985 MHz, I am painfully aware of the adjacent-channel problems many of our users have with another local repeater on 147.000 MHz, only 15 kHz (and less than 30 miles) away. While there is an ongoing dispute over the operation of the 147.000 repeater and its possible "wide" modulation, I am personally never bothered by this powerful adjacent signal. The ALR-206T is to thank for this blessing. Its receiver is razor-sharp and precisely on frequency, making operation within 15 kHz of a very strong and heavily modulated signal a pleasure. In my opinion, this is one of the most important characteristics by which an FM transceiver should be measured. You know what they say, "If you can't hear 'em, you can't work 'em."

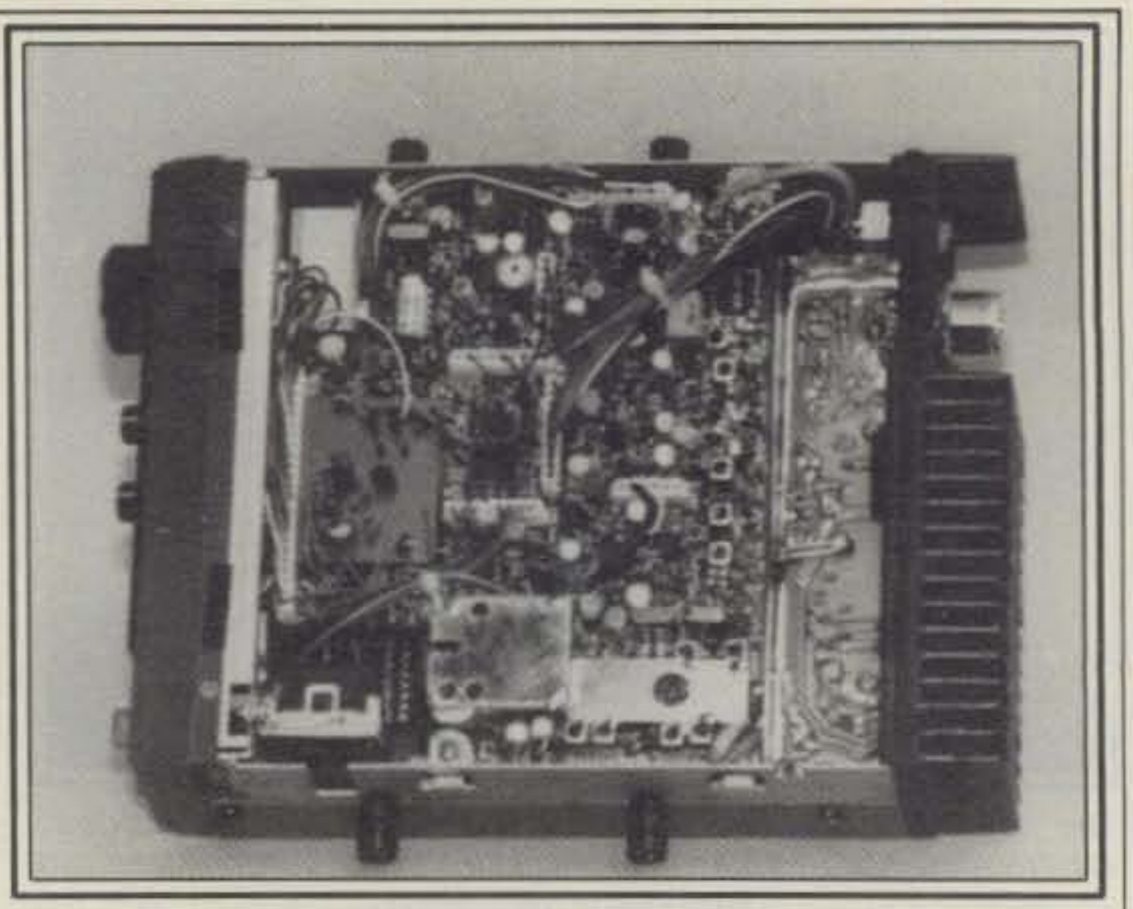
After ten weeks of pleasurable mobile operation with the ALR-206T, I felt it was finally time to run some laboratory tests on the rig and assign some numbers to its obviously impressive performance. A visit to the local RF lab at Hewlett Packard revealed the Alinco radio to be a strong performer. Thanks again to Charlie Rothschild, WB2INB, for his assistance in accessing the requisite equipment. Tabulated data on the ALR-206T under evaluation is shown in Table I. (All data was taken with 13.80 VDC applied.)

Parameter	Measurement
Xmtr output: 144 MHz	4.3 W (low), 26 W (high)
145 MHz	4.3 W (low), 26 W (high)
146 MHz	4.3 W (low), 26 W (high)
147 MHz	4.3 W (low), 26 W (high)
148 MHz	4.3 W (low), 25 W (high)
Current drain, receive	100 mAdc (display lamp "off") 200 mAdc (display lamp "on")
Current drain, transmit	2.2 Adc, low power position 4.5 Adc, high power position
Xmtr spurious output	X2 harmonic, −54 dB (low power) −56 dB (high power) X3 harmonic, −65 dB (low power) −65 dB (high power) No other spurious within 70 dB
Rcvr sensitivity	−115.3 dBM (.38 uV) for 20 dB quieting
Rcvr "S" meter level	S1 = −115.3 dBM (.38 uV) S3 = −110.3 dBm (.69 uV) S5 = −107.6 dBm (.93 uV) S7 = −105.4 dBm (1.2 uV) S9 = −103.4 dBm (1.5 uV) 20/S9 = −100.3 dBm (2 uV) 40/S9 = −97.2 dBm (3 uV)
Average "S" unit	2.6 dB
MDS* w/400 Hz mod.	−130.4 dBm (.07 uV)
w/1 kHz mod.	−126.3 dBm (.11 uV)
15 kHz adj. ch. rej.	>> 60 dB
Min. squelch threshold	−122 dBm (.18 uV)
Max. squelch threshold	−114 dBm (.45 uV)
Squelch range	8 dB
Rcvr. spurious rejection	114.3 dB, ±65 kHz and +290, −495 kHz. None others noted.

*MDS = minimum discernible signal; data taken with 5 kHz peak deviation. Readings vary with modulating frequency.

Table I– Evaluation data for the Alinco ALR-206T.

Based on the above, the ALR-206T meets or exceeds all its ratings except possibly the second harmonic rejection, which appears to be about 4 to 6 dB above its rated level, but would normally be further reduced by using a tuned antenna system. One performance parameter which is difficult to specify but on which I attempted to take data is that



The Alinco ALR-206T top view with cover removed. Layout is densely packed but neat and serviceable. The P.A. heatsink takes up most of the rear panel, leaving just enough room for the UHF antenna receptacle and 2-pin power connector. The supplied mobile bracket is an easy "push in, pull out" affair which is simple but secure.

of 15 kHz adjacent channel leakthrough; I'll define this as the power ratio required to affect a change in readability of a desired signal already limiting the receiver. This is a most critical parameter to users in densely populated areas, and is probably more important than sensitivity under uncrowded band conditions.

Based on my measurements, I'd proclaim the ALR-206T to have one of the best 2 meter FM receivers I've ever used (and I've used a lot of them). Adjacent channel leakthrough (spaced 15 kHz) does not vary from −100 dBM (2.23 uV) all the way to +13 dBm (1 volt!) once the receiver is already limited by the "desired" signal. The "fully limiting" signal used for my tests was one at −94 dBm (4.47 uV), fully modulated (5 kHz peak deviation at 1 kHz rate); this appeared to be the level required to put the IF limiters into full saturation. To say the ALR-206T's receiver is remarkable would be an understatement.

A look at the Alinco's schematic diagram reveals the "secret" behind its excellent dynamic receiver performance. The first RF stage, a 3SK129 dual-gate FET, is protected by a pair of back-to-back diodes across the receiver input line, and the signal applied to its gate is filtered by a dual-tuned bandpass network; its drain then drives a triple-tuned bandpass filter before the signal reaches the first mixer, a 2SK192 JFET. The mixer's output at 10.7 MHz is filtered by a four-pole discrete crystal lattice and then fed through a pair of cascaded 2SC2668 bipolar IF amplifiers before reaching an integrated IF-AMP-DETECTOR module labeled "IR3NO6," a circuit with which I am not familiar. This IF-AMP-DETECTOR integrated circuit contains, according to the block diagram, the second local oscillator, second mixer, second IF amplifier, and limiter, discriminator, and squelch circuit.

Between the second RF mixer and the IF AMP-LIMITER is a multipole ceramic filter tuned to the second IF at 455 kHz. A separate IF amplifier drives the S-meter detector, while the output from the discriminator drives an integrated audio power amplifier module labeled "uPC575C2." Again, I'm not familiar with the audio amplifier integrated circuit, but the manufacturer rates the output to be more than 1.6 watts. I didn't measure this, but can say that the internal (bottom-mounted) speaker produces enough audio to overcome a fairly noisy environment (automobile with windows open at 55 mph).

The ALR-206T transmitter is straightforward, using an integrated CPU/PLL (central processing unit/phase lock loop), crystal oscillator/divider, and prescaler with mostly discrete stages comprising the main RF chain. The "PA Unit" which contains the power amplifier and its driver stage (a 2SC2538 bipolar power device), output detector, P-I-N diode T/R switch, high/low power range circuit, and 6-pole output RF filter, is located in a separate housing from the main circuit board. The 25 watt power amplifier is a hybrid module which would require replacement in the event of a malfunction. The unit under test did not malfunction at any time, despite my efforts to force a failure; the ALR-206T is apparently capable of driving an open or short circuit without damage.

Since the Alinco's T/R switching is all solid-state, I imagine it is well suited for automatic high-speed digital communications (packet), but I

did not attempt to measure its switching speed. Possibly a call or note to the importer will shed some light on this.

Speaking of light, the ALR-206T, having a liquid-crystal display (LCD) of operating frequency, offset, memory selected, and S/RF meter, needs a source of light to be readable. No problem in daylight, of course, when the display offers plenty of contrast. At night, an internal light source may be switched on by the front panel "lamp" switch; this creates a cool, green glow as the background for the black LCD segments. It's quite attractive. The front panel does have three LED (light-emitting diode) indicators as well. These show the selection of "duplex," "low power," and "busy" (on receive) or "transmit" status.

Frequency programming of the ALR-206T is accomplished in any of three ways: One may select a frequency by "keying it in" with the 16-button key pad on the rear of the factory-supplied microphone; one may "dial" the frequency in using the five-position, spring-return rotary switch located on the left side of the front panel; or one may use the "up/down" push buttons located atop the factory-supplied microphone. Either of these latter approaches requires that the user watch the LCD frequency display to determine when he has reached the desired channel. At home or parked roadside, any of these methods works well. While operating an automobile, the preferred method is the keypad entry, which is quickly accomplished and only requires taking one's eyes off the road for perhaps a second—not enough time to get into trouble under normal traffic conditions.

Any of ten preprogrammed channels may be selected using just two keypad buttons. Once the user gets the hang of this, a preprogrammed channel may be selected without taking his eyes off the road at all; surely this is the approach condoned by the National Traffic Safety Council. The rig emits a subtle but reassuring "beep" tone with each keypad stroke to let the operator know that some change in programming has been effected. "Keyboard Operation" instructions consume four pages of the ALR-206T owner's manual, and the new user is well advised to familiarize himself with all the keyboard functions before pushing the mike button. It is entirely possible to transmit *anywhere* in the 2 meter band with this radio, regardless of the frequency displayed on receive, if you don't know what you're doing.

Other front-panel switches select ±600 kHz transmit offsets, duplex/simplex mode, display lamp on/off, a non-standard transmitter offset (which uses one memory channel that must be preprogrammed), volume, squelch, and power on/off. The ALR-206T contains a long-life battery for semi-permanent storage of CPU information; that is, the rig will "remember" all your preselected memory channels *and* the last frequency you selected prior to shutting the power off, even if it is disconnected from its 12 volt power source. This is very handy, and I can't imagine using a transceiver that "forgets" where it was last used.

The Alinco also has "bells and whistles" which will be used by only some owners; for example, the ALR-206T contains a DTMF ("touch tone") encoder in its microphone and a synthesized, programmable subaudible ("PL") tone generator within its case. The desired "PL" tone is selected by a DIP switch with the aid of a chart contained in the owner's manual. Further, the ALR-206T is capable of frequency scanning any band segment or the preprogrammed memory channels with the touch of a couple of keypad buttons. It takes some getting used to, but this is a very versatile rig!

The Alinco ALR-206T measures just 5.5″(W) × 2″(H) × 7.5″(D) and weighs only 2.8 lbs. Its diminutive size allowed its installation alongside the center console in my Toyota Cressida, a car not noted for its abundant free space. Because of its small power consumption, even in the 25 watt mode, a pair of #16 conductors are more than sufficient to handle the DC line to the car battery or base power supply.

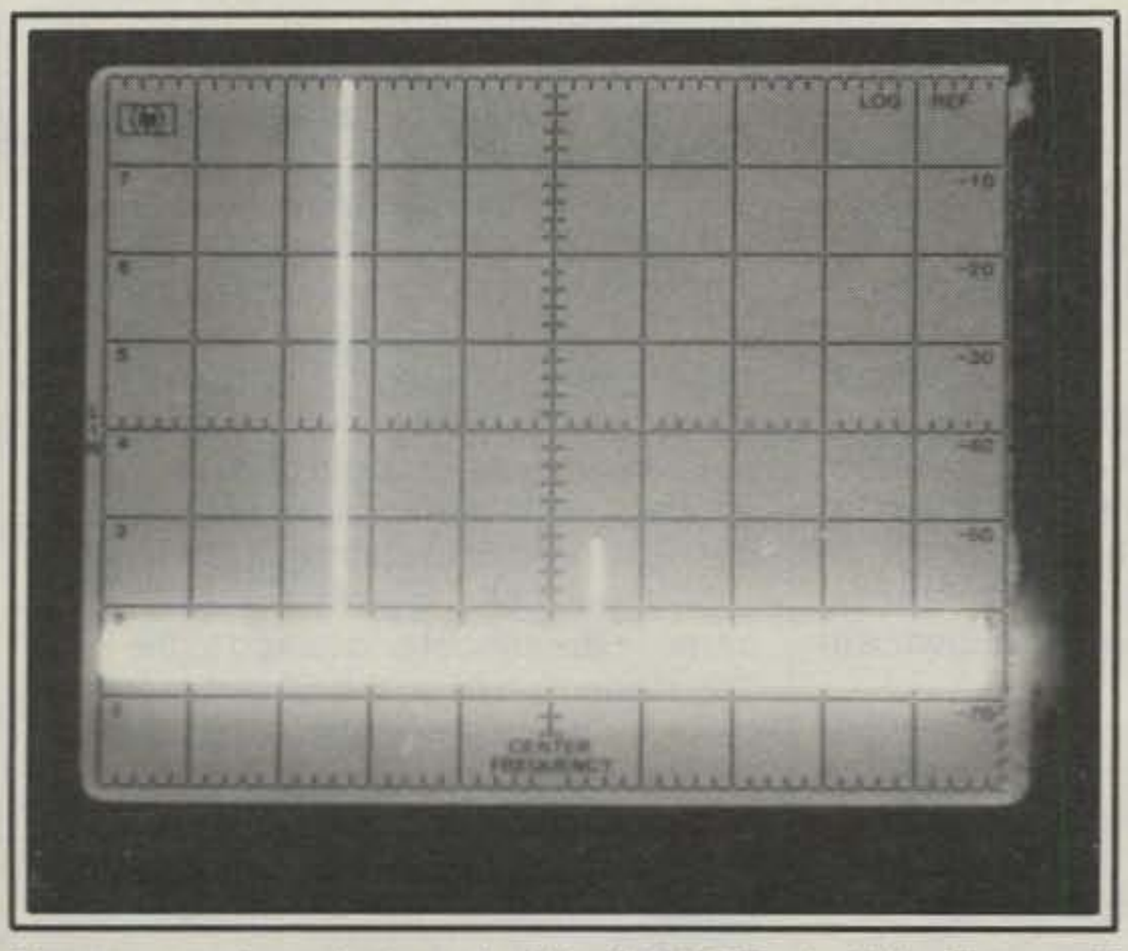
Oh, yes . . . I had mentioned a problem with the LCD display in the fourth paragraph of this review. This problem occurs only when the rig is in my car with the display window facing "up" (towards the sun) and the car windows all closed on a very hot and sunny day. The display goes totally black and cannot be read until it cools off a bit, usually after a few minutes of driving with the air conditioning on. This is symptomatic of liquid-crystal displays in general, and has only actually occurred twice with my rig and installation. The display blanking does not otherwise affect the rig's operation.

The Alinco ALR-206T is manufactured in Osaka, Japan and is imported by Alinco Electronics, Inc., 44 Glen Carran Circle, Sparks, NV 89431. It is available from leading amateur radio distributors.

Big News

Before I go, I should mention that the fabulous F9FT "Tonna" antennas from France are available from a newly franchised east-coast distributor who is importing these products in large quantities. If you're interested in Tonna VHF/UHF antennas, try writing to The PX Shack, 52 Stonewyck Drive, Belle Mead, NJ 08502 or calling (201) 874-6013. Ivars, KC2PX, is a nice guy and will be glad to help you out. Also, the excellent muTek Ltd. VHF/UHF products, some of which have been reviewed in this column, are now being distributed by "Q" Products, 417 Staudaher St., Bozeman, MT 59715. Write, or call Gene, KB7Q, at (406) 587-9150 for more info on this innovative British gear.

73, Steve, WB2WIK



Spectrum analyzer photograph of the ALR-206T output "low" power (5 watts), which is a "worst case" condition. The second harmonic is down 54 dB from the 146 MHz signal; all other spurious outputs are down more than 60 dB.

Ticket Talk

a monthly feature by
FREDERICK O. MAIA, W5YI

INFO ON AMATEUR RADIO LICENSING

Youngsters—The Future of Our Hobby

Amateur radio exists for many reasons. None is more important than providing a reservoir, a beginning, for those who might someday become gifted high-tech engineers and technicians. In today's sophisticated technology times no nation can survive without highly trained professionals. Electronics is more than a profession; it is a lifelong calling, a love of tinkering and experimenting, of trying something different, making it work, and getting excited about it. It takes those with a certain psychological makeup.

Those who make electronics their lifelong work usually begin at an early age. They start with science projects, or as a computer buff or amateur radio operator. Innovators start as curious experimenters. Crackerjack technicians are more than trained machines. They are lifelong tinkerers. Ingenuity, genius, talent, aptitude, brightness—call it what you may, it isn't something that you develop. It is something that you have from birth. Under the right circumstances, the seed once planted germinates and eventually blossoms into ability and professionalism. Amateur radio is frequently the catalyst.

We must continually seek out those who are inquisitive and have the capacity to excel in a high-tech career. The Amateur Radio Service historically has provided the reservoir from which many of our finest scientists have sprouted. Hamming provides us with a method of recognizing aptitude and a training ground for those with an interest in electronics.

In recent years, however, substantially fewer youngsters are entering amateur radio. Most of those who do are turned off by what they see. Their classroom environment is filled with the magic of computers and satellite communications. Few are excited about being restricted to Morse code operation. They consider it to be antiquated. Most who do become amateur radio operators consider the code *a necessary evil* and want to get it out of the way as fast as possible. Their only interest in the code seems to be that they know they must have knowledge of it before they can go on up the amateur radio license ladder. A sad fact is that most Novices today never go on the CW airwaves.

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

FCC statistics show 10,000 fewer Novices *than just three years ago*. More than 30,000 of the 50,000 amateur radio operators over that period dropped out of the hobby, never making it even to the voice privileges Technician level. It is obvious that we need to make the service more attractive to beginners, and it is destined to happen soon.

In Japan it is a different story. Ham radio there is big. Very big! In a nation smaller than the state of California (and with a population less than half that of the United States), Japan has more than twice as many amateur radio operators as our entire country and its possessions put together. Many go on to high-tech careers after first having had their interest fueled by the wonders of amateur radio. It is little wonder that Japan leads the world in high-technology and consumer electronics manufacturing. Hardly a day goes by when we don't read about some Japanese innovation.

There has to be a reason for their success. I believe part of it is the manner in which they create desire (particularly among their youngsters) by providing an electronic playground—a no-code ham class—for their people. A certain percentage go on to high-tech careers. The larger the pool, the greater the number of engineers and technicians. It is that simple.

Many countries around the world—many of them previously closed to amateur radio for what is perceived to be national security interests—are now recognizing its technological value. Amateur radio is a national sport in the Soviet Union. Beginners there start early by simply listening to shortwave radio.

You have developed nations, emerging nations, and the so-called "third world." A characteristic of a developed nation seem also to be a developed amateur radio program. Interest in electronics and technical achievement go hand in hand. Think about it. Where amateur radio is big, so is the country's progress, self-esteem, and their overall influence in the world.

Having been a ham for more than three decades and having witnessed a severe deterioration of amateur radio interest among our youth, I am really concerned about our country's technological future prospects. From where are our replacement engineers and scientists going to come and what about our technological position in the free world? Will it also deteriorate?

Amateur radio statistics indicate that *we are going backward*. It is vital that we place renewed emphasis on bringing new blood, particularly youngsters, into our hobby, not because we need radio operating activity to utilize (and therefore protect) our valuable amateur radio spectrum, but because it is essential down the road to our nation. The following Novice "success story" shows what happens when youngsters are interested and guided.

78 New 6th Grade Novices

About a year ago, 37-year-old George Gruenther, a sixth-grade social-studies teacher at James Madison Middle School in Burlington, Iowa, was studying Newfoundland in his class. He came across the name Marconi. Marconi was the first to send a transatlantic radio message to Newfoundland. At that time he knew nothing about amateur radio.

It wasn't long before Gruenther was investigating the Iowa Illinois Amateur Radio Club in Burlington, Iowa. George Smyth, KØKOP (one of our VE's), helped Gruenther get started. A few short months later he became a Novice, KAØVPM.

George Gruenther asked his class of 20 social-studies students if they would like to learn about radio and Morse code and possibly even get their Novice licenses. They were all very excited! It wasn't long before they too were learning the code with the help of the radio club—particularly John Lenahan, KØRW, and Larry Newby, WBØBHF.

Gruenther had five other classes, and they too wanted to participate in the project. The Novice amateur radio classes at James Madison Middle School swelled to 143 students! George arranged for the students to do most of their social studies as homework so he could concentrate on amateur radio during class time. He had the full support of the principal, John Smull.

Members of the amateur radio club came to the school and talked to the kids. The students had built a crystal radio in a previous class. They were told that with amateur radio they not only would be able to hear foreign countries, but would be able to talk back to them as well. This kindled their interest even more! Club members put out the word on various nets that code oscillators and keys were needed, and did they ever start coming in! Some even came in from as far away as South Dakota.

One amateur donated a Heathkit HW-101 to the school. John Lenahan had a code keyboard and that made a big difference. The kids would get on the keyboard and send messages to each other. The students were allowed to check out the oscillators at night to practice at home. There were never any oscillators left over. There was always a waiting list for the 18 oscillators.

The kids' grades, self-confidence, and self-esteem increased. They worked harder and harder. The Iowa Illinois Amateur Radio Club volunteered all sorts of books, equipment, gadgets—support. They would get on the 2 meter band and scrounge up more oscillators and keys for the kids. A complete operating amateur radio station was set up—the antenna one weekend, the equipment the other. The kids sold jars of honey to finance some of the equipment purchases that John made at the Dayton HamVention.

On May 15th, three months after beginning the Novice classes, the kids were ready. John Lenahan, Larry Newby, and Willie Anderson administered the Novice tests that our VEC program provided in three groups. The code exams were from the Gordon West/WB6NOA 5 word-per-minute code test tape. Each group got a different test.

Sixty-one kids passed the code test the first go-round. On the 29th of May more code and written tests were given in the school cafeteria. All together, 78 new 11- and 12-year-old Novices emerged! John said examining 143 Novices was a little breath-taking! He said it took him a while to sign all of the applications at his dining-room table. The club is now addressing the issue of upgrading the kids to Technician. The story made the front page of their local newspaper, complete with a photo of 12-year-old Jennifer making her first Morse code radio contact!

A great success story for ham radio thanks to the efforts of a motivated teacher and an amateur radio club! Our bet is that at least one of those kids will be an electronic engineer thanks to them. Being a VEC, we review a lot of 610's (applications). Very few are from youngsters. We need more of this sort of thing!

Novice Oscillators, Keys, Manuals . . .

We published that Novice success story in our twice a month ham newsletter. It got a lot of attention. We also asked if anyone could help make low-cost Novice study material and code equipment available.

Bob Grove, WA5PYQ, of Brasstown, North Carolina offered his Grove Enterprises engineering and production capability to provide low-cost code oscillators. Gordon West, WB6NOA, called and agreed to let us purchase Morse code keys (which he imports from the Orient) and code-learning/practice tapes at essentially his cost. We get special volume discount prices as a dealer for various study guides. Both the League and AMECO gave us special "deals." The bottom line is that we have put together a complete Novice package that we believe is the most comprehensive (and lowest priced) ever devised. We are offering it without a profit motive at essentially our cost. The package contains:

Morse Code Oscillator (9V battery not included)	Reg. $9.95
Morse Code Telegraph Key	Reg. $4.95
ARRL FCC Rule Book	Reg. $4.00
AMECO Element 2 Study Guide	Reg. $3.50
W5YI Novice Q&A Guide (Contains all 200 questions and multiple-choice answers)	Reg. $4.00
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If you just want the code oscillator, the price is $5.95 (plus $1.50 postage). The code key is $3.95 (plus $1.00). Order from: W5YI-VEC, P.O. Box 10101C, Dallas, Texas 75207. VISA and MasterCard also accepted. The whole idea of this package is to provide the best Novice training materials at rock-bottom prices. It includes everything you need to teach a Novice Class, or to teach yourself. Let's have a real campaign to interest our youngsters in ham radio!

Things Are About To Change For The New Novice

Both our FCC and Canada's DOC (Department of Communications) are aware that changes are needed in the amateur radio entry level. Both regulatory bodies have suggested changes, and as I write this, they are considering the appropriate path of action to take. The DOC has suggested and the two largest Canadian national organizations have supported an entry-level no-code certificate. (They don't call them licenses in Canada.) A 7 wpm code endorsement will permit voice privileges on 10 meters.

The FCC proposal, patterned on a petition from the ARRL and others, would allow voice privileges on segments of the 10 meter and 1215–1300 MHz band in addition to 220–225 MHz VHF operation. The FCC/ARRL Novice recommendation still requires 5 wpm code proficiency.

One thing is for certain: It will be easier to get into amateur radio in this continent, and the enhanced operating privileges will be more attractive to beginners. I predict a big expansion in amateur radio. We will probably see what the FCC and DOC have in mind for their respective

amateur radio beginners sometime around Christmas.

Whatever new Novice privileges Canada and the U.S. permit will still fall short of what Japan allows its amateur radio newcomers. They have a low-power (10 watt) no-code phone class that permits long-distance HF operation on all bands except 160 and 20 meters. It is unbelievably popular! Strictly speaking, this is in violation of the ITU rules which allow no-code operation only above 30 MHz. Japan gets around this by stating that any radio operation is allowable under the rules, providing it does not cause interference to other nations. No other country has ever complained about Japan's no-code HF license.

From The Mailbag

We try to answer general-interest questions in this column. This month's topic . . .

Code is a problem for me. How does the testing and code credit work? The ITU members (about 150 different countries) agreed several years ago that Morse Code proficiency would remain a requirement for amateur radio operation above 30 MHz (International Radio Regulations, Article 32, Section I, §3.1). Japan bends the rules a little, as we mentioned above. In reality it appears that a nation can do pretty much what it wants to.

While the international law states that amateurs shall prove that they are "*able to send correctly by hand and receive correctly by ear, texts in Morse code signals*," our FCC allows volunteer examiners to waive the sending requirement. There is no provision for this waiver in the §Part 97 rules, but it is mentioned in the instructions sent to all VECs. A VEC (Volunteer Examiner Coordinator) acts as the FCC's tesing administrator, since all testing is now prepared and conducted by ham volunteers (VE's).

It is the FCC's experience that if a person can receive Morse code, they possess sending ability, too. There is no international requirement for receiving code at a specific speed. Theoretically, as far as international law is concerned, one word per minute legally could qualify you for all amateur privileges.

§Part 97, a section of the Communications Act of 1934, defines the U.S. Morse code requirements for ham band operation. They are 5 wpm for Novice/Technician level, 13 wpm for General/Advanced level, and 20 wpm for the top-of-the-line Extra class ticket.

The §Part 97 rules governing Morse code examinations do not specify the testing format that VE's should use. Some require correct answers to questions asked about what was transmitted, while others correct copy transcription for a one minute period out of five. Still others require various combinations. The test can even be oral.

There is no FCC requirement that the code be transcribed on paper. Some people copy the code in their heads and then answer seven out of ten questions, a multiple-choice or a fill-in-the-blanks format examination. It is even legal to pass an amateur who simply correctly tells the VE what generally has been transmitted. This is a particularly useful method when testing the handicapped. Again, it is totally up to the volunteer examiner. Passing mark is 70 percent. The exam objective is for the applicant to be able to *communicate* by the Morse code language. While you don't have to put anything down, you are required to be able to know what is being sent.

Applicants who hold commercial First or Second Class Radiotelegraph licenses (or who have held one within five years) get automatic credit for the 20 wpm code exam. No code credit is given to amateurs who hold foreign ham licenses or those operating with a U.S.-issued reciprocal amateur operator license. Even though our country has accepted these operators' own nations' examinations and has issued them a U.S. amateur (reciprocal) license, they must take the code tests like everyone else if they want a regular United States ham ticket.

Amateurs are responsible for knowing all 26 letters of the alphabet, the numerals 0-9, the period, the comma, the question mark, and certain operating prosigns (AR, SK, BT, and DN). Five characters are considered one word. Each punctuation mark, prosign, or numeral is counted as two characters. If a sending test is given (and it is at the option of the VE), a straight, semi-automatic (bug), or electronic keyer may be used, but not an electronic keyboard keyer.

Only one General class or above volunteer examiner is required to administer the 5 wpm Novice code test. A formal VEC accredited testing team consisting of three Extra-class-level VE's is needed to administer the 13 or 20 wpm code test. All applicants for code (or written) amateur examinations must apply using FCC Form 610, June 1984 or July 1985 versions only. Earlier application form versions can't be used since they are not suitable for the FCC's new volunteer examination program.

The VE will grade your test immediately after you complete it, and you are advised of the results. The test paper is retained by the VE for one year (if a Novice examination) or sent by the VE team to the VEC if for 13 or 20 wpm. All applicants who pass a Morse examination are issued a certificate indicating that they have attained a specific code speed proficiency, or have upgraded to a new license class.

Every VEC has these certificate blanks available for its examiners. VE's administering the 5 wpm test can make out their own certificates. It can be as simple as a short note. This certificate indicates that the applicant has code examination credit for a period of one year at the specified speed. Instead of having to take another code test, the code credit certificate is given to the VE at a subsequent test session when taking the needed written test in order to upgrade.

Getting a new license or upgrading also requires successful completion of a written test. If you do that, then the VE sends the application directly to the FCC in Gettysburg, or to the VEC in the case of Technician and higher class operator levels. After a review process the VEC then sends it to Gettysburg, and about six weeks later you get a new upgraded license. You can immediately operate your radio set with your new privileges even though you haven't received the upgraded FCC license yet. The certificate also allows temporary "Instant Upgrade" privileges. Your new operating rights won't be permanent, however, until the license is issued.

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DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATION AROUND THE WORLD

They spoke, I think, of cycles past.
They spoke, I think, of DX at last.
One thing I remember:
CQ Worldwide Tests go forever . . .
Every October.

We knew it was one of the Locals coming up the hill, even at some distance. The joggers who frequent the hill route are always in their jogging shorts. This Local had the traditional DX garb—the pants with the seat cut knee length. He came to talk about DX. We were not surprised. It was what he said that was surprising.

"You know something," this Local started in with an always original opening, "a couple of months back I heard about planning by a DX group aiming to do some really great things in DXing—a really grass-roots effort which not only will bring the scarce and long-needed countries up on the bands, but which will also have some absolutely *new* countries for the first time. It's really a good plan, and they have a good grasp of what DXers need. They told me so themselves."

While it might be fall with most of the thinking being directed to the start of the new DX season with the *CQ* WW DX Test the last weekend in October, this one caught our attention. "Tell us about it," we suggested. One does hear of many DX plans which never come to full fruition, but one also learns the perils of skepticism. That was learned the hard way years back when the story was released on the planning for Okino-Torishima and the possibility of a new DXCC country. "No way!" we had expounded. "That reef is only above water at low tide. How can they operate?" They could and they did. If you are curious, they erected some of that portable scaffolding you see on construction jobs and operated very nicely while 6 feet of water covered the reef below them. We never again doubted. DXers can do anything!

"Well," the Local continued, obviously anxious to impress us with all the good information he was carrying, "these fellows doing the planning are DXers who really know all about DXing. They are organizing a non-profit, scientific organization aimed at learning all about propagation. They plan to operate from various DX spots around the world. Some will be new countries, everyone will be rare, and from the signal reports they can learn a great deal about propagation and how it affects DXing. Understand?"

77 Coleman Dr., San Rafael, CA 94901

Here is a true Believer, a long-time worker in the DX vineyards, Leo Haijsman, W4KA, who handles the most difficult award in amateur radio—the Worked All Zones Award. Some years back Leo was with the FCC, but now he lives in Florida, works DX, guards the WAZ, and wonders when he will get that handful of countries he needs. Most DXers want the WAZ. Now you know whom you do business with—W4KA!

We did understand what he was saying. Always there are great things going in DXing, and big plans and planning are often among them. Perhaps we had heard of similar plans in the past but always one needs all the facts to reach a considered and mature judgment. This time we were not going to miss anything, but still, this time again we were cautious. "New countries?" we echoed brightly. "How are they going to find those? Hasn't everything been worked over by this time—the enclaves, the UN outposts, the extra-territorial spots—and hasn't the DXCC Desk moved to tighten up the consideration of those kinds of places? Aren't such possibilities just about dead? Don't you think so?"

If the Local did, he was not admitting it. Instead, he moved to attack. "You might believe that, but there are some who label such thinking a dead-end street. And these are not just sitting and waiting for something to drop out of the heavens at Newington. They are doing research. In old ship logs, in European and South American libraries, and in the file of ancient charts compiled by such as Lord Anson back in the 1700s when he was capturing the Spanish treasure galleons in the Pacific, that's where they are looking. Just stop and remember how the treasure of the Atocha was found by studying old charts and records. That should prove that the study of those ancient charts can reveal a lot of new information. Think about that."

There is always difficulty in arguing with solid facts firmly presented, even should they be erroneous. "Tell us about the group," we suggested. "How they are going to operate and things like that." Actually, we wanted a bit more time to mull over things.

"The whole thing is rather unique," the Local said, "and the first thing will be to complete the compiling of an updated needed country list and which DXers are interested. Certainly every active DXer will be interested, and the itineraries will be molded to cover as many needed ones as possible. But the real kicker is that there will be at least one new country on every leg of the DXpeditions. Thus, you will not only work the rare and often needed ones, but you can also work the new one. Neat, yes?

Neat it was. It made us younger just to think about it. "But how will they travel," we asked, "and where will they go? All that travel and all the needed gear certainly will present a logistics problem. Don't you think so?"

The Local did not. "All of that has been covered in the careful planning," he advised. "If you go to Clipperton, you'll need a boat, right? And if you go to Kingman, you need a boat, right? And if you go to Minerva Reef, you'll need a boat, right? So isn't it the sensible thing to plan to travel by boat? On the continental land areas naturally it will be more convenient to use land transportation. But remember that there are a lot of places in this world where boat transportation is not only convenient but necessary. A lot of such places can be new DXCC countries. Certainly you can understand that!"

We were trying, and trying real hard. "Any idea where some of these islands might be?" we asked brightly, wondering if this one would reveal any information, or if he had anything at all. He did have it and definitely was out to put us in our place.

"Okay," he quickly replied with some firmness. "I've been in on some of the planning, and I'll tell you a couple of things if only to prove them beyond any doubt. But you will have to promise not to reveal the names of the islands to anyone. Promise?"

Of course we promised. What true-blue DXer would not promise anything when a possible new country is involved? After all, such information has to kept secret, at least until you've worked it.

"Ever hear of Kentzell's Island?" the Local asked, and we had to admit that we had not. We could also note that the admission of ignorance pleased the Local.

The WPX Program

Mixed

1223	LZ2RS	1226	I2UIY
1224	IK8EPC	1227	N2CIC
1225	YU1GR	1228	WB5LBR

S.S.B.

1824	W0GOQ	1828	JL1EDB
1825	NK2H	1829	HA8XX
1826	I2UIY	1830	W6MDH
1827	N2CIC	1831	WB5LBR

CW

2386	JA0SOD	2389	WA2LEW
2387	I2UIY	2390	OK3CGT
2388	LA9XG		

Endorsements

Mixed: 450 LZ2RS, YU1GR, N2CIC. 500 LZ2RS, DK2UB, YU1GR, IV3PVD. 550 DK2UB, HB9BIN, YU1GR, N2CIC. 600 DK2UB, HB9BIN, KA6SWI, YU1GR, N2CIC. 650 DK2UB, HB9BIN, YU1GR, N2CIC. 700 DK2UB, YU1GR. 750 DK2UB, AC2J. 800 DK2UB, AC2J. 850 DK2UB, AI8S. 900 DK2UB, AI8S. 950 DK2UB. 1000 I5HOR. 1150 IT9VDQ. 2300 N9AF.

S.S.B.: 350 I2UIY, HA8XX, W6MDH. 400 I2UIY, N2CIC, W6YLJ, HA8XX, W6MDH, DL8ZAW. 450 I2UIY, HA8XX, W6MDH, DL8ZAW. 500 I2UIY, DL8ZAW, N2CIC. 550 I2UIY, JF1PHJ, DL8ZAW, N2CIC. 600 I2UIY, N2CIC. 650 I2UIY, N2CIC. 700 I2UIY. 750 IN3AHO, I2UIY. 800 IN3AHO, I2UIY, I2EOW. 850 I2UIY. 900 I2UIY. 950 I2UIY, KK0L. 1000 W3GXK, I2UIY, KK0L. 1050 I2UIY, KK0L, SM6DHU. 1100 KK0L, PP2ZDD. 1150 PP2ZDD. 1250 AC2J. 1750 F6DZU, WD8MGQ. 1800 F6DZU, WD8MGQ. 1850 F6DZU. 1900 F6DZU. 1950 F6DZU. 2000 F6DZU. 2300 ZL3NS.

C.W.: 350 W3GXK, I2UIY, LA9XG, NI2N, OK3CGT. 400 W3GXK, DL2HBX, I2UIY, LA9XG, OK2CGT. 450 DL2HBX, I2UIY, LA9XG, JA1OJZ. 500 DL2HBX, I2UIY, LA9XG, KA9GZM. 550 DL2HBX, I2UIY, LA9XG, KW9N. 600 DL2HBX, I2UIY, LA9XG, KW9N. 650 I2UIY, LA9XG. 700 I2UIY, LA9XG. 750 I2UIY. 800 I2UIY, W9PWM, OZ5EDR. 850 I2UIY. 900 I2UIY, SM6DHU. 950 SM6DHU. 1450 N4YB. 1500 N4YB.

VPX: 1000 KDX1A.

15 meters: AC3T, W4UW, HB9CSA, I2EOW, TI2KD.
20 meters: EA3AAY, NI2N, HB9CSA, N2CIC.
40 meters: HB9CSA, DL9JI, TI2KD, OZ5EDR.
80 meters: DL9JI, 5B4MF, PA3BFH.
160 meters: OK2PO.

Asia: SP8DYY, G4CHP, W4UW.
No. America: NI2N, I2EOW, G4CHP, WB5LBR.
Europe: JA1OJZ, WA2LEW, G4CHP, HA8XX.
Oceania: PP2ZDD.

Award of Excellence: SM6DHU
Award of Excellence Holders: DL7AA, ON4QX, YU2DX, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU.
Award of Excellence Holders with 160 Meter Endorsement: W8ILC, W1BWS, G4BUE, LU3YL/W4, VE7WJ, W9NUF, N4NX, SM0DJZ, DK5AD, W3ARK, LA7JO, W4VQ, K6JG, W4CRW, N4MM, SM0AJU, KF2O, K5UR, OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY, W5UR, N4NO, W8RSW.

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.

This one definitely was on the inside and enjoying it.

"Back in 1856," the Local continued, "the North Pacific Surveying Expedition stopped in San Francisco and learned of reports of an island at approximately 40°N and 150°W. A San Francisco bar pilot, a Captain Kentzell, asserted that he had seen the island and that it was about 20 miles long and very low. It was reported that the island was kept secret so that certain parties could exploit anything of value found on the islands such as the sea lion colony and the guano deposits. What do you think of that?"

The ingredients of a DXpedition—W2CQA and the XYL of PP2ZDD stand beside the gear (including two 40 foot masts) off-loaded from W2CQA's twin Cessna at the Brazilian Air Force base on Fernando de Noronha. A three-day operation, as PY0FI, was mounted by W2CQA, PP2ZDD, and KB4MHR with two transmitters on the air. A total of 90 countries was worked despite poor propagation.

This was interesting, maybe. But we also knew that back in sailing-ship days such reports had not been infrequent. What we wanted was some corroboration. "Only that one report?" we asked, and the Local smiled.

"No, the barkentine *Washington* bound for the west coast from Hawaii in 1867 also reported sighting the island, saying it was about 40 miles long and swarming with sea lions and sea elephants. What do you think of that?"

We had to think over things. We knew that ships bound for Hawaii take a southwesterly course out of the Golden Gate, and those bound for Japan and the Orient head almost north on a Great Circle course. The coordinates of this island would make it about 700 miles straight west of California. Without saying such, we made a note to look further into this matter. "Any others?" we asked, and from his look we knew that there were.

"Well," he said, continuing to savor the moment, "maybe just a few of the names of islands so you can recall them later on when they are on the air. Just keep in mind names like Duncan, Gallego, Walker, and Sarah Anne. And you might also listen for Jane, Poltroon, Barbera, and Prospect Islands. You just might do that. And if you are having any doubts, just try checking some of the nautical charts from the middle of the last century. The problem at that time was that their navigation was not too precise, and the islands were logged in wrong positions. But, and keep this in mind, there should be no arguments made at all that in a majority of cases the ships did see something. The problem has been the exact locations. That's where this group is doing their research, and they are doing it well. You should hear them tell about what they are doing. They are good. That's for sure!"

Sometimes Sam further down the county tells us that we are gullible and spend too much time watching the financial stations on TV. "Watch out for those fellows with the full beards selling gold and silver and things like that," Sam has warned us. "They can convince you even when you know you should be smart enough to ignore their words." But this Local brought a different word. This was about DX, and always there are things to learn about DX and DXing, maybe even from a Local DX type who has hardly more than a hundred countries on the wall. We were receptors and asked, "How are they going to pay for all the travel and expenses? How will they live and things like that?" The Local proceeded to tell us, and we thought again of that name that we have dared not mention in this house for the last 20 or so years.

"This is a non-profit, scientific group," the Local explained. "Thus, it will not have any foundation or grant money. Those who will benefit naturally will be the ones who will support the good work. Memberships in the group will be available, and naturally they will be tax deductible if the non-profit status is ap-

The WAZ Program

10 Meter Phone

307	JE1VPC		

20 Meter Phone

565	KB7VD	567	G4UCB
566	K0JZM	568	WL7E

40 Meter Phone

37	JA1WTZ		

80 Meter Phone

37	I1APQ		

15 Meter CW

118	SM0AJU		

20 Meter CW

244	LA9XG	246	I4YTE
245	OH3TQ		

All Band WAZ
SSB

3033	I4FYF	3037	K9MDK
3034	DF2AL	3038	YB5QZ
3035	I4AVG	3039	W5BPT
3036	I4EWH	3040	JR3HEW

Phone and CW

5977	IK4CQJ	5982	JA7YAF
5978	WB4CSK	5983	VE7FJE
5979	HB9ASN	5984	DK6CC
5980	JA3FKK	5985	DK2GZ
5981	F6HWM	5986	I1QGZ

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 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 July 1, 1986

All 200 zones worked:

1. ON4UN	43. I4EAT	84. SP3BQD
2. K4MQG	44. ZL1BQD	85. LZ1NG
3. SM4CAN	45. TG9NX	86. N4JF
4. AA6AA	46. XE1J	87. CT2AK
5. W8AH	47. F5VU	88. HB9CIP
6. W6KUT	48. W3AP	89. OK1MG
7. EA8AK	49. YO3AC	90. CT4BD
8. LA7JO	50. K3TW	91. VK6HD
9. EA3SF	51. XE1OX	92. EA6ET
10. OH1XX	52. VE7IG	93. VK3QI
11. EA8OZ	53. OK1ADM	94. LZ2DF
12. W0SD	54. CT1FL	95. ON4QX
13. K0ZZ	55. WA1AER	96. SM0DJC
14. ON6OS	56. N4RR	97. CT3BM
15. OK3TCA	57. UW0MF	98. K2TQC
16. K6SSS	58. W4DR	99. EA8XS
17. ZL3GQ	59. OK1MP	100. HA9RE
18. OK3CGP	60. W1NW	101. SM4CTT
19. SM0AJU	61. OE1ZJ	102. A71AD
20. OZ3PZ	62. HB9AHL	103. LZ2CC
21. I3MAU	63. HB9AMO	104. SM4CLE
22. I2ZGC	64. LA6OT	105. LZ1HA
23. 4Z4DX	65. UR2QD	106. SM5AKT
24. N4KE	66. UK2RDX	107. CT4NH
25. K5UR	67. ZS5LB	108. ZL4BO
26. K9AJ	68. F6DZU	109. I1BSN
27. SM3EVR	69. DL4YAH	110. DF6CY
28. LA5YJ	70. LA7ZO	111. DK5AD
29. DL3RK	71. W9ZR	112. DL6EN
30. N4WJ	72. W1NG	113. SM6CVX
31. G3MCS	73. VK9NS	114. LU8DPM
32. SM5AQD	74. N4KG	115. SM6DYK
33. W0MLY	75. YU7DX	116. DL7XS
34. I0RIZ	76. DL8MAG	117. DF7NM
35. ON5NT	77. OK3DG	118. UA3TT
36. OH6JW	78. ZL1BOQ	119. OK1DDS
37. OK1AWZ	79. EA9IE	120. YU2TW
38. IV3PRK	80. DL7HZ	121. EA8QL
39. DJ6RX	81. DJ9RQ	122. I1APQ
40. OH3YI	82. EA5SP	123. G3TJW
41. I4RYC	83. EA2IA	124. NW5K
42. ZL1BIL		

The top 16 contenders for 5 Band WAZ are:

1. JA1BWA, 199	9. K4CEB, 199
2. JA3EWU, 199	10. G3GIQ, 199
3. N4WW, 199	11. SP7KTE, 199
4. K5YRA, 199	12. ZP5JCY, 199
5. W8UVZ, 199	13. LU6GV, 198
6. F6BEE, 199	14. W2YY, 198
7. JA0CWZ, 199	15. K7UR, 198
8. W6GO, 199	16. W3GG, 198

377 Stations have attained the 150 zone level.

proved. Even if they change the tax laws, no DXer would refrain from helping such a good DX endeavor. Just think of the new countries alone. Everything will be computerized in this organization. Thus, the expeditions will be able at all times to have an updated list of members and their contributions. This list will help in pile-ups. You know how it is always easier to pick out a familiar callsign in a pile-up. If you know the callsign, it is easier to read. Right?"

Of course he was right. Most DXers have seen this happen in other times and on other bands, but we had the information and, admittedly, it was intriguing. But the echoes of other years were still ringing through our memories. The Local was about ready to depart but took the time to fling one last barb.

"I get the idea that you have some reservations about this project," he said, and we forced ourselves to withhold any comment. "But isn't it true," the Local continued, "that while things did not end right years back, not all the operations were invalidated?" We acknowledged that this was true.

"Thus," the Local pressed on, "it was not the plan that was faulty, but rather the operator or operators, right?" Again we had to admit that this was right.

"Then," the Local said with a note of patience in his voice, "if a group was to handle things right, do everything above board and out in the open, and play the game squarely and by the rules, things could be different." Again we had to admit that perhaps the thinking was correct.

"So tell me," the Local said, drawing up to his full height and taking care not to mask the stridency in his voice, "why wouldn't such a plan work?" We again had to admit that it did seem that he was on track. And on that final note of triumph the Local left us. Going, no doubt, to further the good work on the great plan for DXing.

All the rest of the day the words of the Local stayed with us. We could not shake them at all. The plan had promise, that was for sure. And in other times and other places we had heard guarded mention that there were still places out in the Pacific that would count for new countries should anyone put them on the air. And not only the Pacific. There were other places in the world, and we recalled the time we had spent months looking for information on Mustang. Even Gus Browning had mentioned that one along the way. Then the Old Timer came wandering down the hill, and we had something perhaps interesting to tell him.

"A propagation study?" the Old Timer said, immediately picking up some of our report on the matter. "What sort of a report does a DXpedition get usually?" he asked, and after some thinking we had to admit that we could not ever racall anything but a 599. "And phone?" he asked, and again we had to concede that we remembered nothing but steady 59s.

"What about those new countries?" he continued, pushing us back against the wall. "That Kentzell's Island, for instance. Didn't you say that the last report was of a sighting in 1867? And doesn't it seem strange that such a large island, 40 miles long, has not been sighted again in over a hundred years?" We did have to admit that this was rather strange.

"Remember back in the sixties," the Old Timer continued, "when Slim showed signing 4X4A from Cray Island? When a lot of experienced DXers questioned the operation on the air, all Slim did was refer them to a recent issue of *National Geographic* and an article about volcanic islands popping up out of the sea south of Iceland. Remember?"

Well, there it is! Solid proof that there is a boat named the Long Path. *There must be something to what the Local says about that DX planning and Kentzell's Island. (Photo for substantiation only to help the Believers believe.)*

We sure did remember that one. Slim sure fooled a lot of DXers. The latter would get very irate if you expressed any doubt about the operation. "But these fellows have a boat," we protested. "Certainly that should prove a point. And look at the name. They call it the *Long Path*. I have even seen it at one of the marinas down by the Golden Gate. How about that?"

If we thought to convince the Old Timer, we were wrong. All he did was shake his head. "You are jumping in and believing because you want to believe," he told us. "Yet every time you stop to think out things you start to hear the doubts in the back of your mind, right?" It was so and we admitted it.

"Anytime you hear of a big plan for DXing that sounds too good to be true, just stand aside and let the crowd rush by you," the Old Timer advised. "Listen to hear how it rings. There is a logic to most everything, even DXing, and when it's right you'll know it."

So what could we say? The Old Timer was right, and we recalled that more than one has been embarrassed by wanting to believe because he needed a new country. Others, when they found they had been had, never got over their righteous indignation—not even after a couple of decades.

"But what about those islands on the old charts?" we protested. "Isn't it possible that there is something to all of that?"

The Old Timer shook his head. "Possibly, but not probably," he advised us. "Keep in mind that a lot of islands shown on old nautical charts are duplicates, this often being caused by navigational errors. For example, Bouvet was also known as Lindsay Island for some years. Actually, they were not sure whether there were two separate islands or the

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00 (U.S.) for each mode, with no fees required for up-dates.

MIXED

2903	YU2DX	1792	YU1DZ	1490	CT1LN	1131	YU2CQ	901	W0JIE
2865	F9RM	1792	YU7BPQ	1437	N6AW	1108	SM0AJU	889	I0AOF
2664	K2VV	1782	SM7TV	1415	K8LJG	1090	N4IB	883	WI4K
2616	W2NC	1709	W9NUF	1414	IT9QDS	1079	N8BJQ	853	K7CU
2532	K6JG	1675	I2PHN	1392	I2MQP	1063	KC8CC	821	KX1A
2416	VE3XN	1674	W0SFU	1391	IS0LYN	1060	WD9IIC	820	W2XQ
2346	K6XP	1668	I6SF	1370	PY1APS	1052	3A2LF	800	I2TZK
2244	W4BQY	1662	YT7DX	1359	KL7AF	1038	YU2CBK	800	AC2J
2224	N4NO	1654	4X4FU	1322	N6JM	1028	PY1DFF	799	KO2Q
2209	W9DWQ	1644	YU7AW	1312	LA7JO	1028	W5PWG	764	I2EAY
2174	N4MM	1637	I2PJA	1305	DK5AD	1016	N2AIF	747	OE1KJW
2103	YU7BCD	1620	K9BG	1247	YU7AJD	1012	AI8S	745	VE6VW
2077	YU2TW	1599	WA8YTM	1227	W6OUL	1007	AI6Z	679	W4WKQ
2018	N6JV	1597	KF2O	1227	WB8ZRL	997	SV1PL	661	KL7VZ
1985	N9AF	1584	I3ZKD	1215	G4FAM	995	KC2RS	654	G4SDJ
1869	K5UR	1564	IN3ANE	1194	W7CB	973	VE5FX	650	JO1BMV
1855	N4UU	1525	N5TV	1189	JH1VRQ	934	WD4RAF	640	N3KR
1840	N2AC	1516	PY4OD	1181	K2QF	922	VE2PD	633	Y44UI
1836	I8YRK	1516	WA1JMP	1169	K2OLG	917	NE6I	632	K6UXO
1829	K0BLT	1512	K7NN	1157	K2POF	917	W6YMH		

SSB

2789	F9RM	1479	WF4V	1075	I1POR	921	IK5ACO	699	I2KKL
2409	I0ZV	1460	CT4NH	1073	N6FX	909	I0SGF	692	XF4MDX
2260	K2VV	1413	CT1LN	1060	TG9GI	902	VE2PD	687	W6YMH
2223	K6JG	1377	I2MQP	1037	KC4OV	896	WA2FKF	666	JA1XDA
2157	ZL3NS	1370	WA4QMQ	1035	WB8ZRL	896	PY4VX	666	KC2FC
2108	K2POA	1339	KF2O	1032	KC8CC	895	N4IB	663	CT1AHU
2089	K6XP	1303	CT1FL	1029	N2AC	888	I5AFC	662	TI2KD
2070	I0AMU	1301	W9NUF	1017	I4LCK	878	WI4K	662	VO1AW
1956	N4MM	1249	N5TV	1012	KC8YM	850	CT1BY	659	I4UFH
1950	CT1UA	1243	AC2J	996	K5RPC	817	ON6IT	654	EA8AKN
1858	W0YDB	1234	LA7JO	992	HI8GB	805	EA8AKN	654	KX1A
1840	I4ZSQ	1219	G4CHP	974	I4CSP	795	I2EOW	652	CP8HD
1803	WD8MGQ	1204	W3ARK	967	LA2TO	792	AG2K	649	AI6Z
1724	YU7BCD	1183	XE1OX	950	PY4OD	769	KK5P	646	OE5BGL
1693	N4NO	1173	W2NC	945	CT4UW	763	K3IXD	643	KE6KT
1688	OZ5EV	1171	W2CC	945	EA3AQC	758	WB6SRK	621	YB3CEV
1667	I8YRK	1132	I8KCI	938	W4UW	744	EA5BCX	618	CT1BWY
1642	W4BQY	1130	NJ0C	936	W3GXK	715	I8WYD	616	NE6I
1633	I2PJA	1112	KK0L	935	XE1XF	714	SM0AJU	615	N2AIF
1605	W9DWQ	1095	KL7AF	934	W0ULU	707	K9BQL	607	YB3CDL
1599	I8YZP	1078	ZP5RS	933	K8LJG	704	K8ZZU	606	WA8YTM
1593	K5UR								

CW

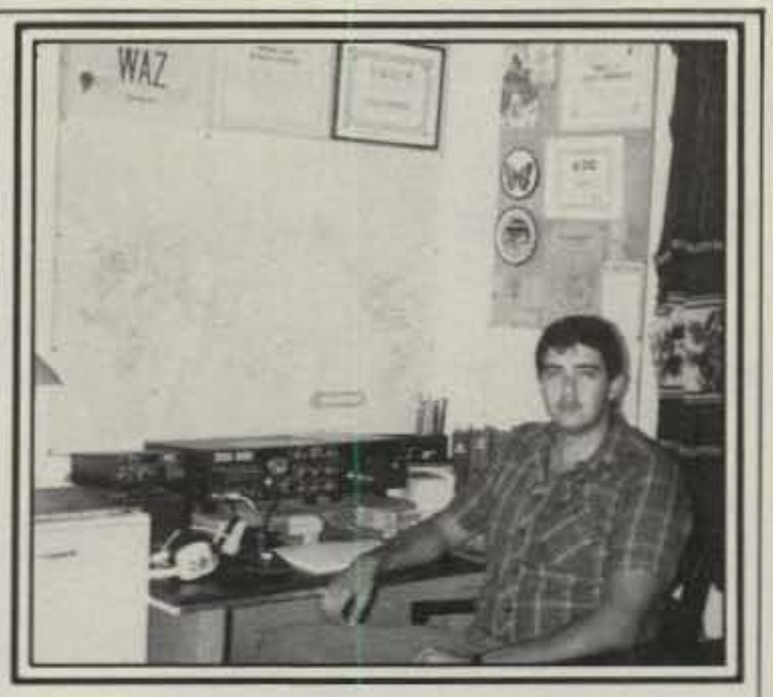
2391	W2NC	1569	YU7SF	1161	I2DMK	811	N2AIF	654	W0JIE
2116	K2VV	1501	N4MM	1160	KA7T	800	JH1VRQ	647	WB8ZRL
1999	N6JV	1501	LZ1XL	1159	N6FX	788	YU2CQ	646	JA2GCW
1950	WA2HZR	1482	K5UR	1130	JE1JKL	753	KN7K	645	PA3CKO
1924	N4NO	1446	VO1AW	1116	IT9VDQ	748	SM5DAC	643	N4IB
1901	K6JG	1436	ON4QX	996	K2POF	747	W9PWM	642	I2EAY
1836	W3ARK	1436	I6SF	990	K8LJG	725	SM0AJU	641	NE6I
1834	W9DWQ	1357	N4YB	943	KL7AF	724	VE4AEX	628	W6YMH
1739	K6XP	1329	W4WJ	922	OH3TQ	715	F6HKD	621	CT1LN
1734	W4BQY	1296	W9NUF	909	DJ1YH	710	TI4BGA	616	WA8YTM
1730	G2GM	1290	K9QVB	901	AK2H	689	OE1KJW	614	KQ8J
1699	VE7CNE	1287	PY4OD	850	I7PXV	669	ZS6BCR	610	K6UXO
1672	YU7BCD	1234	I1YRL	823	G4FAM	667	W2XQ	603	I8YRK
1651	N2AC	1200	N5TV	818	AI6Z	663	LA7JO		

same island with two names. In addition, Thompson Island was reported in the same area to add confusion. For years these duplications, as well as the ones reported once or twice but not again, have been in the process of being purged from charts. Even Maria Theresa—and you know about that one— was still showing on charts in 1978 and in 1983 was relocated on the charts some 15° east of the 1978 chart position. The only trouble is that no one seems to be able to find it."

We were getting the feeling that the Old Timer was not placing too much trust in the great DX planning, not even in the propagation studies. "What do you think we should do?" we finally asked, and again the Old Timer shook his head.

"Listen to everything, believe only that which is plausible, and expect only that which is possible," he said. "In other words, don't accept every promise, but don't reject any plan. Is that clear?"

Really, it was not. Maybe one of these days, however, we will understand. Maybe when we are a bit older, like the Old Timer, or something like that. But always it is a joy to anticipate. DXers do a lot of that. Perhaps we might even get to calling the *Long Path* on the long path. Sometimes DXers do have some real problems, but some we wonder about.



This is Spyros Staurinides, 5B4MF, at Nicosia on Cyprus. Spyros is 18 years old and was first licensed in 1982 at the age of 14. He runs a Yaesu FT-102 with a TH3MkII Hy-Gain beam for 10/15/20 meters with dipoles for 40/80. All this is atop the apartment where he lives. Possibly you met Spyros in a contest along the way. He was 3rd in the 1983 CQ WPX test on 10 meters, 7th in the same contest in 1984 but on 15 meters, 7th in the 1984 IARU Radiosport, 2nd in the 1985 European DX Test, and all as single operator, all SSB. He likes contests. Listen for him later this October in the CQ WW DX Test.

One thing we know for sure. DXers always give accurate signal reports—accurate and honest. And any study will prove that DXers always hear very well the signal from a needed country—sometimes amazingly so.

Andorra

Right at this time, and to the 18th, Heinz Gronemeier, WD8QVD, says that there will be activity from Andorra during the WAE DX Test. Actually, the action will have started on September 9th, and the plan was to run up a bit of a score during the contest period, September 13/14th. Possibly you can still catch them when you read this. They were planning activity on everything from 160 to 10, CW and SSB. Trying to fit their operating plan to the current band conditions, they were looking for emphasis on 160, 40, and 80 meters. You can watch for C30AAN, and QSLs can go to either Dieter Schuster, Uhlandstr. 28, D-4902, Bad Salzuflen 1, West Germany, or via the DARC Bureau to DL8OH. SASE or SAE/IRC needed.

Korea QSLS

The American Amateur Radio Club of Korea is looking for a bit of elbow room and hopes to gain it by cleaning out some of the unclaimed HL9 QSLs they are holding. Any past member of the club who operated under an HL9 callsign can gather their cards, or even find out how many are on hand, by writing to: American Amateur Radio Club of Korea, Dependent Mail Section, APO San Francisco 96301.

Steve Hanes, HL9AV, passes along the word, and he also notes that the 1988 Olympics will be held in Seoul, in case you might be traveling that way.

Labrador

This is another "work 'em right now" note.

CQ DX Awards Program

SSB

1486	YC0DPZ	1488	YB4FW
1487	YB3CDL	1489	EA7AVU

CW

669	OH1MQ

SSB Endorsements

310	I8AA/316	200	N2CIC/200
300	KE3A/301	200	YB3CDL/209
300	KZ0C/301	3.5/7 MHz	N2CIC
250	I8WYD/250		

CW Endorsements

310	W2FXA/312	275	IT9QDS/279
275	WD9IIC/288	150	OH1MQ/191

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.

The Zone 2 DX Group, with KA1BC setting the course, headed for Labrador a couple of weeks back and planned to operate through the month of September. The plan is to operate on all bands, mostly CW and with a kw of power. The callsign will be VO2DX. along with KA1BC will be VO1CA. Listen for the QSL information.

DXers—The True Internationalists

Once we asked a DXer, and this was years ago, why DXers are so friendly and have so many friends overseas. The answer was quite terse, maybe even pithy: "Because Part 97.1 of the FCC Regulations says that the basis of the amateur license is the continuation and extension of the amateur's unique ability to enhance international goodwill. That's why!"

When we did not immediately snap to attention, this possibly taken as a sign of residual skepticism, we were firmy directed: "Just look in Section 'e' of the Basis and Purpose, Section 97.1." We did. Son of a gun! There it was. It made us instant believers. It's a government regulation!

A couple of recent notes brought this fresh again to our thinking. Ron Weaver, N6VO, dropped a note to tell us of his reception in Tahiti by the local amateur group. Among other things, Ron noted that Pierre John, FO8JP, and his wife were most gracious as guide and host during the stay there. Stan, FO8IW, and Dominique, FO8IZ, entertained at dinner. Robert, FO8KS, not only showed them the island during the day, but added astronomical observations at night. Bob, FO8BI, gave a surprise barbeque as well as information on the island culture. Emille, FO8AG, located someone to repair N6VO's rig, and Daniel, FO8LP, gave a lot of information on navigating the Southern Ocean. While in Tahiti Ron signed FO0WVR. That's to help if you need a QSL route.

We also had a note from George Wagner, K5KG, of Quail Creek Drive in Houston, who in recent years has been heard far from the familiar skies. George notes he has left Al-Jubail in Saudi Arabia and can now be found in downtown Buenos Aires. He obtained the call LU6KG with the help of Oscar, LU1BEU, and Jorge, LU8DQ, and George expects to be heard in the *CQ* World-wide DX Tests the last weekend in October. If you work LU6KG, QSLs go to K5TU. If you are going to Buenos Aires or thereabouts, drop a line to George via ESSO S.A.P.A., 396 Alhambra Circle, Coral Gables, Florida 33134, or if you are right on the scene, phone him at 313-7531-5061—Buenos Aires, that is.

We had another note from Josephine Clarke, WB6ZUC, who handles the archives for the Northern California DX Foundation. She tells of going to San Francisco for a dinner and meeting Kirsti and Jim Smith, P29JS, et al, then going east to the FOC meeting at Danbury, Connecticut and finding that Jim and Kirsti were staying at the same motel.

These are only a couple of examples of amateurs with wide-ranging acquaintances with other DXers. If you are planning to travel overseas, you should drop a line to Naoki Akiyama, JH1VRQ/N1CIX, at the ARRL in Newington. He can give you updated information on licensing and things like that. Also, Naoki has the International Travel Host Exchange Program. You might be surprised to find what amateurs are along your itinerary, and even what languages they speak. True internationalists need all the help they can get.

This is Drew Givens, GM3YOR, who should be heard from Sri Lanka this October. Drew has been heard in other years from the Faroes, Iceland, Gibraltar, and Montserrat. Look for GM3YOR/4S7 from October 14th, mostly CW but some SSB during the WW DX Test. In case you are curious, that hair is red!

Tony Smaker, KL7AF, is the only 5BDXCC in Alaska and shortly should be the only one holding 5BWAZ. Tony is on Kodiak Island and is ex-W6JDO, DL4JD, KL7JDO, F7JD, WA5IHE, and KG1AC. He has been KL7AF since 1976. Tony has been in the service. Guess what branch!? He is a member of the Wireless Institute of Australia, and a founder of and Second Past President of the Alaska DX Assn. Currently he holds 185 DX Awards and is concentrating on 160 and 80/75 meters. (Photo via K6ZDL)

Sri Lanka

Drew Givens, GM3YOR, from Kirkcaldy, Fife, in Scotland, will be in Sri Lanka in October from the 14th to the 28th, and should be heard signing GM3YOR/4S7. Drew will be mainly on CW, and you can look for him low on the bands, 3 kHz up on 80 and 40, 33 kHz up on 20, 15, and 10 meters. During the *CQ* WW DX Test Drew might try some SSB during the annual hallelujah chorus.

Previously Drew has operated from the Faroes and Iceland in 1978, from Sierra Leone as a guest operator at 9L1SL in 1982, from Gibraltar in 1982, and from Montserrat in 1984. QSL to his home QTH.

Turkey

Dr. Unal Akbal, TA1A, notes that he is on the air most days, mostly on 15 and 20 CW from 2100Z to 2400Z. Actually, look for Unal at 14013 kHz or 21025 kHz, possibly 5 kHz either way, but definitely in that neighborhood. TA1A QSLs, but only directly. His latest address is: Dr. Unal Akbal, c/o Box 787, Istanbul, zip 34435, Turkey. That should put a Turkish QSL within reach should you need one. If you are among the fortunate, drop in anyhow.

Guyana

Rick Dougherty, NQ4I, will be in Georgetown, Guyana, later this October for the great *CQ* WW DX Test. Rick has been there before and will again sign his contest call, 8R1Z. Look for him to be on the air a couple of days before the weekend—maybe even four or five days before. He will be concentrating on 75 and 160 meters during this time. Last time out Rick made 6500 contest QSOs, operating in the single-operator category, and finished up in #3 spot for all bands. This time it will be even better.

The Moseley Classic 33 will be reinstalled atop the Pegasus Hotel some 165 feet above the street, the 40 from one corner at 190 feet of elevation, and there will be a couple of slopers for 160/75 meters sloping down towards the ocean, one favoring Europe and one favoring stateside, these being designed and built by W9INN especially for this 8R1Z operation.

Rick says the Europeans should look for 8R1Z on 160 at 1827 kHz, transmitting here and listening at 1849 kHz, the action each hour starting at 0200Z and showing at the start of each hour for at least 10 minutes.

A member of the Dixie DX'ers, dedicated contest operators in the Atlanta area, Rick was on the team that in 1983 and 1984 put 4V2C on the air in the multi-single category, in 1984 the group being #1 worldwide. After you work 8R1Z, direct your QSLs to Carol, WI4K (SASE or SAE/IRC needed).

Paraguay

Doug Woolley, ZP5XDW, says he will be in Ascunsion for at least another year and continues to rack up a lot of QSOs, all on CW. Doug has been there for four years now and notes that when he leaves it might be a bit difficult to find any CW activity with the ZP5 prefix.

Previously Doug was heard from EP-Iran and VS6-Hong Kong. Recovering from a recent major operation, five bypasses, he is back working DX but chewing less red meat. Doug notes that the local radio club there in Ascunsion has used the DXpedition slide shows from the Northern California DX Foundation in their programs and are highly delighted with them. He also reports that ZP5XGG has departed Paraguay for Sierra Leone and hopes to get a license there for some sustained CW work.

If you work ZP5XDW, Doug Woolley, or even if you worked ZP5XGG in the past, the QSL route for both stations is via N4DW. If you want ZP5 on CW, your best opportunity is right now, before Doug departs the country.

Sunspots

One sunspot scanner noted that in midsummer there was little to scan. There are a number of predictions as to when the actual bottom will be. Unfortunately, you won't be sure until things are well beyond that great solar milestone.

June was almost a blank. One source said there was no activity for over a week in the latter part of June. Another said that the June solar flux level was the lowest average he'd ever recorded. There were only a couple of days in June with much sunspot activity and the preliminary mean spot count for June was noted by one source as expected to be down around 0.8. That's low.

Some say that the bottom will be reached around the turn of the year. A late NASA/NOAA prediction is pointing at October/November, and you know how far ahead that is—not very far.

Some stations, however, have been reporting 20 meters open into the evening hours, and even up to midnight. The Northern California DX Foundation beacons at 14100 kHz are reported as being heard by large numbers. There are nine of these, and there have been periods during the summer when some observers have reported logging all nine beacons.

What should a Deserving DXer do? As the Hero of Mafeking, Lord Baden-Powell, would often say, "Be Prepared!" Listen to WWV at 18 minutes after the hour, listen for the NCDXF beacons on the hour, and if you do not know the sequence, drop W6RQ a query with a self-addressed, stamped envelope. No matter whose sage advice you follow, the bottom does appear near, if not already passed. Also, don't be surprised at what you are starting to hear on 20 and 15. The *CQ* WW Phone Test the end of October might be surprising. Then again, if you have been waiting long, it might not be. Just what was expected.

The looked-for reverse polarity has been showing in some areas, but not in high latitudes—rather low down. But while there are such areas, in June they had no spots. The beacons, however, are being heard better than they were last year at this time. Son of a gun! All the portents are there. Cycle 22 is at hand. The Great Days of DXing are with us. Rejoice! . . . Maybe.

Some DX Notes

A recent note came from a nearby country noting that though one of the locals has been out of the country for over two years, his DXCC score continues to mount. Seems this was not considered cricket. As the note went to about everyone that might be concerned with awards and such, you might hear something about it elsewhere.

Nick Langmead, G4OOE, currently on Cyprus, notes that the ZC4RSJ callsign was a special one to mark the Silver Jubilee of the Royal Signals Amateur Radio Society. Nick is currently signing ZC4EE on Cyprus and is also the custodian of the ZC4RSJ special call. The QSL address for ZC4-Bureau is ZC4-QSL Bureau, JSB, BFPO 53, London, England. This is also the route for ZC4EE and ZC4RSJ.

The publishers of DX bulletins often have to make a choice—either use the available space for terse and often cryptic reports or expand and give some matters full background treatment. Chod Harris, who took over the *DX Bulletin*, is going in both directions. He is adding supplements to the regular issues, a recent addendum covering items such as MacQuarrie Island, the Kenwood TS-940, some decisions of the DXAC/DXCC Desk, Aruba, and DL7FT/SV/A operation.

Jack Troster, W6ISQ, has stepped down as President of the Northern California DX Foundation, and Bob Ferrero, W6RJ, has taken over the duties. Bob is a long-time member of the Board of Directors of the Foundation.

The "JA DX Family News Letter" notes that ". . . the 'famous' group which recently gave up on Peter I has been trying to open the route to Albania through the Chinese bureau . . . ." There is mention that the JARL is looking for something suitable to commemorate their 60th anniversary. If not Peter I, maybe Bhutan,

CIRCLE 78 ON READER SERVICE CARD

CIRCLE 80 ON READER SERVICE CARD

or Albania, or Burma. Don't discount anything. Remember when the JARL had a 50th anniversary . . . .

There is a report that the FO8 prefix may have become FO4 or maybe FO5 sometime this last summer. FK25 is a special prefix in New Caledonia for the 25th anniversary of amateur radio there. The recent Clipperton effort, the one last spring, still did not work all the Europeans looking for it. Some complain, while others say that the operators were trying hard. One European DX bulletin complained that only about 120 QSOs were made with Europe on 20 SSB, while 2485 were made with the W/Ks. One school of thought says that any DXpedition at the bottom of a sunspot cycle can expect problems. Possibly that thought should be given to waiting, even though that might be difficult. Another raises the question as to how many W/Ks worked FO0XX for practice or ". . . to check band conditions." It is sometimes difficult to realize that all areas are not equal when a needed station or country shows. The Pacific is often difficult for the Europeans, while the Caribbean is tough for the JAs, and the Indian Ocean/East Africa sometimes causes a problem for the W/K/VE stations. When things get rough, it often is time to show a bit of reticence in displaying one's signal. Or, as the Old Timer has been heard to say, "Let it not be them that have gets," but rather "Let the last be first, let the distant be near, let the needy be heard."

Mike Menafo, K3UOC, will put 4M4A on the air during the *CQ* WW DX Tests this year both phone and CW. Mike is in Valencia, Venezuela. QSL to K3UOC, his home QTH. SASE desired.

Those who read the masthead on the DX bulletin *INC SPOTS* may wonder about those Breckenridge names. Where did you hear that name before? We ourselves had to ask. We were right. James Cabell Breckenridge was Vice-President of the U.S. under Buchanan, nominee of the southern Democrats for President in the 1860 election that Lincoln won, and Major-General in the Confederate Army and its last Secretary of War. There was a recent article in *Civil War Illustrated* on General Breckenridge's service at the Battle of Stone River in Tennessee in the War Between the States. Drop a note to Jim Breckenridge at Box 1082, La Grange Park, Illinois 60525 if you want to know more about DX Incorporated, the publisher of *INC SPOTS*. You might also tell Jim that you remember his ancestor, vice-president at the age of 35.

Finally, circle the dates for the last weekend in October, the start of the great DXing in Cycle 22—phone this October, CW next month at the end of November. Check Frank Anzalone's notes and the rules for the contest. DX is coming back, and this is the year. Already on Saturday nights we can hear the local DXers down in the village shouting, "We're Number One! We're Number One!" But then again, every true-blue DXer has always known that we are Number One. Number Two? Not even in sight.

DX Ten Years Back

PY1ZAE was on from Trinidade, and K4IIF was headed for the Bahamas for the *CQ* WW Phone Test. Also out was Martii Laine in Madeira, CT3, DJ9ZB in Turkey, WB4ZKG in the Western Carolines, 6W8FP in Senegal, HL9TD in Korea, K6SDR in the British Virgins, the Buffalo DX Club in Antigua, W5MYA in Grenada, DJ0UP at St. Vincent, Grand Turks by the North Florida DX Club, WA1JKJ in Guadeloupe, HP1KC in Panama, WA5KLF at the Grand Caymans, and WB4SJG in Jamaica. The Colvins were in the U.S. Virgins, WB6EXW was in Polynesia, and UV3GM was promising to spend the contest on 80 meters. Ah, the cry was, "Let the good times roll!"

The Big QRM, *aka* "The Russian Woodpecker," showed, and there were demands that something be done. An early solution to the problem was promised ". . . through both legal and official channels." When some DXers, later on when nothing improved, asked some of the ubiquitous ". . . those in the know," the guarded answer was that not too many noisy protests could be made . . . through legal and official channels . . . when some of the homebodies hereabouts are also stretching the frequency allocations a bit. No amateurs but . . . . Anyhow, it was eventually identified as over-the-horizon radar, and a call to HH5HH, Cousin Dominique in the Greater Antilles, improved the understanding of the matter.

QSL Information

One gets smarter about QSLing. Often the initial indexing is a marker at the DX section in the monthly magazines. On upgrading to a DX bulletin a lot of the information comes with the reports. One also learns to listen when a DX station is on the air, especially when not sure of the station worked. Contests are often difficult times for callsigns, and if you did not get the whole callsign, listen. Eventually it will come, especially if the band holds out. Some stations apparently score points for the rapid delivery of their callsign.

When you are really elbowing everyone out of the way as you head for the 300 DXCC country mark, you look for the specialists. The W6GO/K6HDD QSL List shows what computers have brought to the Deserving. Also, a long-established list is the "JA QSL Report" turned out by Hiromichi Katsurashima, JH1HWN. Eventually most DXers find their way to the specialized information—DX bulletins and QSL publications. There must be a reason.

AZ1ARU to LU6FAZ
A35WZ to NE7W
A71AU to DJ9ZB
BT1YRC to JA6YRC
H44JA to JP6CMA
H44BL to SM6APQ
LU6KG to K5TU
KH0AC to K7ZA
OA8P to W7LZG
OH0MD/OJ0 to OH2BH
OE5SYM/5N3 to N2AU
VP8AEN to GM3ITN
VQ9GB to NA7P
VK0SJ to VK7RM
YN8RC to WB8SSR
ZK1XE to WB6GFJ
ZP5DXW to N4DW
ZP5XGG to N4DW
ZK1XV to VK2BCH
ZL7BKM to ZL2HE
8R1Z to WI4K
9M8EN to WB0TEC
A71AD to Box 7121, Nicosia, Cyprus
C30AAN to Dieter Schuster, Unlandstr. 28, D-4902, Bad Salzuflen 1, West Germany
CE0ZIJ to Box 1, Easter Island, Chile
BY4RB to Box 413, Zhenjiang, Peoples Republic of China
HK3MAE to Allison Bergsneider, HK7IMP, Box 864, Bucaramanga, Colombia
J6LGH to Box 638, Castries, St. Lucia, West Indies
RZ10WA to Box 88, Moscow, USSR
TA1A to Dr. Unal Akbal, c/o Box 787, 34435, Istanbul, Turkey
TA1D to Box 1167, Istanbul, Turkey
ZC4EE to ZC4-Bureau, JSB, BFPO 53, London, England
ZC4RSJ to ZC4-Bureau, JSB, BFPO 53, London, England
4M4A to Mike Manafo, 2419 Willow St., Wesleyville, PA 16510
3C0A to TR0A, Box 1826, Libreville, Gabon
9H3DX to Peter Hans, Hardbergstr 8, D-7550, Rastatt, West Germany
5V7HL to Box 8062, Tokoin, Lome, Togo

73, Cass, WA6AUD

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

DX Contest Special

Bulletin

A long-range CQ propagation forecast based upon 27-day and other recurrence tendencies in day-to-day conditions indicates that Low Normal HF conditions are most likely to occur during the CQ World-Wide DX Contest Phone Section weekend of October 25–26.

The 1986 CQ World-Wide DX Contest will be held on the following dates:

Phone: 0000 GMT Saturday, Oct. 25 to 2400 GMT Sun., October 26

CW: 0000 GMT Saturday, Nov. 29 to 2400 GMT Sunday, Nov. 30

For the 36th successive year this month's Propagation column is devoted to special forecasts for the contest periods, both Phone and CW.

Solar Activity

The daily sunspot count during June 1986, as reported by the Royal Observatory of Belgium, was the lowest to be recorded in more than 160 years! The sun's surface was completely devoid of spots on 27 days during the month. The monthly mean sunspot number for the month was one, the lowest recorded since 1824. This results in a smoothed sunspot number of 15, upon which the cycle is based, centered on December 1985.

The plateau in the decline of the present cycle, which was discussed in last month's column, now appears to have ended, and the cycle is again declining. A smoothed sunspot number of approximately 8 is forecast for October 1986. This would be the lowest level of sunspot activity to occur during a *CQ* World-Wide DX Contest since 1954. By comparison, solar activity during last year's contest periods was at a level of 17. During 1979, the year of maximum solar activity, the smoothed sunspot numbers were 158 for October and 162 for November.

Statistically, this would mean that general propagation conditions during the 1986 contest periods, particularly on the *10*, *15*, and *20* meter bands, are very likely to be poorer than during last year's contest, and in fact, poorer than they have been during the past 32 years.

Don't dismay, however. The ionosphere will still be there, and world-wide DX will still be possible. DX contests are always a challenge to participants, and even more so during very low periods of solar activity, as we are now experiencing. It will take more time, more patience, greater skill, and a better understanding of the ionosphere to pile up points during the 1986 contest, but DX openings will still be out there to work, particularly if you know where and when to look for them. This is where the information contained in this month's column can be of use to contest participants. The DX Propagation Charts and other information are designed to help the 1986 contest participant make optimum use of the ionosphere, despite the continuing decline in solar activity.

This means that propagation conditions on the *10* and *15* meter bands, and to a lesser extent on the *20* and *40* meter bands, should not be as good during this year's contest compared to last year's results. Conditions should be somewhat better, however, on the *80* and *160* meter bands, since DX propagation on these bands usually *improves* during periods of very low solar activity.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for October 1986

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 1, 10, 28	A	A	B	C
High Normal: 2, 11–12, 23–24, 29	A	B	C	C-D
Low Normal: 3–5, 8–9, 13, 17–19, 21–22, 25–27, 30–31	A-B	B-C	C-D	D-E
Below Normal: 6–7, 14, 16, 20	B-C	C-D	D-E	E
Disturbed: 15	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 excellent (A) on Oct. 1st, good (B) on the 2nd, fair to good (B-C) from the 3rd through the 5th, etc. Low Normal conditions are expected for the WW DX Contest on the 25th and 26th.

Band-By-Band Conditions

The following is a band-by-band summary of DX propagation conditions normally expected during October and November and centered on the contest periods.

10 Meters: With the bottom of the present sunspot cycle rapidly approaching, very few DX openings are expected on this band. During High or Above Normal conditions look for some openings towards Central and South America from a few hours before until a few hours after noon, and perhaps towards the South Pacific during the afternoon.

15 Meters: Although DX conditions are not expected to be as good as last year, *15* meters could be a fair DX band during many of the daylight hours, especially towards Central and South America. When conditions are High or Above Normal, signals from Europe and Africa should peak an hour or two before noon, while signals from Central and South America, the Far East, and the South Pacific should peak during the late afternoon. During Below or Disturbed conditions, *15* meter openings will be spotty and of short duration, if possible at all.

20 Meters: This is again expected to be the "mainstay" band during the Contest. During Normal conditions good DX openings are expected to almost every corner of the world sometime between sunrise and the early evening hours. Conditions should peak for a few hours after sunrise and again during the late afternoon. When conditions are High and Avove Normal, the band should remain open for DX well into the evening hours. During peak periods openings will usually be characterized by strong, steady signals. When conditions are Below Normal, *20* meter openings will be considerably fewer in number, of shorter duration, and with weaker signal levels. In general, however, the band should hold up for some DX openings during all but Disturbed conditions.

40 Meters: The band is expected to open towards Europe and the east during the late afternoon hours, and remain open for DX to one area of the world or another until shortly after sunrise. Look for openings to Europe and Africa to about midnight in the MST and PST time zones, and to about 2 a.m. in the CST and EST zones. Good openings towards Central

and South America should be possible throughout most of the hours of darkness. Openings towards the South Pacific and the Far East are expected to peak during a two-hour period before sunrise. When conditions are at least Low Normal, *40* meters should share honors with *80* meters as the best DX band during the hours of darkness. When conditions are Below Normal or Disturbed, openings will be spotty and considerably fewer in number.

80 Meters: DX propagation condtions are generally at their best on this band during periods of very low solar activity. Some good *80* meter DX openings are expected to several areas of the world during the hours of darkness and the sunrise period. When propagation conditions are at least Low Normal, signals should be strong during many openings. Even during Below Normal and Disturbed periods there is a fairly good chance that some DX openings may be possible during the hours of darkness. Expect conditions to normally peak around midnight for openings towards Europe, Africa, and the east; after midnight and before sunrise for openings towards Central and South America; and just before sunrise for openings towards the South Pacific and the Far East.

160 Meters: DX possibilities are also improving on this band as the solar cycle nears its absolute minimum. While not as good as *40* and *80* meter openings, some DX should be possible to many areas of the world on *160* meters during the hours of darkness and the sunrise period. Because of power limitations imposed in this band in many areas of the world, signals at best are likely to be weak, especially on phone. The best time to look for *160* meter DX is when a path is in complete darkness, or when the sun is just beginning to rise at the *easterly* terminal. The best do-it-yourself forecaster for *160* meter DX is a set of sunset and sunrise tables. For example, if the sun is expected to rise at 0600 GMT in western Europe, then this would be the best time to check *160* meters for openings between the USA and western Europe, plus or minus a half hour. Conditions on *80* meters can often serve as an indicator for *160* meter openings. When conditions seem to be peaking on a particular path on *80* meters, check for the same path to open on *160*. With these tips and some patience, it should be possible to work several DX areas of the world on *160* meters during the contest.

Contest Work Plan

The DX Propagation Charts in this column show the times when each amateur band from *10* through *160* meters is expected to open for DX from the United States to the major areas of the world. Instructions for the proper use of these Charts are given elsewhere in this column.

Time PST	Areas to which openings should be optimum
00-03	No openings expected with a propagation index of (2) or higher. Some (1) openings should be possible to South America, South Pacific, New Zealand, and Australasia, but this means conditions should be High Normal or better. This is a good time to catch up on some sleep.
03-06	About the same as the previous block.
06-09	Should open in just about every direction: Europe, North Africa, Eastern Mediterranean and Middle East, most of Asia and the Far East, Pacific Islands, New Zealand, Australasia, the Caribbean, Central America, and most of South America. This is the period in which to rack up points.
09-12	About the same as previous period, but signals getting weaker and openings falling off.
12-15	Western and southern Europe, most of Africa, most of the Caribbean, Central America, and the northern countries of South America.
15-18	All of the Caribbean, Central America and South America, most of Africa, the Pacific Islands and New Zealand, the Far East.
18-21	Another peak period, and a good time in which to increase scores. Most of Asia including the Far East; the Pacific Islands, New Zealand, and Australasia; Caribbean, Central and South America, but falling off: Antarctica.
21-00	South Pacific, New Zealand and Australasia, much of South America, Antarctica. A propagation index (1) opening to Europe and Africa.

Table I- Sample 20 meter operating schedule for a Western USA QTH.

The information contained in the Charts can easily be reorganized into more convenient types of operational work plans, or schedules, which can serve as valuable propagation guides during the contest. Experience gained through previous years has shown that such plans can be extremely useful in piling up points with a minimum of wasted time.

Table I is an example of one of several types of plans that can be devised. It shows, for each three-hour period throughout the day, the areas of the world to which *20* meter propagation conditions are expected to be optimum. Only those openings shown in the charts with a propagation index of (2) or higher were used in compiling this plan.

A western USA QTH has been chosen for this example, but similar plans can be devised for other locations, for other bands or for multi-band operation, and for other time spans.

Radio Storms

The forecasts discussed in this column are based on *Normal* propagation conditions expected with a sunspot level of approximately 14. If actual conditions during the contest turn out to be *Above Normal*, DX openings on *10*, *15*, and *20* meters are likely to be somewhat better than shown in the charts. On the other hand, if a radio storm should develop, with accompanying Below Normal or Disturbed HF propagation conditions, fewer openings will take place on these bands. During radio storms, propagation conditions on *40*, *80*, and *160* meters generally also become erratic, with poorer openings during certain types of storms and improved openings during other types.

If a radio storm should develop during the contest, circuits passing through or near polar regions will probably become weak, fade considerably, or may even black out entirely, depending upon the severity and duration of the storm. During certain storms, while east-west propagation may become poorer, north-south openings may improve.

If a storm should occur, concentrate on working the higher frequency bands and the paths to the northeast, north, and northwest during the daylight hours, and the lower bands and the paths to the east, south, and west during the evening and early morning hours.

A Last Minute Forecast made at press time for the phone section of the contest appears at the beginning of this column. A similar forecast for the CW section will appear in next month's column. For updated geomagnetic and solar data during the contest period, check the National Bureau of Standards Radio Station WWV broadcasts at 18 minuts past each hour. These broadcasts (transmitted simultaneously on 2.5, 5.0, 10.0, 15.0, and 20.0 MHz) contain the latest available geomagnetic A- and K-figures and the level of 10.7 cm solar flux. They also contain a short-term forecast of geomagnetic and solar conditions given in subjective terms. Table II can be used to convert the geomagnetic and solar data given on the WWV broadcasts into expected HF ionospheric conditions. For example, a solar flux of 70 and an A-index of 9 should result in Low Normal conditions, while a solar

Geomagnetic Activity	Range K	Range A	Solar Flux Range 65-80	Solar Flux Range 80-100
Quiet	0–1	0–3	Above Normal	Above Normal
Quiet	1–2	3–7	High Normal	Above Normal-High Normal
Unsettled	2–3	7–15	Low Normal	High Normal
Active	3–4	15–27	Low Normal-Below Normal	Low Normal
Minor Storm	4–5	27–48	Below Normal-Disturbed	Below Normal-Disturbed
Major Storm	5+	48+	Disturbed	Disturbed

Table II- This table can be used to convert the geomagnetic and solar data given on the WWV broadcasts into expected HF ionospheric conditions.

flux of 74 and a K-index of 6 would indicate Disturbed conditions.

The hourly forecasts broadcast on WWV along with the latest solar flux and geomagnetic indices, also may be obtained by telephoning (303) 497-3235 at any time. This is a service provided by the NOAA Space Environment Services Center, but the call is not toll free. For live, up-to-the-minute propagation data, direct inquiries can be made to the NOAA duty forecaster at the Center by calling (303) 497-3171. This service is available around-the-clock every day of the week. As with the recorded announcements of WWV transmissions, there is no charge for this service, but the call is not toll free and collect calls will not be accepted.

Do-It-Yourself Forecasting

Besides the WWV transmissions of solar flux and geomagnetic data, there are now available several aids, including software for home computers, which can be used for forecasting conditions and band openings during the 1986 contest.

I use W6EL's MINIPROP program with my IBM-PC. This is a user-supported, comprehensive HF propagation program developed by Sheldon C. Shallon, W6EL. It produces a wealth of information, including the prediction for around-the-clock short- and long-path band openings between path terminals anywhere in the world, predicted signal levels, sunset and sunrise times, gray-line times and bearings, etc. The program is well prompted, self-explanatory, and easy to use. Required input data are latitude and longitude of path terminals, date, and smoothed sunspot number. If real-time values of flux data are available, their equivalent values of sunspot numbers can be used to obtain "real-time" results. Additional information and terms for obtaining a copy of MINIPROP can be obtained directly from: Sheldon C. Shallon, W6EL, 11058 Queensland Street, Los Angeles, CA 90034. The MINIPROP program is intended for use with IBM PCs and compatible types. Commodore and Apple computer users will find another program, called MUFPLOT, useful for predicting HF propagation conditions. The latest version of the program will print out in standard format highest usable frequency, maximum usable frequency, and lowest usable frequency for any path over a 24-hour period. The program also prints out beam heading and distance, and can also be used for obtaining sunrise and sunset data, etc. The only input needed, besides path terminals and date, is solar flux level. Since solar flux values can be obtained from WWV, the MUFPLOT programs is to a very large degree a "real-time" propagation prediction method. For pricing, availability, and full information write directly to Base (2) Systems, 2534 Nebraska Street, Saginaw, MI 48610. Check the Ham Shop section in this issue of *CQ* for other propagation programs that may be available. Programs such as MUFPLOT can be of tremendous help during the DX Contest.

Another propagation aid that I use is the *DX Edge*, which is available from Xantek, Inc., P.O. Box 834, Madison Sq. Station, New York, NY 10159. It is a slide-rule-type device which allows you to determine quickly and easily those areas of the world that are in daylight, darkness or twilight at any given time of day and for any month of the year. It is great for determining sunrise and sunset times at a glance, for locating the terminator, and for predicting long-path and gray-line openings. The *DX Edge* has recently been modified to also make it possible to determine great-circle bearings. I also find it useful for determining local time anywhere in the world.

The *DX Edge* consists of a slide-rule-type carrier and a set of monthly transparent overlays. Imprinted on the carrier is a unique double map of the world showing the 40 *CQ* DX zones and many country prefixes. The overlays slide along the carrier, giving a clear, instant visual picture of daylight-darkness conditions. Easy-to-understand instructions come with the *DX Edge* and explain how to use the instrument for determining the best times to look for DX openings on the HF bands. It should be an invaluable aid during DX contests. Pricing and other information can be obtained directly from Xantek. A computerized version of the *DX Edge* is also available.

Lee Wical, KH6BZF, puts out an excellent weekly newsletter, full of interesting propagation information, and containing advanced forecasts of HF and VHF ionospheric openings. Write directly to KH6BZF at 45-601 Luluku Road, CRT #4411, Kane'Ohe, Hawaii, 96744-1854 for more complete details, availability, and pricing.

If you do not already have a copy of the *Shortwave Propagation Handbook* by myself and Theordore J. Cohen, N4XX, then you might want to get one to read *before* the contest begins. Copies are still available from the *CQ* Book Shop, 76 North Broadway, Hicksville, NY 11801 for $8.95 postpaid (plus $2.00 shipping and handling).

VHF Ionospheric Openings

While the *CQ* Contest does not include the VHF bands, some interesting ionospheric activity is likely to occur on these bands during October.

Some fairly good meteor-scatter-type openings should be possible on the VHF bands around October 21st when the two-day *Orionids* meteor shower is expected to begin. This should be a major shower, with a maximum hourly rate of at least 25 meteors.

Auroral activity usually increases during October, and some corresponding auroral-scatter-type and sporadic-*E* VHF

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; ** indicates best times for 10 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:
(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days
Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

Note: The Propagation Charts are given in Standard Time. In the USA, daylight time is in effect until 2 a.m. October 26, local time. While daylight time is in effect, add *one hour to the times shown in the charts for band openings*. The first day of the 1986 *CQ* World-Wide DX Contest, October 25, will fall in the daylight time period; the second day, October 26, will fall in the standard time period.

openings can be expected during periods of such activity. The best days to check are those which are expected to be either Below Normal or Disturbed on the HF bands. See the Last Minute Forecast at the beginning of this column for the days in October that are forecast to be in these categories.

CW Contest Forecast

This month's DX Propagation Charts are valid for both the phone and the CW sections of the contest. Be sure to keep them handy for use during next month's CW section as well. Short-Skip Propagation Charts for use during October appeared in last month's column.

Experience from the past 35 contest years has shown that DX contests are excellent periods in which to test the accuracy of prediction and forecast methods used in this column. Contests generate a large amount of activity in every corner of the world and on all HF bands. Previous results and observations have helped considerably in improving the accuracy of this column. Comments concerning the 1986 contest and the accuracy of these forecasts and predictions would be appreciated, and should be sent directly to W3ASK at P.O. Box 1714, Silver Spring, MD 20902. *Good luck in the contest!*

73, George, W3ASK

October and November 1986
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe & North Africa	08-09 (1) 09-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-09 (4) 09-11 (3) 11-13 (4) 13-14 (2) 14-15 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-01 (2) 01-02 (3) 02-03 (2) 03-04 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 20-23 (1)* 23-01 (2)* 01-02 (1)*
Northern Europe & European USSR	08-10 (1)	06-07 (1) 07-11 (2) 11-13 (1)	17-19 (1) 19-22 (2) 22-00 (1) 00-01 (2) 01-02 (1)	19-22 (1) 22-01 (2) 01-02 (1) 22-01 (1)*
Eastern Mediterranean & Middle East	08-09 (1) 09-10 (2) 10-11 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-17 (1)	17-19 (1) 19-23 (2) 23-02 (1)	20-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	10-14 (1)** 08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-17 (4) 17-18 (2) 18-19 (1)	18-20 (1) 20-02 (2) 02-03 (1)	20-22 (1) 22-01 (2) 01-02 (1) 22-01 (1)*
Eastern & Central Africa	10-13 (1)** 09-11 (1) 11-13 (2) 13-15 (1)	07-15 (1) 15-17 (2) 17-18 (1)	20-01 (1)	21-00 (1)
Southern Africa	09-12 (1)** 08-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-15 (1) 15-17 (2) 17-18 (1)	18-19 (1) 19-22 (2) 22-00 (1)	20-23 (1) 20-22 (1)*
Central & South Asia	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-21 (1)	18-21 (1) 05-08 (1)	18-20 (1) 05-07 (1)
Southeast Asia	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-21 (1)	17-20 (1) 05-08 (1)	05-07 (1)
Far East	17-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 16-19 (1) 19-21 (2) 21-22 (1)	17-20 (1) 04-08 (1)	05-07 (1)
South Pacific & New Zealand	13-16 (1)** 12-15 (1) 15-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (2) 11-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	00-03 (1) 03-05 (3) 05-08 (2) 08-09 (1)	02-04 (1) 04-07 (2) 07-08 (1) 05-07 (1)*
Australasia	14-16 (1)** 14-16 (1) 16-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-20 (1) 20-22 (2) 22-00 (1)	02-04 (1) 04-08 (2) 08-09 (1)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1)** 09-14 (2)** 14-15 (1)** 07-08 (1) 08-10 (2) 10-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-03 (2) 03-06 (1) 06-07 (2) 09-11 (3) 11-15 (2) 15-16 (3) 16-18 (4) 18-19 (2) 19-00 (1)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (3) 05-06 (2) 06-07 (1)	19-21 (1) 21-01 (2) 01-03 (3) 03-05 (2) 05-06 (1) 22-02 (1)* 02-04 (2)* 04-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	10-15 (1)** 07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-17 (2) 17-18 (1)	02-06 (1) 06-08 (2) 08-11 (2) 14-16 (1) 16-17 (2) 17-18 (3) 18-20 (2) 20-23 (1) 23-02 (2)	20-22 (1) 22-04 (2) 04-05 (1)	21-23 (1) 23-03 (2) 03-04 (1) 02-04 (1)*
McMurdo Sound	15-17 (1)	20-22 (1) 22-00 (2) 00-07 (1)	00-03 (1) 03-05 (2) 05-07 (1)	03-05 (1)

Time Zones: CST & MST (24-Hour Time)
CENTRAL USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe & North Africa	08-09 (1) 09-11 (2) 11-12 (1)	07-08 (1) 08-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	17-18 (1) 18-19 (2) 19-20 (3) 20-22 (2) 22-01 (1) 01-02 (2) 02-03 (1)	18-20 (1) 20-00 (2) 00-02 (1) 20-01 (1)*
Northern Europe & European USSR	08-10 (1)	06-07 (1) 07-11 (2) 11-13 (1)	18-19 (1) 19-21 (2) 21-01 (1)	20-00 (1) 20-23 (1)*
Eastern Mediterranean & Middle East	09-11 (1)	06-11 (1) 11-14 (2) 14-16 (1)	18-20 (1) 20-22 (2) 22-00 (1)	20-22 (1)
Western Africa	10-13 (1)** 08-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	18-20 (1) 20-01 (2) 01-02 (1)	19-20 (1) 20-00 (2) 00-01 (1) 20-00 (1)*
Eastern & Central Africa	10-12 (1)** 08-11 (1) 11-13 (2) 13-14 (1)	07-15 (1) 15-17 (2) 17-18 (1)	20-00 (1)	21-23 (1)
Southern Africa	10-12 (1)** 08-10 (1) 10-11 (2) 11-12 (3) 12-13 (2) 13-14 (1)	07-15 (1) 15-17 (2) 17-18 (1)	18-19 (1) 19-22 (2) 21-23 (1)	19-22 (1) 20-22 (1)*
Central & South Asia	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-18 (1) 18-20 (2) 20-21 (1)	05-08 (1) 18-20 (1)	05-07 (1) 18-20 (1)
Southeast Asia	16-18 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-21 (1)	04-08 (1) 17-19 (1)	05-07 (1)
Far East	16-19 (1)	07-08 (1) 08-10 (2)	01-02 (1) 02-04 (2)	02-03 (1) 03-05 (2)

		10-12 (1) 16-18 (1) 18-20 (2) 20-22 (1)	04-06 (1) 06-08 (2) 08-09 (1)	05-07 (1) 03-06 (1)*
South Pacific & New Zealand	12-17 (1)** 11-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-09 (3) 09-12 (2) 12-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	23-01 (1) 01-03 (2) 03-07 (3) 07-08 (2) 08-09 (1)	00-02 (1) 02-07 (2) 07-08 (1) 02-07 (1)*
Australasia	14-17 (1)** 10-14 (1) 14-18 (2) 18-19 (1)	05-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-15 (1) 15-17 (2) 17-19 (1) 19-23 (2) 23-02 (1)	02-04 (1) 04-08 (2) 08-09 (1)	03-04 (1) 04-07 (2) 07-08 (1) 04-07 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1)** 09-14 (2)** 14-16 (1)** 07-08 (1) 08-09 (2) 09-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	02-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-14 (2) 14-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-23 (1) 23-02 (2)	18-19 (1) 19-20 (2) 20-21 (3) 21-03 (4) 03-05 (3) 05-07 (1)	19-21 (1) 21-00 (2) 00-03 (3) 03-05 (2) 05-06 (1) 21-02 (1)* 02-04 (2)* 04-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	09-11 (1)** 11-14 (2)** 14-15 (1)** 07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (3) 16-17 (1)	01-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-20 (2) 20-22 (1) 22-01 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-04 (2) 04-05 (1)	21-23 (1) 23-01 (2) 01-03 (1) 00-02 (1)*
McMurdo Sound, Antarctica	15-17 (1)	18-20 (1) 20-23 (2) 23-08 (1)	23-02 (1) 02-05 (2) 05-06 (1)	02-05 (1)

Time Zone: PST (24-Hour Time)
WESTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	08-11 (1)	06-07 (1) 07-09 (2) 09-10 (1) 10-13 (2) 13-15 (1) 23-01 (1)	18-20 (1) 20-22 (2) 22-00 (1)	19-23 (1) 20-22 (1)*
Northern Europe & European USSR	08-10 (1)	06-07 (1) 07-11 (2) 11-12 (1) 23-01 (1)	21-00 (1)	21-23 (1)
Eastern Mediter-ranean & Middle East	08-10 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-12 (2) 12-14 (1) 21-23 (1)	18-22 (1) 06-08 (1)	Nil
Western Africa	09-11 (1)** 08-10 (1) 10-13 (2) 13-14 (1)	07-10 (1) 10-14 (2) 14-16 (3) 16-17 (2) 17-18 (1) 22-00 (1)	18-23 (1)	19-22 (1) 19-21 (1)*
Eastern & Central Africa	09-12 (1)	08-13 (1) 13-15 (2) 15-17 (1) 21-23 (1)	18-21 (1) 06-08 (1)	Nil
Southern Africa	08-10 (1) 10-13 (2) 13-14 (1)	06-09 (1) 09-10 (2) 10-13 (1) 13-16 (2) 16-18 (1) 23-01 (1)	18-19 (1) 19-20 (2) 20-21 (1) 06-08 (1)	18-20 (1)
Central & South Asia	16-18 (1)	08-11 (1) 16-17 (1) 17-18 (2) 18-19 (1)	17-19 (1) 04-09 (1)	05-07 (1)
Southeast Asia	14-16 (1)** 14-15 (1) 15-17 (2) 17-18 (1)	07-09 (1) 09-10 (2) 10-13 (1) 17-19 (1) 19-20 (2) 20-21 (1)	02-03 (1) 03-06 (2) 06-08 (1)	03-07 (1) 04-06 (1)*
Far East	13-14 (1) 14-16 (2) 16-17 (1)	07-08 (1) 08-09 (2) 09-11 (1)	22-00 (1) 00-02 (2) 02-06 (3)	23-01 (1) 01-05 (2) 05-07 (1)
		11-13 (2) 13-16 (1) 16-18 (3) 18-19 (2) 19-21 (1)	06-08 (2) 08-09 (1)	01-06 (1)*
South Pacific & New Zealand	12-14 (1)** 14-16 (2)** 16-17 (1)** 11-13 (1) 13-16 (2) 16-17 (4) 17-18 (2) 18-19 (1)	04-08 (1) 08-10 (3) 10-12 (2) 12-16 (1) 16-17 (1) 17-18 (3) 18-20 (4) 20-21 (2) 21-02 (1) 02-04 (2)	21-22 (1) 22-05 (3) 05-07 (2) 07-09 (1)	22-00 (1) 00-05 (2) 05-07 (1) 02-06 (1)*
Australasia	15-17 (1)** 11-12 (1) 12-15 (2) 15-17 (3) 17-18 (1)	17-19 (2) 19-20 (3) 20-21 (2) 21-03 (1) 03-05 (2) 05-08 (1) 08-10 (3) 10-12 (2) 12-17 (1)	02-03 (1) 03-04 (2) 04-07 (3) 07-09 (1)	03-04 (1) 04-06 (2) 06-08 (1) 04-07 (1)*
Caribbean, Central America & Northern Countries of South America	08-10 (1)** 10-14 (2)** 14-15 (1)** 07-08 (1) 08-11 (2) 11-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	08-09 (4) 09-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-22 (1) 22-02 (2) 02-06 (1) 06-08 (3)	18-19 (1) 19-01 (3) 01-04 (2) 04-05 (1)	19-22 (1) 22-01 (2) 01-04 (1) 22-00 (1)* 00-02 (2)* 02-03 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	09-11 (1)** 11-14 (2)** 14-15 (1)** 07-08 (1) 08-09 (2) 09-13 (1) 13-14 (2) 14-15 (3) 15-16 (1)	12-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-22 (1) 22-01 (2) 01-06 (1) 06-07 (2) 07-09 (1)	19-21 (1) 21-02 (2) 02-05 (1)	20-23 (1) 23-00 (2) 00-02 (1) 23-01 (1)*
McMurdo Sound, Antarctica	14-16 (1)	17-19 (1) 19-22 (2) 22-02 (1) 08-10 (1)	23-02 (1) 02-05 (2) 05-06 (1)	02-05 (1)

**Indicates best time for 160 meter opening.*
***Indicates best time for 10 meter opening.*

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

All competitive sporting events have rules and regulations that must be followed to keep things in order. With judges, referees, and umpires on the scene to make a visual judgment, a positive decision can be made. The decision might be questioned, but it must be accepted. Penalties and disqualifications follow for those making strong objections.

Contesting in amateur radio is also considered a sporting event with rules and regulations, penalties and disqualifications. However, I sometimes wonder if a small minority pay any attention to them.

Reading the results of the last *CQ* World-Wide Phone Contest, I only saw two disqualifications, which were for obvious reasons, giving the impression that we had a clean contest. However, the remarks made in the story, some of the remarks in the QRM section, and on-the-air observations would indicate that this was not the true story. The honor system and self-policing does not prevent certain operators from using their own set of rules.

Unfortunately, it is almost impossible for the Contest Committee (the judges) to do much about the situation except to cross-check logs for scoring violations. They do not have the on-the-spot advantages of judges in other sporting events. Don't you think it's about time to give more attention to other areas and to try to keep things from getting out of hand?

This observation is not limited to our own *CQ* contest, which was probably the first one to enforce penalties for rules violations, but also pertains to other world-wide organizations who have contest programs. Sweeping the dirt under the rug is not going to solve this growing problem.

Deadline for material for the January issue is October 15th, and November 15th for the February issue.

73 for this time, Frank, W1WY

Iberoamericano Contest

2000Z Sat. to 2000Z Sun., Oct. 4–5

Organized by "Seccion Territorial de URE del Valles Oriental" and by "CQ Radio Amateur de Boixareu Editores," this contest will be sponsored every year the weekend before October 12th to commemorate the anniversary of the discovery of America. This is a phone-only contest with the emphasis on Latin-American areas.

Classes: Both single and multi-operator, and SWL. Multi stations are restricted to one transmitter.

Exchange: RS plus a progressive QSO number (001, etc.).

Bands: All six bands, 1.8 through 28 MHz.

Points: Latin-American stations score one point per QSO. Non-Latin-Americans, 3 points per QSO with Latin-Americans, 1 point with other non-Latin-Americans.

Multiplier: Latin-Americans use the DXCC list. Non-Latin-Americans use the following L-M country list: CE, CO, CP, CR, CT, CX, C3, C9, DU, EA, HC, HI, HK, HP, HR, HT, KP4, LU, OA, PY, TG, TI, XE, YS, YV, ZP, 3C, and dependencies.

Final Score: Total QSO points from all bands times the sum of multipliers from all bands.

SWL: Same rules apply to SWL entries. The same station cannot be logged more than 15% of the total logged. And the same station can only be logged again after 5 other entries.

Penalties: Taking credit for excessive duplicate contacts, and violation of rules and amateur radio regulations could result in disqualification.

Awards: Certificates will be issued to the highest scores in each DXCC country. Participating certificates will go to non-Latin-American stations making 50 or more QSOs. There are plaques for overall winning scores showing at least 4 hours of operation and 100 or more QSOs.

Mailing deadline for entries is November 30th to: IX Concurso Iberoamericano, Gran Via de les Corts Catalanes, 594, 08007 Barcelona, Spain.

Pennsylvania QSO Party

1600–0500Z Sat.–Sun., Oct. 11–12
1300–2200Z Sun., Oct. 12

This is the 29th annual party sponsored by the Nittany ARC of State College, Pennsylvania. The same station may be worked on each band and mode for QSO points. PA stations may also work other PA stations for QSO and multiplier credit. Mobiles may be worked in each county change.

Exchange: QSO number, and QTH. County for PA, ARRL section for others.

Scoring: One point for SSB contacts, 1.5 points for CW, 2 points for CW on 80 and 160.

PA stations multiply total by ARRL sections + PA counties + 1 DX country worked. Others use PA counties for their multiplier (maximum of 67).

Mobiles add 500 bonus points for each county operated from, minimum of 10 QSOs. Mobiles on county lines give one QSO number but get credit for two multipliers.

Frequencies: CW—1810 and 40 kHz up from bottom edge of each CW band. SSB—1850, 3980, 7280, 14280, 21380, 28580. Novice—10 up from bottom of each Novice band. Mobile—5 kHz below listed frequencies. Try 160 at 0300Z.

Awards: Will be made in five classes—single operator, multi-single, multi-multi, mobile, and QRP (maximum 5 watts). Certificates to winners in each county, each section, and club (minimum of 3 members and 20 QSOs). Plaques to top scorers in both eastern and western PA, out-of-state, multi-single, mobile, western and central USA, and QRP (*quite a selection—ed.).*

Include a summary sheet with your entry showing the scoring, a check list of counties or sections worked, and a dupe sheet if you make 100 or more contacts. There is a severe penalty of 100 points deducted for each dupe that has not been removed.

Official log forms are recommended and are available from W3HDH. For a copy of the results send 50¢ (no SASE).

Mailing deadline for entries is November 15th to: Douglas R. Maddox, W3HDH,

Calendar of Events

	Oct.	4-5	Iberoamericano Contest
*	Oct.	4-5	IRSA World Championship
*	Oct.	4-5	"Middle of World" Contest
*	Oct.	4-5	VK/ZL/Oceania SSB
*	Oct.	11-12	VK/ZL/Oceania CW Contest
	Oct.	11-12	Pennsylvania QSO Party
	Oct.	12	RSGB 21/28 MHz SSB
	Oct.	12-13	Illinois QSO Party
	Oct.	15-17	YLRL Anniv. CW Party
	Oct.	18	RSGB 21 MHz CW Contest
	Oct.	18-19	ARCI QRP CW Contest
	Oct.	18-19	Boy Scout Jamboree
	Oct.	18-20	CARTG RTTY Contest
	Oct.	18-20	Rhode Island QSO Party
	Oct.	**25-26**	**CQ WW DX Phone Contest**
	Ot.25	-Nv.1	Cayman's Pirate Week
	Oct.	29-31	YLRL Anniv. SSB Party
	Nov.	1-2	Int. Police Assn. Contest
	Nov.	1-3	ARRL CW Sweepstakes
	Nov.	8	ALARA YL/OM Contest
	Nov.	8-9	European RTTY Contest
	Nov.	15-16	AOEC 160 Meter Contest
	Nov.	15-16	Oceania QRP CW Contest
	Nov.	15-17	ARRL Phone Sweepstakes
	Nov.	**29-30**	**CQ WW DX CW Contest**
	Dec.	6-8	ARRL 160 Meter Contest
	Dec.	14-15	ARRL 10 Meter Contest

** Covered last month.*

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Illinois QSO Party

1800Z Sun. to 0200Z Mon., Oct. 12–13

The Radio Amateur Megacycle Society has changed the dates of this year's party and made other minor modifications. It's a shorty, only 8 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).

Additional 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. Include a large SASE for a copy of the results.

RSGB 21/28 MHz Phone Contest

0700 to 1900 GMT Sunday, Oct. 12

It's the world working the British Isles on 21 and 28 MHz.

The same station may be worked on each band for QSO and multiplier credit. There are a total of 42 prefixes available on each band. Following are the rules for areas other than the British Isles.

Sections: Single operator and multi-operator, both bands only, and SWL.

Exchange: RS report plus a progressive QSO number starting with 001.

Scoring: Each contact with a B.I. station is worth 3 points. Multiply total QSO points from each band by the sum of B.I. prefixes worked on each band (maximum of 42 per band). The GB prefix does not count for QSO or multiplier.

Unmarked duplicate contacts will be penalized 10 times the points claimed. Logs containing more than 5 unmarked duplicates will be disqualified.

There is also an SWL section. Only B.I. stations are to be logged. Scoring is the same as indicated above. The same call sign may appear once only in every three contacts, except when the logged station is a new multiplier.

Awards: Overseas stations will be awarded certificates to the leading station in each country and the leading station in the multi-operator section, and to the SWL winner in each country. The first, second, and third overall winners will also receive certificates of merit.

Separate log sheets are required for each band. Include a summary sheet showing the scoring, prefixes worked, and a signed declaration that rules and regulations have been observed.

Logs must be received by December 8th. This year they go to: RSGB Contest Committee, P.O. Box 73, Lichfield, Staffs. WS13 6UJ England.

RSGB 21 MHz CW Contest

0700 to 1900 GMT Sunday, Oct. 19

Like the 21/28 MHz Phone Contest, the activity in this one is between the British Isles and the rest of the world. Competition is limited to single operator stations only. There is a separate QRP section in which power input must not exceed 10 watts, and there is also an SWL section.

The following rules are for areas other than the British Isles.

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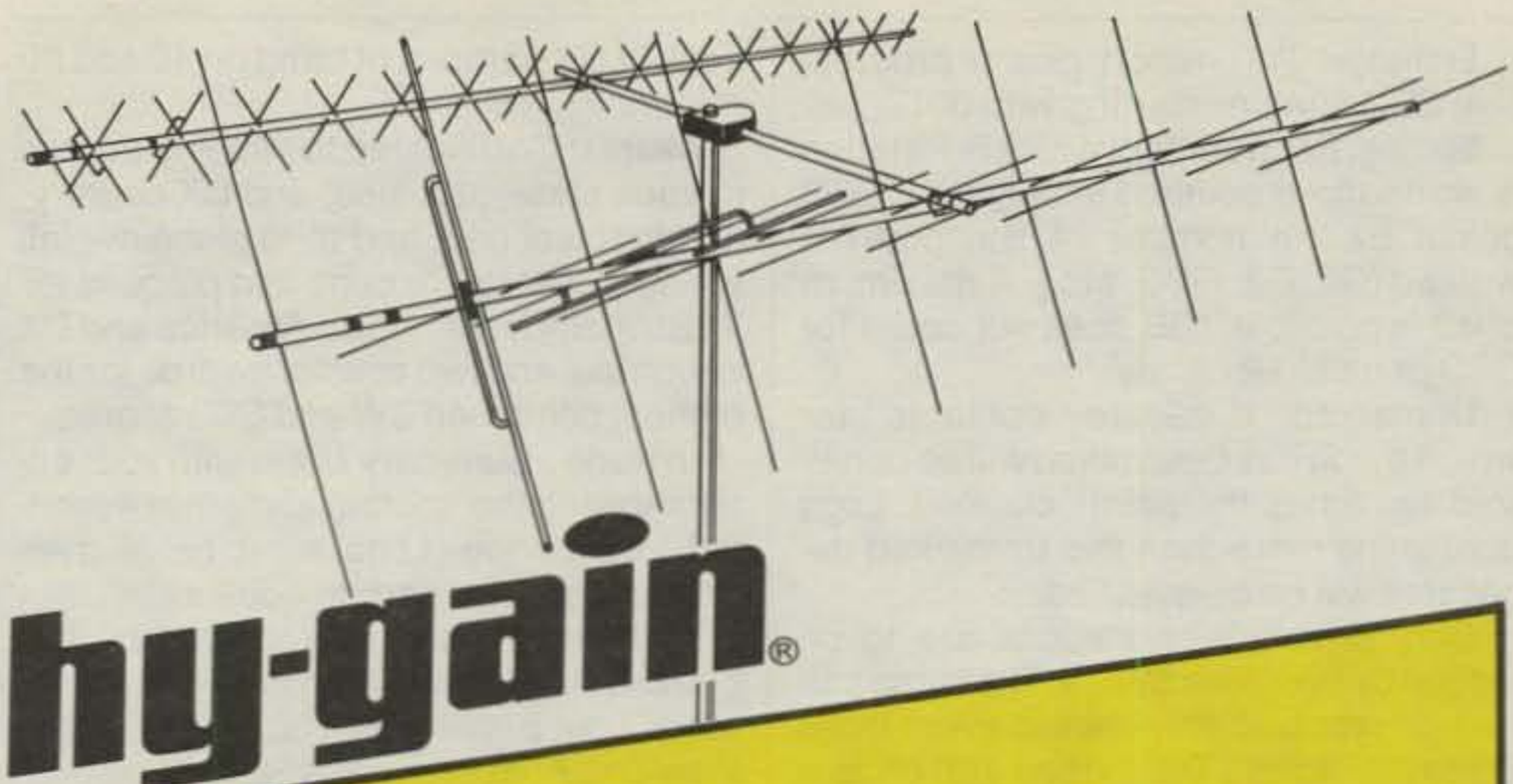

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Exchange: RST report plus a progressive QSO number starting with 001.

Scoring: Each contact with a B.I. station is worth three points. Multiply total QSO points by the number of B.I. prefixes worked (G2, G3, GD3, etc.). A maximum of 42 is possible. (GB does not count for QSO or multiplier.)

Unmarked duplicate contacts for which credit has been taken will be penalized ten times the points claimed. Logs containing more than five unmarked duplicates will be disqualified.

Only British Isles stations are to be logged by overseas SWL's. The same call may be reported only once in every three contacts, unless the logged station is a new multiplier. Scoring is the same as above.

Awards: Certificates to the three leading stations in each overseas country, both transmitting and SWL.

Include a summary sheet with a list of prefixes worked, station description, the usual signed declaration, and your name and address in block letters.

Logs must be received by December 31st. This year they go to: RSGB HF Contests Comm., c/o J. Bazley, G3HCT, "Brooklands" Ullenhall, Solihull, Warks. B95 5NW, England.

YLRL Anniversary Party

CW: Oct. 15–17 SSB: Oct. 29–31
1400Z–0200Z, Wed.–Fri.

This is the 47th annual party run by the YL Radio League. It is open to all YL's around the world. Activity will be found on all bands, 10 through 80 meters, and will be between YL's only.

CW and SSB are separate contests and require separate logs. A station may be worked *once only* for contest credit. Operation is limited to 24 out of the 36-hour contest period. Be sure to indicate off periods in your log.

Exchange: QSO no., RS(T), and QTH; U.S. state, VE province, or DX country.

Scoring: One point per QSO between stations within the U.S. and Canada (including Alaska and Hawaii). Two points for contacts with stations in other areas.

DX YL's score 2 points for QSOs with the U.S. and Canada and with other continents, but 1 point with stations in own continent.

Final Score: Multiply total QSO points from all bands by the sum of states, provinces, and DX countries worked.

There is a low-power bonus multiplier of 1.25 for stations using 150 watts or less on CW and 300 watts PEP on SSB. Multiply final score by 1.25 if applicable.

For each duplicate contact removed from your log there is a penalty of 3 additional and equal contacts removed from your log.

Frequencies: CW—3555, 7055, 14055, 21195, 28195. SSB—3955, 7255, 14295, 21395, 28595 (plus or minus 15 kHz). Look in DX portions of band on 40 and 80 meters.

Awards: Certificates to winning scores in each state, province, and DX country, and first, second, and third place overall winners. There are cups and plaques for YLRL members in North America and DX countries, and two special awards for the highest combined CW and SSB scores.

Include a summary sheet with your entry showing the scoring and other essential information. Logs must be in their original form, no carbon copies.

Your entry must be received by December 13th, and this year logs go to: Mary Lou Brown, NM7N, 504 Channel View Dr., Anacortes, WA 98221.

ARCI QRP CW Contest

1200Z Sat. to 2400Z Sun., Oct. 18–19

This is the fall edition and 25th anniversary of the QRP Amateur Radio Club International. This year's activity will be found on CW only. Participants may operate the full 24 hours.

Exchange: RS(T) and state, province, or country. Members will include their number; non-members their power output.

Scoring: Contacts with members, 5 points. Non-members, 2 points if in same continent, 4 points if in a different continent. The same station may be worked on each band for QSO and multiplier credit.

There is a power output bonus: 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 check log only.

The following bonus multipliers are also available: solar or wind power—×2; battery power—×1.5. Must be used for duration of contest.

Multiplier: Each state, VE province, and DX country worked on each band.

Final Score: Total QSO points from all bands × (states + provinces + countries) × power bonus × power type if any.

Frequencies: 1810, 3560, 7040, 14060, 21060, 28060, 50360. Novice—3710, 7110, 21110, 28110.

Awards: Certificates to the highest scorers in each state, province, and DX country with two or more entries. All entries will be considered for the Triple Crown QRP Award. In addition, Adrian Weiss, W0RSP, is sponsoring a special *Milliwatt* certificate to be awarded to the top-scoring station in the less than 1 watt category, providing there are two or more entries in that category.

Use a separate log sheet for each band. Include a summary sheet showing the scoring, equipment description, and other essential information. Include a large SASE for a copy of the results. It is suggested you send a large SASE to KA5NLY for official log forms.

Logs must be received by November 19th and go to: QRP ARCI Chairman, Gene Smith, KA5NLY, P.O. Box 55010, Little Rock, AR 72225-0010.

Rhode Island QSO Party

1700Z Sat. to 0500Z Sun., Oct. 18–19
1300Z Sun. to 0100Z Mon., Oct. 19–20

This one is again being sponsored by the East Bay AWA (WA1YPN). The same station maybe worked on each band and each mode. RI stations may contact others RI stations for QSO points.

Exchange: RS(T) and QTH. City or town for RI; state, province, or DX country for others.

Scoring: Phone QSOs are worth 2 points, CW 3 points, and Novice/Tech. 5 points.

RI stations multiply total QSO points by the number of states, VE provinces, and DX countries worked. Others by the different RI cities and towns worked for their final score (39 cities and towns).

Frequencies: CW—1810, 3550, 3710, 7050, 7110, 14060, 21050, 21110, 28050, 28110. Phone—3900, 7250, 14300, 21360, 28600, 50110, 144.2 and 146.52. (Use of FM simplex is encouraged. No repeaters.)

Awards: Certificates to the top-scoring single operator station in each RI county, and each state, province, and country. The top-scoring Novice/Tech. in RI and out of state will also be rewarded, as will the winning RI multi-operator station.

Include a summary sheet with your entry showing the scoring and other essential information, and an SASE for a copy of the results.

Mailing deadline is November 30th to: East Bay AWA Inc., P.O. Box 392, Warren, RI 02885.

Scouts Jamboree On The Air

0001 Sat. to 2400 Sun., Local Time,
Oct. 18–19

This is the 29th annual Jamboree sponsored by the World Bureau of Scouts. Activity is world-wide and includes not only Scout units, but also Girl Scouts and Guides. This is not a contest, but an opportunity for Scouts or anyone interested in Scouting to get together on the air and exchange greetings. Amateurs can invite members of Scout units or individuals to visit their stations or clubs to see how ham radio operates.

No specific exchange, no scoring, and no logs are required. However, participating postcard-size certificates issued by the World Scout Bureau are available. They may be requested before the JOTA weekend for distribution and included with your QSLs of JOTA contacts. Send a large SASE to: JOTA, 1325 Walnut Hill, Irving, TX 75038-3096. Cost is 22¢ postage for 10 cards and 17¢ for each additional 10.

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cies are suggested. CW—3590, 7030, 14070, 21140, 28190. Phone—3940, 7290, 14290, 21360, 28990. And the usual frequencies for Novice, RTTY, SSTV, ATV, and Packet. Look for headquarters stations K2BSA, HB9S, and other special calls.

Reports of your activity and additional information should be sent to: JOTA Coordinator, International Division BSA, 1325 Walnut Hill Lane, Irving, TX 75038-3096.

(Harry Harchar, W2GND, who was the stateside coordinator for many years, became a Silent Key some months ago.)

CARTG RTTY Sweepstakes

0200Z Sat. to 0200Z Mon., Oct. 18–19

This is the 26th annual contest run by the Canadian Amateur Radio Teletype Group. No more than 30 hours out of the 48-hour contest period are permitted for single operators. Multi-operators can use the full 48 hours. Off times can be taken at any time, but must be indicated in the log.

Use all five bands, 3.5 through 28 MHz, in that portion of the band designated for RTTY. A station may be worked once on each band for QSO and multiplier credit.

Classes: Single operator, multi-operator single transmitter, and SWL.

Exchange: RST, Time in GMT, and CARTG Zone.

Points: Contacts with stations within own zone, 2 points. All other contacts, points as listed in CARTG zone chart. (Write to CARTG for copy of chart.)

Multiplier: ARRL country list plus U.S., VE, and VK call areas.

Final Score: Total exchange points × countries/call areas × continents. There is a bonus of 200 points added to final score for each Canadian contact on all bands.

Awards: All awards in form of plaques. Ten to the top scores and several other awards in different classes and categories.

It is suggested that you send a large SASE or IRC to CARTG for additional information, log sheets, and a copy of the zone chart.

All entries must be received before December 31st and go to: CARTG, 85 Fifeshire Road, Willowdale, Ontario, Canada M2L 2G9.

Caymans Pirates Week

0000Z to 2400Z Sat., Oct. 25–Nov. 1

This is not a contest, but an event that should stir up some activity in the Cayman Islands.

Special prefixes will be used that will make it interesting for prefix collectors. ZF1 will sign ZF1O, ZF2 will sign ZF2O, ZF8 will sign ZF8O, and ZF9 will sign ZF9O—four brand new prefix calls to add to your total.

A special QSL card commemorating Pirates Week will be issued to all stations sending a confirmation of contacting a Cayman station during the above week.

Include 2 IRCs with your QSL, which must be received no later than December 1st 1986. Address it to: C.A.R.S., P.O. Box 1029, Grand Cayman, B.W.I.

CQ World-Wide DX Contest

Phone: Oct. 25–26 CW: Nov. 29–30
0000Z Saturday to 2400Z Sunday

Complete rules were published in last month's issue and are the same as those used these many years. There have been a few changes and additions in the sponsors of the more than 60 trophies and plaques that will be awarded in the 1986 contest. The Team Contesting category has been retained.

You are again reminded to study the disqualification clause. Penalties for taking credit for duplicate contacts and other infractions have been clearly defined. You not only risk a deduction in your score, but also possible disqualification, especially if your score was questionable in last year's contest.

There are other areas that might lead to being disqualified—sportsmanship, regulation violations, etc. Reading the comments in the phone results last month (USA QRM) would indicate that there are areas for improvement. The Contest Committee is cognizant of the fact and will be watching those areas in this year's contest.

Note: The *CQ* Champion Plaque for stations winning the same category for two consecutive years only applies to world winners, not to other sub-areas.

Repeating the deadline, all entries must be postmarked NO LATER than December 1, 1986 for the phone section, and January 15, 1987 for the CW section. An extension may be granted if requested in writing to the Contest Committee.

Again this year all logs must be sent directly to: CQ World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801 U.S.A. Be sure to indicate Phone or CW on the envelope.

Int. Police Assn. Contest

CW: Sat., Nov. 1 SSB: Sun., Nov. 2
0600Z–1000Z & 1400Z–1800Z

The International Police Assn. Radio Club Contest is again organized by the German Chapter. There have been some changes made in the rules.

Participation is by members and non-members in three classes: single operator, multi-operator, and SWL. The same station may be worked in each band and mode for QSO and multiplier credit. CW and SSB should be scored separately.

Exchange: RS(T) and QSO number starting with 001. Club members will identify by including IPA and their state if in the U.S. Non-members in the U.S. will also include their state.

Scoring: One point per QSO; 5 points if it's with an IPA station. Multiply total by DXCC countries and U.S. states worked on each band with an IPA station.

Frequencies: CW—3575, 7025, 14075, 21075, 28075. SSB—3650, 7075, 14295, 21295, 28575. DX—3775, 3800, 7075, 7100. (U.S. on 40 and 80?)

Awards: Certificates to the three highest scorers in each class and each mode. Contest contacts can be applied to the Sherlock Holmes Award and Trophy *(requirements were not given).*

Stateside stations can get additional information by sending a large SASE to Thomas D. Jenkins, WA8VDC, 4828 Elm Street, Newport, MI 48166.

Mailing deadline for contest logs is December 31st, and they go to: Anton Kohten, DK5JA, P.O. Box 40 0163, D-4152 Kempen 1, West Germany.

ARRL Sweepstakes

CW: Nov. 1–3 Phone: Nov. 15–17
Starts: 2100Z Sat. Ends: 0300Z Mon.

This is the 53rd running of the Sweepstakes, making it the oldest domestic competition going, and it really stirs up a lot of activity.

Operation is limited to stations in ARRL sections, which also includes the West Indies section (KP4, KV4, etc.) and U.S. possessions in the Pacific. Operation is limited to 24 out of the 30 hour contest period. Times off may not be less than 30 minutes and must be clearly indicated in your log.

In order to minimize QRM to non-contesters it is recommended that operation be confined to certain portions of the bands. It is recommended that you check *QST* for details.

There are several other regulations, including a cross-check sheet if you make 200 or more contacts. A large SASE (39¢ in postage) will get you the "SS Package" and Operating Aid #6 with enough log and summary sheets for an average outing.

Exchange: QSO no., power class, call, last two digits of year first licensed, and your ARRL section.

Stations using 150 watts or less are classed "A" and over 150 watts "B." The same station may be worked once only regardless of the band.

Scoring: Each completed QSO is worth 2 points. The multiplier is derived from the number of ARRL sections, plus VE8, worked (maximum of 74).

Awards: The usual certificates in each class and mode for single operator stations in each section and multi-operator stations in each division.

Logs must be received no later than December 21st and go to: ARRL Communications Dept., 225 Main Street, Newington, CT 06111.

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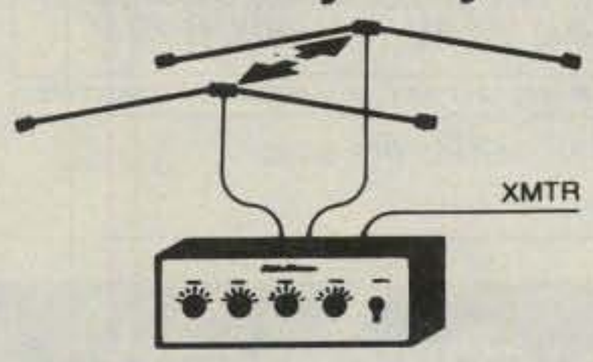

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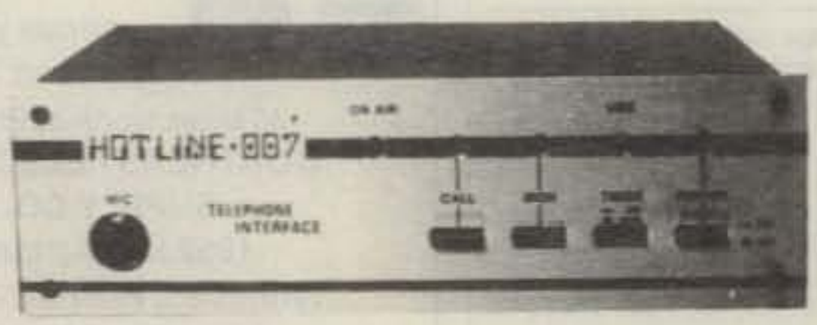

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MRF433		12.5W	12.00	30.00
MRF449,/A	Q	30W	12.50	30.00
MRF450,/A	Q	50W	14.00	31.00
MRF453,/A	Q	60W	15.00	35.00
MRF454,/A	Q	80W	15.00	34.00
MRF455,/A	Q	60W	12.00	28.00
MRF458		80W	20.00	46.00
MRF475		12W	3.00	9.00
MRF476		3W	2.75	8.00
MRF477		40W	11.00	25.00
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MRF222	25W	136-174	14.00	—
MRF224	40W	136-174	13.50	32.00
MRF237	4W	136-174	3.00	—
MRF238	30W	136-174	13.00	30.00
MRF239	30W	136-174	15.00	35.00
MRF240	40W	136-174	18.00	41.00
MRF245	80W	136-174	28.00	65.00
MRF247	75W	136-174	27.00	63.00
MRF260	5W	136-174	7.00	—
MRF261	10W	136-174	9.00	—
MRF262	15W	136-174	9.00	—
MRF264	30W	136-174	13.00	—
MRF607	1.75W	136-174	3.00	—
MRF641	15W	407-512	22.00	49.00
MRF644	25W	407-512	24.00	54.00
MRF646	40W	407-512	26.50	59.00
MRF648	60W	407-512	33.00	69.00
SD1441	150W	136-174	74.50	170.00
SD1477	100W	136-174	32.50	78.00
2N3866*	1W	30-200	1.25	—
2N4427	1W	136-174	1.25	—
2N5591	25W	136-174	13.50	34.00
2N6080	4W	136-174	7.75	—
2N6081	15W	136-174	9.00	—
2N6082	25W	136-174	10.50	—
2N6083	30W	136-174	11.50	24.00
2N6084	40W	136-174	13.00	31.00

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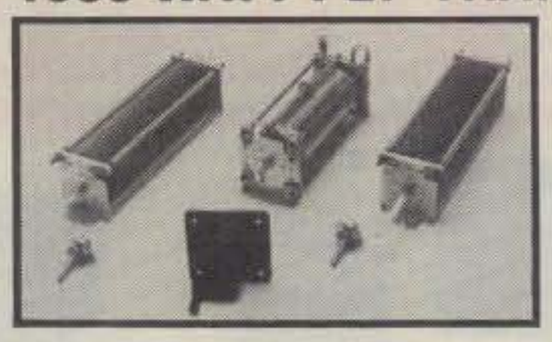

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Radios above shown actual size.

PL tone board (optional). PL display. External PL selection. Independent PL memory per channel. PL encode *and* decode. Expanded Rx coverage. LCD power output and "S"-meter display. Battery saver circuit. Push-button squelch override. Eight-key control pad. Keypad lock. High/low power switch (½ watt on low power.) ■ Options available: Dry cell battery case for 6 AAA-size cells. Dry cell battery case for 6 AA-size cells. DC car adapter/charger. Programmable CTCSS (PL tone) encoder/decoder. DTMF keypad encoder. Mobile hanger bracket. External speaker/microphone. And much more. ■ So get the intelligent mini HT that's built for life's realities. Yaesu's 2-meter FT-23R, or 440-MHz FT-73R.

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Improved Smooth Tuning. The IC-751A features a newly designed tuning knob for velvet smooth tuning.

Added LED Annunciator. For easily identifying if you're using the tuning speed, dial, or band switching functions.

32 Memories. Mode and frequency may be stored in any of 32 memories...all the memory capability that you'll ever need.

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