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**Results Of The 1989
CQ World Wide DX
CW Contest . . . page 11**

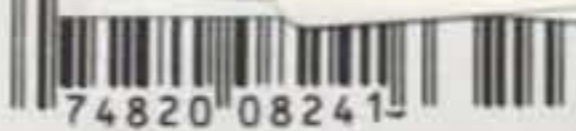
**CQ Reviews the Ameritron AL-1200
and the PacComm HandiPacket TNC**

**WW II German Fusp rech.f
Transceiver . . . page 48**

**Operate Two Rotators With
One Controller . . . page 34**

On the cover: Lew Gordon, K4VX

AMATEUR'S JOURNAL



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KENWOOD



TS-950SD

"DX-clusive" HF Transceiver

The new TS-950SD is the first Amateur Radio transceiver to utilize Digital Signal Processing (DSP), a high voltage final amplifier, dual fluorescent tube digital display and digital meter with a peak-hold function.

• **Dual Frequency Receive Function.**

The TS-950SD can receive two frequencies simultaneously.

• **New! Digital AF filter.** Synchronized with SSB IF slope tuning, the digital AF filter provides sharp characteristics for optimum filter response.

• **New high voltage final amplifier.**

50 V power transistors in the 150-watt final section, resulting in minimum distortion and higher efficiency. Full-power key-down time exceeds one hour.

• **New! Built-in microprocessor controlled automatic antenna tuner.**

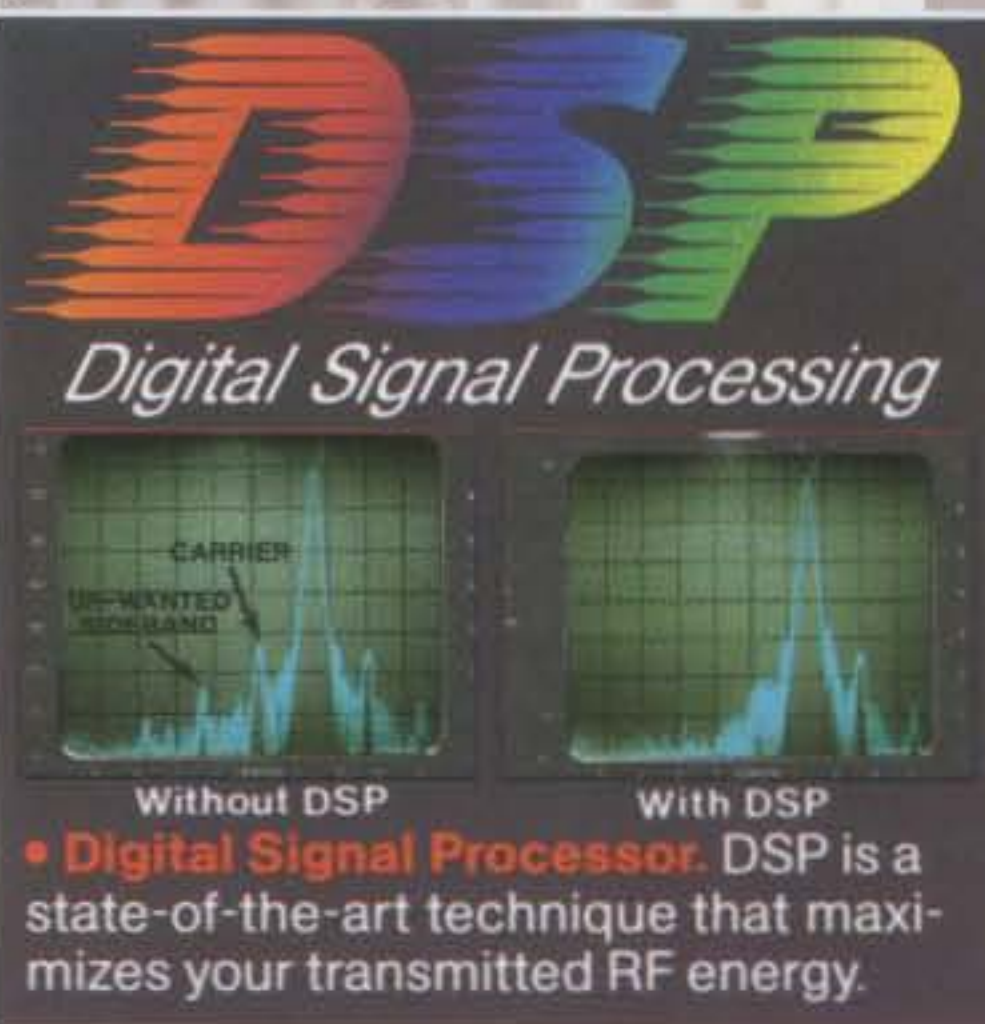
• **Outstanding general coverage receiver performance and sensitivity.**

Kenwood's Dyna-Mix™ high sensitivity direct mixing system provides incredible performance from 100 kHz to 30 MHz. The Intermodulation dynamic range is 105 dB.

• **Famous Kenwood interference reduction circuits.** SSB Slope Tuning, CW VBT (Variable Bandwidth Tuning), CW AF tune, IF notch filter, dual-mode noise blanker with level control, 4-step RF attenuator (10, 20, or 30 dB), switchable AGC circuit, and all-mode squelch.

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

The Ultimate Signal.



• **High performance IF filters built-in†** Select various filter combinations from the front panel. For CW, 250 and 500 Hz, 2.4 kHz for SSB, and 6 kHz for AM. Filter selections can be stored in memory!

• **Multi-Drive Band Pass Filter (BPF) circuitry.** Fifteen band pass filters are available in the front end to enhance performance.

• **Built-in TCXO for the highest stability.†**

• **Built-in electronic keyer circuit.**

• **100 memory channels.** Store independent transmit and receive frequencies, mode, filter data, auto-tuner data and CTCSS frequency.

• **Digital bar meter.**

Additional Features: • Built-in interface for computer control • Programmable tone encoder • Built-in heavy duty AC power supply and speaker • Adjustable VFO tuning torque • Multiple scanning functions • MC-43S hand microphone supplied

Optional Accessories

- DSP-10 Digital Signal Processor *
- SO-2 TCXO * • VS-2 Voice synthesizer
- YK-88C-1 500 Hz CW filter for 8.83 MHz IF *
- YG-455C-1 500 Hz CW filter for 455 kHz IF *
- YK-88CN-1 270 Hz CW filter for 8.83 MHz IF
- YG-455CN-1 250 Hz CW filter for 455 kHz IF *
- YK-88SN-1 1.8 kHz SSB filter for 8.83 MHz IF
- YG-455S-1 2.4 kHz SSB filter for 455 kHz IF *
- SP-950 External speaker w/AF filter
- SM-230 Station monitor w/pan display
- SW-2100 SWR/power meter
- TL-922A Linear amplifier (not for QSK)

* Built-in for the TS-950SD

† Optional for the TS-950S

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
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Two in the Hand!

TH-75A

2m/70cm Dual Band HT

The new TH-75A Dual Band HT from Kenwood is here now! Many of the award-winning features in our dual band mobile transceivers are designed into one hand-held package.

- **Dual Watch** function allows you to monitor both bands at the same time.
- **1.5 watts on 2 meters and 70cm: 5 watts when operated on 12 VDC (or PB-8 battery pack).**
- **Large dual multi-function LCD display.**
- **10 memory channels** for each band stores frequency, CTCSS, repeater offset, frequency step information, and reverse. A lithium battery backs up memories. Two memories for "odd split" operation.
- **Selectable full duplex operation.**
- **Extended receiver range:** 141-163.995 and 438-449.995 MHz; transmit on Amateur band only. (Modifiable for MARS and CAP. Permits required. Specifications guaranteed on Amateur bands only.)
- **Uses the same accessories as the TH-25AT (except soft cases).**
- **Volume and balance controls, plus separate squelch controls on top panel.**
- **Super easy-to-use!** For example, to recall memory channel, just push the channel number!
- **CTCSS encode/decode built-in!**
- **Automatic Band Change (ABC).** Automatically switches between main and sub band when signal is present.
- **Automatic offset selection on 2 meters.**
- **Tone alert system for quiet monitoring.** When CTCSS decode is on, the tone alert will function only when a signal with the proper tone is received.
- **Four ways to scan, including dual memory scan,** with time operated or carrier operated scan stop modes, and priority alert.
- **Automatic battery saver circuit extends battery life.**



• **Supplied accessories:** Dual band rubber-flex antenna, PB-6 battery pack, wall charger, belt hook, wrist strap, water resistant dust caps.

Optional Accessories

• **PB-5** 7.2 V, 200 mAh NiCd pack for 1.5 W output • **PB-6** 7.2 V, 600 mAh NiCd pack • **PB-7** 7.2 V, 1100 mAh NiCd pack • **PB-8** 12 V, 600 mAh NiCd for 5 W output • **PB-9** 7.2 V, 600 mAh NiCd with built-in charger • **BC-10** Compact charger • **BC-11** Rapid charger

• **BT-6** 6-cell AA battery case • **DC-1/PG-2V** DC adapter • **HMC-2** Headset with VOX and PTT • **SC-22** and **SC-23** Soft case • **SMC-30/31** Speaker mics. • **WR-1** Water resistant bag.

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Warp Drive!



TS-790A Satellite Transceiver

The new Kenwood TS-790A VHF/UHF all-mode tri-band transceiver is designed for the VHF/UHF and satellite "power user." The new TS-790A is an all-mode 144/450/1200 MHz transceiver with many special enhancements such as automatic uplink/downlink tracking. Other features include dual receive, automatic mode selection, automatic repeater offset selection for FM repeater use, VFO or quick step channel tuning, direct keyboard frequency entry, 59 memory channels (10 channels for separate receive and transmit frequency storage), multiple scanning and multiple scan stop modes. The Automatic Lock Tuning (ALT) on 1200 MHz eliminates frequency drift. Power output is 45 watts on 144 MHz, 40 watts on 450 MHz, and 10 watts on 1200 MHz. (The 1200 MHz section is an optional module.)

- **High stability VFO.** The dual digital VFOs feature rock-stable TCXO (temperature compensated crystal oscillator) circuitry, with frequency stability of ± 3 ppm.
- **Operates on 13.8 VDC.** Perfect for mountain-top DXpeditions!
- **The mode switches confirm USB, LSB, CW, or FM selection with Morse Code.**
- **Dual Watch allows reception of two bands at the same time.**
- **Automatic mode and automatic repeater offset selection.**
- **Direct keyboard frequency entry.**
- **59 multi-function memory channels.** Store frequency, mode, tone information, offset, and quick step function. Ten memory channels for "odd split."
- **CTCSS encoder built-in.** Optional TSU-5 enables sub-tone decode.
- **Memory scroll function.** This feature allows you to check memory contents without changing the VFO frequency.

- **Multiple scanning functions.** Memory channel lock-out is also provided.
- **ALT—Automatic Lock Tuning—on 1200 MHz eliminates drift!**
- **500 Hz CW filter built-in.**
- **Packet radio connector.**
- **Interference reduction controls:** 10 dB RF attenuator on 2m, noise blanker, IF shift, selectable AGC, all mode squelch.
- **Other useful controls:** RF power output control, speech processor, dual muting, frequency lock switch, RIT.
- **Voice synthesizer option.**
- **Computer control option.**

Optional Accessories:

- **PS-31** Power supply • **SP-31** External speaker
- **UT-10** 1200 MHz module • **VS-2** Voice synthesizer unit
- **TSU-5** Programmable CTCSS decoder
- **IF-232C** Computer interface • **MC-60A/MC-80/MC-85** Desk mics • **HS-5/HS-6** Headphones
- **MC-43S** Hand mic • **PG-2S** Extra DC cable

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The Radio Amateur's Journal



ON THE COVER: A nice mix of home-brew and commercial products make the Hannibal, MO station of Lew Gordon, K4VX a pleasure to operate in the various CW contests. (Photo by Larry Mulvehill, WB2ZPI)

OCTOBER 1990

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FEATURES

RESULTS OF THE 1989 CQ WORLD-WIDE DX CW CONTEST

Bob Cox, K3EST/6, and Larry Brockman, N6AR/4	11
CW TROPHY WINNERS AND DONORS.....	12
BAND-BY-BAND BREAKDOWN & TOP ALL-BAND SCORES..	13
CLUB SCORES.....	16
TOP SCORES.....	17
WORLD TOP 10 QRPp.....	20
TEAM CONTESTING.....	20
ZONE LEADERS, SINGLE OPERATOR.....	21
SINGLE OPERATOR ASSISTED.....	24

HOW TO OPERATE TWO ANTENNA ROTATORS WITH ONE CONTROL BOX.....	John R. Somers, KC3YB	34
---	-----------------------	----

CQ REVIEWS: THE AMERITRON AL-1200 HF LINEAR AMPLIFIER.....	John J. Schultz, W4FA	36
--	-----------------------	----

YE OLDE VOLT SOURCE.....	George Wilson, W1OLP	47
--------------------------	----------------------	----

THE FUSPRECH.F TRANSCEIVER... ..	Bengt Lundgren, SM5GDQ	48
----------------------------------	------------------------	----

CQ REVIEWS: THE PACCOMM HANDIPACKET TNC	Buck Rogers, K4ABT	52
---	--------------------	----

CQ SHOWCASE: NEW AMATEUR PRODUCTS.....		56
--	--	----

CQ WORLD-WIDE DX CONTEST ALL-TIME RECORDS

Frederick Capossela, K6SSS	
ALL-TIME PHONE RECORDS.....	58
ALL-TIME CW RECORDS.....	59
ALL-TIME USA RECORDS.....	60

ANTENNAS & ACCESSORIES: THOUGHTS ON MULTIBAND ANTENNAS AND MORE.....	Karl T. Thurber, Jr., W8FX	62
--	----------------------------	----

WORLD OF IDEAS: WRTC '90—AN INSIDE REPORT	Dave Ingram, K4TWJ	74
---	--------------------	----

PACKET USER'S NOTEBOOK: MAKING THE ROUNDS IN PACKET.....	Buck Rogers, K4ABT	82
--	--------------------	----

BILL'S BASICS: AMATEUR RADIO GOODIES, PART II, CONCLUSION.....	Bill Welsh, W6DDB	86
--	-------------------	----

WASHINGTON READOUT: WORLD RADIOSPORT TEAM CHAMPIONSHIP.....	Frederick O. Maia, W5YI	98
---	-------------------------	----

DEPARTMENTS

CONTEST CALENDAR: 1990 WRTC CHAMPIONSHIP WON BY K1AR AND TEAMMATE K1DG, CONTESTS FOR OCT. & EARLY NOV.....	John Dorr, K1AR	90
--	-----------------	----

AWARDS: STORY OF THE MONTH—BARBARA BAUM, N3DRO	Dorothy Johnson, WB9RCY	102
--	-------------------------	-----

PROPAGATION: DX CONTEST SPECIAL, DX CHARTS FOR OCT. 15 THRU DEC. 15.....	George Jacobs, W3ASK	106
--	----------------------	-----

DX: THE CHANGING FACE OF THE DX CENTURY CLUB	Chod Harris, VP9ML	117
--	--------------------	-----

ZERO BIAS.....	4	OUR READERS SAY.....	46
ANNOUNCEMENTS.....	9	HAM SHOP.....	126

ZERO BIAS

EDITORIAL

This month, as our KH6 friends would say, we see the results of amateur radio's Great Contest Kahunas who have surfed the Continuous Wave. The CW scores are in, tabulated, and presented in this issue. In addition, these noteworthy results also serve as a benchmark for this year's upcoming event. No, CW is not dead, wounded, nor exorcised from the amateur radio lexicon. It is here as long as people enjoy using it and feel that it does something for them. Checking the results, it is obvious that a number of amateurs still enjoy demonstrating their ability and skill with CW.

CW is sort of like lima beans. You either like 'em or you don't. Maybe it has something to do with the way lima beans were first presented to you as a child or the way CW was explained to you as a neophyte amateur, coupled with those "It's good for you" phrases that form that instant somatic reaction. Somehow, though, if you ask "Why is it good for me?" you will get a negative response in either example.

The CQ CW contests and CW endorsements for our awards program prove that a number of amateurs enjoy the mode, get pleasure out of stretching all of the skills needed to be competitive, and really don't care if it's "good for them" or not. The underlying reasons are probably the same as those reasons for taking part in phone activities or RTTY events. It's fun.

If you're one of amateur radio's professional complainers, think of the CQ WW CW as a really long W1AW session where we check on who copied what. Speaking of W1AW, I received some mail the other day concerning an amateur who is bringing charges that they (W1AW) came on his frequency where he was operating without checking whether or not the frequency was clear. He is claiming malicious interference with an amateur radio transmission. That's a little nit-picky, as it should come as no surprise that W1AW comes on the air at certain times and on certain frequencies. I guess that they should listen and perhaps like the rest of us ask if the frequency is in use, but that would tend to make them like us. On the other hand, if they did ask, would our bent-out-of-shape amateur relinquish the frequency for the greater good?

Speaking of CW, Dave Ingram has been working on his next collectible-keys article. Judging from previous mail, these articles are very popular and have enhanced the sub-hobby of collecting and displaying old (and not so old) telegraph keys. I myself am up to about 20 keys now, and I still have to photograph a few new acquisitions for Dave's next article. If you have any unusual keys in your col-

lection, take a picture of them and send the picture and info to Dave.

I guess people collect microphones, too, but somehow it doesn't seem the same. All of this collecting, though, doesn't appear to be a political statement for the advocacy of "CW Forever and For Everyone." It may be nostalgic, it may be an appreciation and love of mechanical beauty and craftsmanship, and in some cases it may be the good feeling one gets while using them. It's what it conjurs up in the individual collector's psyche that's important and satisfying.

Maybe if you have been around for many, many years, you look fondly at a collection of really old QSL cards, some with prefixes that don't exist anymore or from countries that have changed hands several times and are now part of another geographical entity. At some point in time this was reality with all of its concomitant importance of working them and getting the card, possibly to put you over the top of the DX heap. Now the old QSL is like the old telegraph key—a thing of beauty for what it represented, not exactly for what it is.

With 1991 not that far ahead, we still celebrate the rites and rituals of CW with our upcoming CQ World-Wide DX CW Contest. For a number of us it is a living tradition and one in which we take pride. For others it's just another contest that will encroach on "their" band(s) and force them off the air. In 1991 we probably will also celebrate another birthday for the ever-popular median-age amateur—53 candles this time. In 1991 we hopefully can resolve another CW consideration—the Communicator Class of amateur radio license. I've seen quite a variety of proposals and comments so far on what it should be, but nothing on how to implement and encourage the final result.

So maybe it's not just CW itself, but amateur radio in general that's becoming analogous to lima beans. Saying it's good for you should be good enough or reason enough for millions of people to get in on the action. Right now the only display or indication that CW might also be fun is our WW DX CW Contest. No one is forced or ordered to enter for arbitrary reasons, nor is it a federal or international mandate. People all over the world seem to enjoy and have fun in this competition. You could argue that it's the skills being honed or the equipment assembled that enables these contesters to be ready and on the keen edge to handle emergency communications and disaster relief. That's just another bowl of lima beans without butter or salt.

While contests might be an anathema

to some amateurs, the concept mirrors everything else that's going on in the rest of the world. It's called competition. Whether it's economics, politics, or education . . . people compete. Amateur radio competes routinely, except most of us don't realize it. We compete for spectrum, we compete for rules and regulations, and yes, we even compete for awards and in contests. For the most part, though, we react rather than initiate. We *respond* to tower legislation locally rather than initiate new legislation *before* the fact. Most of us never read the Public Hearing notices in our local paper to find out what's happening right in our community (before it happens).

A contest is like a license exam. People prepare themselves *ahead of time* to work for and achieve some desired goal. This past year or so amateur radio (the service or the hobby) has been preparing for a Communicator Class of license. Amateur radio has been engaged with concepts, rhetoric, meetings, and for the most part trying to assuage the rumblings of people who see no need for it. We've yet to figure out just where in the hierarchy of licenses it belongs, what privileges these license holders will have, how will it be funded, and what we have to give up in order to get it (whatever *it* is). So we have a contest going, as many see it, to save amateur radio and make it grow. The only things we haven't agreed upon are the rules and how to compete.

Telling you truthfully that this contest "is good for you" and good for amateur radio still leaves some of you picturing lima beans. Well, maybe you also picture the events going on in the world—walls coming down, walls going up, and walls being moved—as simply a monumental inconvenience to your receiving QSL cards. The times are changing, the rules are changing, and the players are changing. The only certainty of amateur radio's contest is that there will be no single-entry scores; only team efforts and multi-op groups can come up with a winner.

The winning team will have figured out a game plan and how to make the rules *work* for them. Those who lose can typically react and rationalize or spend huge amounts of money fighting individual battles in court. It takes far more effort after the contest to try to change the results than it takes to prepare for the contest. With rare exception, the results usually stand.

So maybe you're a contester after all, or maybe you should be one. The outcome and the future depend on your taking part in this event.

73, Alan, K2EEK

KEEP YOUR COOL

with AEA's NEW LA-30 HF Linear Amplifier

WHAT DO HAMS EXPECT WHEN THEY SEE THE AEA NAME ON A PRODUCT?

Quality and Value.

They expect mechanical and electrical integrity. They expect the best possible physical construction. They expect a product that will look and perform as advertised for years to come. They expect the support they need, before, during and after the sale. They don't expect promises that can't or won't be delivered. They don't expect the frustration that comes from products that don't perform as advertised, or technical support that's less than supportive.

They don't expect to spend their hard-earned money, just to lose their cool.

THE LA-30 DELIVERS!

The LA-30 HF Linear Amplifier delivers what hams expect from AEA.

Designed to provide reliable, stable, high RF output power, the LA-30 is equipped with a pressurized plenum and chimney cooling system to ensure extended periods of continuous use and longer tube life. We use a low-noise "squirrel-cage" blower that moves 30 cubic feet of air per minute past the tube and its base seal to help the LA-30 keep its cool. Others use computer type "muffin" blowers that don't cool the tube seals, and therefore shorten tube life.

Have you priced RF power tubes lately? They're not cheap. And when one goes out before you expect, you're bound to lose your cool.

QUALITY

We install parts that are designed to last, rather than cutting corners to reduce costs.



You won't find any shortcuts in our amplifiers. The LA-30 is the latest in a long line of high quality AEA products, going back over 12 years.

All aluminum parts are "alodized" to keep your LA-30 looking new. Alodizing is an expensive priming process that improves the metal's appearance and helps protect against scratching and corrosion. Make sure the amplifier you choose has alodized aluminum to keep it looking new for years to come.

We could cut manufacturing costs in other ways—such as using cheaper "self-tapping" screws and lower-quality aluminum—but then the unit just wouldn't meet our standards. Remember, only AEA amplifiers are built with AEA quality.

EASY TO USE.

With the LA-30's patent-pending cross-needle tuning bar meter system, we've eliminated the guesswork. You always know at a glance if the LA-30 is in tune. One dual-movement meter measures both plate and grid current simultaneously, which are both crucial to proper operation and extended tube life. The front panel controls are logically arranged and are marked with clear, easy-to-read markings and scales.

KEEP YOUR COOL!

Don't be fooled into buying an imitation when you can own an AEA. This compact self-contained tabletop unit will provide you with years of excellent performance. The LA-30 Linear Amplifier is the best HF

amplifier value on the market today, because of AEA.

Engineering Makes the Difference!

SPECIFICATIONS:

Freq. Range	Amateur Bands 160-10 meters*
RF Input Power	SSB 1.2 KW P.E.P. CW/RTTY/AM/FM/ SSTV 1.0 KW
Power Tube	3-500Z zero-bias triode
Supply Voltage	110 VAC
Dimensions	14"W x 7½"H x 16½"D (36 x 19 x 42 cm)
Weight	35 lbs. (15.9 Kg.)

QSK modification available.

*10 meter mod. requires amateur license.



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2006-196th St. S.W./P.O. Box C2160 Lynnwood, WA 98036 (206)775-7373

Prices and applications subject to change without notice or obligation.

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ALINCO ELECTRONICS INC.



DR-590T(NEW)

VHF/UHF Twin Band Mobile

144-147.995Mhz(RX137—173.995Mhz)

440-449.995Mhz(RX410—469.995Mhz)

45W Hi, 10W Mid., 5W Low on VHF

35W Hi, 8W Mid., 5W Low on UHF

Cross Band Repeater Function Simultaneous Receiving and Scanning on both Band

Front Control Panel is detachable. Remote Control will be available (Option)

MARS and CAP Modifiable (permit required)



DR-570T

Set your sights for dual!

The Alinco DR-570T "Twin Bander" has dual LCD readout, volume, squelch and tuning controls. Double barreled power with 45W on 2M and 35W on 70 cm, plus simultaneous receive on both bands or intermix with four modes of scan. The DR-570T will win the "battle" with its illuminated front function panel and LCD readout, readable in any lighting conditions. Don't let the "Tiny" DR-570T fool you! It's fast, and leaves the competition in the dust with many standard features you expect. Cross band repeat with the flick of a switch. Full duplex, 20 memory channels, call channels, 16-key DTMF Microphone, and subtones are just a few. "Reach" for the DR-570T today!



DR-110T & DR-410T

Tiny 2M Power From Alinco!

DR-110T, this 2M Alinco, enters the nineties a proven winner with the "reputation" of best value. The DR-110T packs a powerful 45W on 2M and sports all the features you expect in today's transceivers. Tuning is a snap with the multi-functioned easy-to-see keyboard, 14 memory channels, subtones, scan, multi-colored LCD readout, reverse, are a few of the many features of the DR-110T. The mobile of the future-today! DR-410T available for 70 cm.



DR-510T

Best Dual Value on the Market!

The Alinco DR-510T has most of the outstanding features of its sister the DR-570T, including 14 memory channels, cross band duplex and cross band repeat. The multi color LCD display, and simple tune control panel makes simplicity the key word. The DR-510T with 45/35 watts is the best, featurepacked dual bander on the Amateur market today. See the DR-510T along with the other Alinco "Magnificent" ones at your favorite dealer today!

DR-112T (NEW)

Full Featured 2M Power Pack.

The DR-112T is a "True FM" full-power (45 watts) transceiver. The backlit LCD display is ideal for bright or dim lit conditions. And, as with most Alinco products, the control panel is engineered to be "User friendly" and still offer a full range of features.



ALINCO ELECTRONICS INC.

DJ-560T (NEW)

Full Featured Twin Band Handy

We packed almost all of the features you would find in a full sized mobile Twin Bander into this compact HT. The DJ-560T has key board entry, CTCSS encode built in, several scanning modes, 40 memories, fully programmable, Autodialer, Dual Display (2 Meter & 70 Cm). The DJ-560T is sitting on top of the mountain.



DJ-100T & DJ-120T & DJ-200T

Best 2M Micro Value

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DJ-500T

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20 Memory channels, subtones, built-in DC to DC, 700 mah nicad battery, LCD readout with 6W on 2M and 5W on 70cm (with optional battery) call channels, DTMF Touchtone, and direct keyboard entry, are just the few winning features of the Alinco DJ-500T Dual Band Handheld. Easy to use, and Value Priced at your Alinco Dealer.

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ANNOUNCEMENTS

• **Microwave Update Conference Call for Papers -**

The Colorado Front Range Microwave Society will sponsor the Microwave Update Conference in Denver beginning January 30, 1991. All amateurs are invited to submit talks and papers for presentation in the technical sessions. Presentations may range from 15 to 45 minutes in length and should stress practical applications of technology. Final versions of presentations should be ready by November 15 1990. If you are interested in presenting material, send a note indicating your subject to Don Lund, WA0IQN, P.O. Box 1664, Boulder, CO 80306 by October 15.

• **Mail Call 1990 -** Holiday greetings will sent this year to servicemen and women all over the world through "Mail Call." To learn how individuals and groups can participate in this yearly holiday project send a first-class postage stamp (no SASE, please) to "Mail Call," Box 817, Christmas, FL 32709.

• **The following special events will take place during October:**

WB2JKJ, from 10th anniversary of "Education Through Communication," New York, NY; Radio Club of Junior High School 22; 1100-1900Z daily October 17-19; 7.238 and 21.395 MHz. For special QSL send QSL to The 22 Crew, P.O. Box 1052, New York, NY 10002.

W3UU, from Three Mile Island Special Event, Harrisburg, PA; Harrisburg Radio Amateur RC; 1400Z Oct. 6 to 0200Z Oct. 7; SSB 7.240 MHz on the hour, 14.240 MHz on the half hour, 28.340 MHz late afternoon (all plus or minus QRM), 2 meter FM, 146.58 simplex, 146.76 W3UU repeater. For certificate send QSL with QSO number and 9 x 12 SASE to W3UU at TMI, c/o Jeff Kisner, N3HCZ, 202 West Green St., Shiremanstown, PA 17011.

K4CO, from Salt Festival, Union, KY; Northern Kentucky ARC; 1400-2100Z Oct. 19-21; on 40, 20, 10 meters. For certificate send QSL, 4 x 8 SASE, and contact number to NKARC, P.O. Box 1062, Covington, KY 41012.

K5XPX, from Global Fest, Russellville, AR; Arkansas River Valley AR Foundation; 1400-2100Z Oct. 5-6; SSB 28.350, 21.305, 14.290, plus or minus 15 kHz. For certificate send 9 x 12 SASE and QSL to Karl Goebel, KB8DM, 1903 West Third Street, Russellville, AR 72801.

N5NT, from 100th anniversary of University of North Texas, Denton, TX; Denton County ARA; Oct. 19-21; 10 meters, 28,350 MHz on 40, 20, 15, the General phone bands. For QSL send QSL and SASE to Denton County ARA, P.O. Box 50433, Denton, TX 76206.

KE5TC, from USS *Battfish* submarine, Muskogee, OK; eastern Oklahoma area amateurs; 1400-2200Z Oct. 6 and 1400-2000Z Oct. 7; on 7.250, 14.250, 21.350, 28.450. For QSL send QSL and SASE to KE5TC, P.O. Box 436, Keota, OK 74941.

W5KAK, from Teddy Bear Festival, Anguilla, MS; South Delta ARC; 1300-1800Z Oct. 20; General segments of 80, 40, 20 meters. For certificate send QSL and 9 x 12 SASE to Bob Golitz, N5OYY, Box 486, Anguilla, MS 38721.

W6TJ, from 107th anniversary of incorporation of city of Riverside, CA; Riverside County ARA; 0000Z Oct. 13 to 2359Z Oct. 14; all bands on or about 3875, 7250, 14250, 18150, 21350, 24950, 28450, also 146.88 MHz and 2 meter packet 145.07 MHz. For QSL send SASE to Fred Roberts, W6TKV, 5464 Peacock Lane, Riverside, CA 92505.

WT8F, from 150th birthday of Lake County, OH; Lake County, Ohio ARA; 1700Z Oct. 6 to 1900Z Oct. 7; on 28.440, 21.320, 14.265, 7.278. For QSL send SASE to Callbook address of WT8F.

W8TO, from Columbus Day Special Event, Columbus, OH; Columbus ARA; 1500Z Oct. 6 to 0300Z Oct. 7, and 1500-2400Z Oct. 7; SSB 7.240, 14.340, 21.375, 28.500 MHz (all plus or minus 10 kHz). For QSLs and certificates (and more information regarding awards for the event) contact Roger Dzwonczyk.

(continued on p. 125)

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IC-4SAT, 440 MHz
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Results of the 1989 CQ World-Wide DX CW Contest

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

Within the last year the world has dramatically changed. These changes are still continuing for most of the world's population. Political, religious, and social systems have made headline news. Most of the people of the world, not being hams, are coming to grips with the new reality and are finding that people have more in common than they have read in newspapers. Of course, if they had asked those involved in amateur radio, they would have discovered that there was already a substantial group that had discovered a friendship among peoples that transcends borders.

All-Band Results

Last year's CW contest was in keeping with those winds of change. The sun put on quite a show, providing remarkable conditions throughout most of the world. In fact, the weekend provided the best CW conditions of this sunspot cycle. The all-band champion was P40GD operated by John, W2GD. Keying his way to a healthy lead, John commented that conditions were *too* good. Everyone was beaming northeast or northwest and not south. Congratulations, John, for an excellent effort.

Moving into second place was D44BC operated by Jim, N6TJ. Jim beat John in QSOs on the high bands, while John took the low bands. In third place was TU4B operated by Dick, N6AA. Dick is on a lifelong quest to operate the CQ WW from every zone.

A new USA record now exists. It was set by K3TUP operated by K5ZD/3. K3TUP, located near Lake Erie, must be doing something right, as Randy demonstrated. Randy also broke into the world top ten box, the first W to do so in recent memory. Operators are now thinking of traveling west from the east coast of the USA to win, which is quite a change. Randy was followed by Dan, K1TO. Dan had more QSOs than any other W station.

Special mention must be given W9RE operated by WA8YVR, N5AU operated by WN4KKN, and N5RZ. All three of these stations broke into the USA top ten from zone 4—super jobs! In Europe Jorma, OH2KI, operating from ZB2X in southern Europe, set a new European CW record by edging out his good friend Ville, OH2MM, operating from the other end of Europe as OH0MM. Congratulations to both stations.

High-Band Results

Just as on SSB, the 28 MHz category proved to be extremely popular. The activity was so fast

*1816 Poplar Lane, Davis, CA 95616

**12041 Walker Pond Rd., Winter Garden, FL 34787



A more dynamic group of guys would be hard to find. Every year they make the test more exciting for all of us. This year they operated as (left to right) D44BC (N6TJ), 9Y4H (K6NA), SU1RR (N6ZZ), TU4B (N6AA), and HC8U (WA6OTU).

and furious that it sounded like a beehive. Long band openings and exciting night conditions exhausted even the best of operators.

First, a new world record went to ZP0Y operated by LU8DQ. The band sure was open to South America. The other top finishers were CW8B, YV3A, and LT8WW. The combined SSB/CW score of LR6ETB/LT8WW garnered Arturo the combined single-band trophy. In the



Utilizing a computer and excellent operating, ZW0F made lots of people happy (left to right, back, PY7XC, PY7ZZ, ZZ0001, and PY1DFF; front, PY7JJ and PY0FF).

USA Jeff, K1ZM, was clearly the winner, setting a new USA record. He was followed by K4XS and N8CXX. Moving up from his second-place SSB finish, YZ6A operated by YT6AA set a new European record. In pursuit were LZ1KDP operated by LZ1AX, and I3JSS.

The diversity of the finishers on 21 MHz demonstrated the fantastic conditions on this band. The winners were almost evenly spaced around the world. N7DF/NH2 brought the world's top score to Guam—quite an effort from the Pacific. Second place went to Tom, 5H3TW, setting a new African record, and third place went to Frank, 9Y4VU. Twenty-one MHz was the best it ever has been to the west coast of the USA. Dan, W7WA, followed up his SSB win with top US CW honors. Second place went to N6RO operated by K3EST. Taking advantage of the lack of solar disturbances, OH6MCW was clearly a winner, setting a new European record. YZ3A operated by YU3BC took second-place honors.

Twenty meters did not slack off compared to the higher bands. Open all day and night, it took a well-thought-out strategy to do well. After the ions settled Dov, 4Z8DX, ended up with first place and a new Asian record. Second place was a surprise. Bill, K2EK, just kept working UB5s all day to finish second in the world and take top US honors. Twenty meters in Europe was hard fought. Taking first place was YU2W operated by YT2F1. He was followed closely by George, UA1DZ, and UQ2QD.

Low-Band Results

Conditions and activity on the low bands were actually good considering everyone was on the high bands. Although no records were set on the low bands, no one complained about the number of countries and QSOs to be had. Activity on 7 MHz was excellent. The top score in the world was YW1A operated by YV1DIG. He was followed by two excellent European scores from ON4UN and OH2HE. Fourth place in the world and first place in the USA went to K1NA. Second place in the USA and sixth in the world went to John, KE7V.

On 3.5 MHz Bahri, TA2BK, put Turkey on the map by finishing first in the world. He was followed by LY2WR and HA8IE. Looks as if zones 15 and 20 were the places to be for 80. Finishing first in the USA and sixth in the world was W1FV. He was followed by the excellent west coast scores of KC7EM and N2KK/6.

It was really a European competition for top-band honors. LY2BTA ran up a big lead and nearly doubled the second-place finish of YT2R. OY9JD made a lot of people happy by handing out OY to 160 tuners. Rick, K5UR, continued his mastery of this band to finish first in the USA. He was closely followed by K4TEA.

Multi-Op Categories

It was a good year for multi-single. Stations could take advantage of the fantastic activity while the multiplier station was faced with the delightful dilemma of high numbers of countries on each band. It had to be a well-thought-

out plan which would allow for a top finish.

Top world honors in this highly competitive category went to EA9EA. They set a new world and European record. Second place went to the fine OH team that put EA8AGD on the map. Setting a new European record and finishing third in the world was LZ9A. Just behind LZ9A in Europe was OL8A. Finishing first in the USA

and setting a new record was K1AR. They were followed by the fine effort from N2RM. Way out in the Pacific KC6AA set a new Oceania record.

The runaway winner in the multi-multi category was CT3M. This fine group of operators from ten different countries put together a massive effort to impress everyone. The real competition was for second, third, and fourth

TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND

World

P4ØGD (Opr. John Crovelli, W2GD)

Donor: Albert Kahn, K4FW—W2AB Memorial

World—Single Operator Assisted

Doug Grant, K1DG

Donor: Pavillion Software

World—QRP

Carl Groner, W2TZ

Donor: Gene Walsh, N2AA

USA

K3TUP (Opr. Randall Thompson, K5ZD)

Donor: Frankford Radio Club

Caribbean/C.A.

8P9HT (Opr. John Laney III, K4BAI)

Donor: CQ Magazine

Canada

John Sluymer, VE6OU/3

Donor: Canadian DX Association

Europe

ZB2X (Opr. Jorma Saloranta, OH2KI)

Donor: Edward Bissell, W3AU

Africa

D44BC (Opr. Jim Neiger, N6TJ)

Donor: Gordon Marshall, W6RR

Asia

Yuri Donskikh, UA9SA

Donor: Japan CQ Publishing Co., Ltd.

Japan

Akito Nagi, JA5DQH

Donor: Japan Crazy Contesters Club

Oceania

Peter Grillo, KNØE/KH3

Donor: Maui Amateur Radio Club

South America

HC8U (Opr. Mark Beckwith, WA6OTU)

Donor: Venezuela DX Club

SINGLE OPERATOR, SINGLE BAND

World—28 MHz

ZPØY (Opr. Jorge Bozzo, LU8DQ)

Donor: Joel Chalmers, KG6DX

World—21 MHz

Larry Strain, N7DF/NH2

Donor: Don Busick, K5AAD—N5JJ Memorial

World—14 MHz

Dov Gavish, 4Z8DX

Donor: North Jersey DX Assn.
W2JT Memorial

World—7 MHz

YW1A (Opr. Paolo Stradiotto, YV1DIG)

Donor: Alex M. Kasevich, VP2MM

World—3.5 MHz

Bahri Kacan, TA2BK

Donor: Fred Capossela, K6SSS

USA—14 MHz

William Gioia, K2EK

Donor: Northern Illinois DX Association

USA—7 MHz

James Power, Jr., K1NA

Donor: Jan Perkins, N6AW—W6AM Memorial

Canada (14 MHz)

David Goodwin, VE2ZP

Donor: Canadian Amateur Radio Federation

Caribbean/C.A. (28 MHz)

J79DX (Opr. Ronald Marra, AA5DX)

Donor: CQ Magazine

Europe (14 MHz)

YU2W (Opr. Mandic Kresimir, YT2FI)

Donor: Southern New England DX Club

Japan—21 MHz

Katsumi Furukawa, JH7XGN

Donor: DX Family Foundation

MULTI-OPERATOR, SINGLE TRANSMITTER

World

EA9EA (Oprs. EA3GAS, EA4BB, EA5BRA, EA7ALG, EA7TL, EA9EO, EA9EU, EA9GK, EC7DMU)

Donor: Anthony Susen, W3AOH

USA

K1AR (Oprs. K1AR, K1EA, K1GQ, KC1F)

Donor: Douglas Zwiebel, KR2Q

Canada

VE3WAA (Oprs. VE3AGR, VE3DTR, VE3IIN, VE3IJE, VE3LFA, VE3OEO, VE3OEQ, VE3PCT, VE3RDN)

Donor: Eastern Canadian DX Assn.

Europe

LZ9A (Oprs. LZ2BE, LZ2CC, LZ2DF, LZ2HE, LZ2II, LZ2PO, LZ2PP, LZ2PS, LZ2TT, LZ2UA, LZ2UU, LZ2XA, LZ2E41, LZ2E72)

Donor: Friends of K3AO—K3AO Memorial

MULTI-OPERATOR, MULTI-TRANSMITTER

World

CT3M (Oprs. CT1BQH, CT1DIZ, CT3BX, CT3EE, CT3EF, DF5UL, DJ2YE, DJ8VC, DK3KD, DL1EFT, DL1EK, DL3HAH, DL5EBE, DL5XX, EA4DAS, EA7CEZ, HB9CEY, HB9CRV, OE1ETA, OE2VEL, OH1EA, OH1NOA, PA3CEF, UA3DEA, UQ2MU)

Donor: Hazard Reeves, K2GL Memorial

USA

W3LPL (Oprs. W3LPL, K3RA, K3ZZ, KA1GD, KD9J, KF3P, KT3Y, N3GB, N8II, ND3A, NW5E, W3EKT, WA8MAZ, WB2EKK, WB3FSB, WD4AXM)

Donor: Jim Rafferty, N6RJ

Europe

LX7A (Oprs. DF3CB, DF4SA, DF6RI, DF7RX, DF9LJ, DJØIP, DJ1AT, DJ2BW, DJ2EH, DJ3TF, DJ5PA, DK2GZ, DK2OY, DK2ZO, DK3GI, DK5PD, DK5WL, DK7PE, DK8FD, DK9IP, DL1HCM, DL1SBR, DL1VJ, DL2HBX, DL2NBU, DL3LAB, DL3NCI, DL4NAC, DL4RDU, DL5MAE, DL5RDO, DL6FBL, DL6RAI, DL7AV, DL7MAT, DL9RDL, LX1II, LX1MK, LX1RQ, LX1WW, Angela)

Donor: Finnish Amateur Radio League

Japan

JE2YRD (Oprs. JR2SCJ, JR2SQU, JI2KVV, JF2DQJ, JI3JGJ, JI3ERV, JK3GAD, JH4RHF, JR7OMD, JA9-1Ø148, JF2EOC, JH2BNL, JF2XJE)

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World—SSB/CW Combined

LX7A (47,076,610)

Donor: Ehrhorn Technological Operations

CONTEST EXPEDITIONS

World—Single Operator

SU1RR (Opr. Phil Goetz, N6ZZ)

Donor: Yankee Clipper Contest Club

World—Multi-Operator

CT3M

Donor: Bill Schneider, K2TT

SPECIAL—SINGLE OPERATOR AWARDS

World—Single Band SSB/CW

LR6ETB/LT8WW

(Opr. Arturo Gargarella, LU6ETB)
28 MHz (3,976,816)

Donor: Yuri Blanarovich, VE3BMV/W2

World, All Band, CW, Most QSOs

8P9HT (Opr. John Laney III, K4BAI)
(5321 QSOs)

Donor: KV4AA Memorial
(From the 14270 KHz Group)

Club

World—SSB/CW

Frankford Radio Club (307,534,371)

Donor: CQ Magazine

Non-USA—SSB/CW

Rhein Ruhr DX Association (74,729,033)

Donor: Northern Calif. Contest Club
N6AUV Memorial

BAND-BY-BAND BREAKDOWN

Number groups indicate QSOs/Zones/Countries on each band.

WORLD TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
P40GD	121/11/24	346/18/54	849/25/72	881/28/86	1011/31/89	1500/33/91
D44BC	58/12/22	128/16/52	463/25/72	1115/30/82	1015/32/81	1544/32/93
TU4B	35/11/22	101/19/28	256/26/64	974/31/91	1419/34/96	1312/31/97
8P9HT	153/10/18	346/16/42	955/22/65	1165/28/74	1293/26/76	1409/23/72
HC8U	40/6/11	296/18/37	846/26/64	1038/27/75	523/28/68	1555/32/82
9Y4H	42/8/14	257/12/40	398/21/60	1325/30/88	785/29/70	1224/29/78
K3TUP	14/5/9	61/15/46	622/31/85	759/36/98	864/35/99	894/33/95
ZB2X	132/10/51	310/18/60	721/25/72	949/30/82	894/31/82	1360/32/82
OH0MM	201/9/43	386/17/54	615/21/54	949/30/71	1182/30/85	1366/32/86
SU1RR	3/2/2	308/9/42	944/23/61	704/23/63	1062/26/63	1242/23/67

USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
K3TUP	14/5/9	61/15/46	622/31/85	759/36/98	864/35/99	894/33/95
K1TD	7/4/6	76/12/40	493/21/69	1391/33/109	619/30/81	760/29/90
K1CC	20/8/15	116/12/45	470/23/68	881/31/84	747/33/83	751/34/97
N2NT	20/10/14	165/13/52	660/26/66	704/32/86	728/32/83	679/33/91
W9RE	11/8/10	60/15/41	427/28/64	897/28/81	764/30/79	936/32/95
W1KM	14/8/12	193/17/56	627/25/69	832/31/84	578/32/77	640/28/94
N5AU	13/8/9	32/14/23	415/27/75	1014/34/88	679/34/88	687/31/94
N2LT	11/7/11	62/13/43	517/27/83	860/30/81	684/28/70	661/30/87
N5RZ	14/9/11	66/14/35	388/29/74	603/33/92	518/33/97	834/35/110
AA1K/3	7/4/6	76/12/40	493/21/69	1391/33/109	619/30/81	760/29/90

WORLD TOP MULTI-OPERATOR, SINGLE TRANSMITTER

Station	160	80	40	20	15	10
EA9EA	41/9/35	261/19/64	1034/32/89	1580/36/110	1304/35/99	1703/36/102
EA8AGD	63/7/42	515/16/58	661/26/74	1011/32/93	2130/36/104	1506/33/89
LZ9A	194/17/67	214/28/84	1333/37/107	1014/39/120	1251/40/125	1336/39/125
K1AR	36/16/33	313/26/75	920/35/100	1139/37/128	773/39/123	920/37/129
DLBA	85/10/44	402/20/71	1184/34/100	964/36/118	853/37/110	1978/37/120
4J5FV	331/11/46	647/21/62	842/34/85	634/36/97	971/34/98	618/33/93

USA TOP MULTI-OPERATOR, SINGLE TRANSMITTER

Station	160	80	40	20	15	10
K1AR	36/16/33	313/26/75	920/35/100	1139/37/128	773/39/123	920/37/129
N2RM	32/14/30	153/23/79	995/35/104	1010/36/132	679/39/124	842/36/136
N4RJ	46/14/44	75/24/71	518/33/101	1309/37/118	779/39/118	731/37/117
N3RS	19/9/18	163/20/68	771/31/95	1014/37/123	981/38/122	661/37/130
K8AZ	8/5/6	42/13/38	415/28/85	1189/38/122	845/37/118	923/37/118
K0RF	16/11/14	92/20/46	434/32/90	864/35/113	826/36/100	790/35/98

WORLD TOP MULTI-OPERATOR, MULTI-TRANSMITTER

Station	160	80	40	20	15	10
CT3M	279/12/60	1320/21/82	2082/31/97	4253/32/113	3351/39/117	3188/37/127
LX7A	834/15/65	1859/25/100	2288/36/125	2936/37/148	2511/39/133	2307/37/134
NL7G	80/7/9	541/22/31	1851/33/89	3096/34/118	3652/36/116	2117/34/105
W3LPL	72/15/34	401/25/86	1508/34/106	1965/39/135	1658/39/126	1546/38/140
RB8M	389/16/57	746/31/93	1443/36/103	2772/38/127	2719/39/124	1862/38/109
4U0ITU	655/10/52	1358/18/71	2720/30/100	3016/36/124	2264/36/111	2359/37/111

USA TOP MULTI-OPERATOR, MULTI-TRANSMITTER

Station	160	80	40	20	15	10
W3LPL	72/15/34	401/25/86	1508/34/106	1965/39/135	1658/39/126	1546/38/140
KY1H	52/13/25	165/19/65	1228/34/93	1839/39/125	1313/39/125	1221/36/134
K1ST	26/9/18	188/18/57	1437/36/108	1232/37/113	1791/39/127	1204/36/124
NR5M	72/15/25	273/23/71	1094/35/99	1494/38/131	1582/38/130	1098/32/114
K4VX/0	170/17/34	196/96/71	826/34/87	1784/38/119	1438/38/120	1377/34/111
K5NA/2	40/11/24	112/18/56	978/37/111	1493/38/124	1276/39/119	1367/37/131



Whatever Finland's amateurs are doing to encourage young, enthusiastic operators to enter our hobby is working. Here is a prime example. EA8AGD, celebrating their excellent Multi-Single finish (left to right, top, OH6LK, OH6OS, OH6UI, OH6DK, OH8PF, and OH8LP; bottom, OH6EI and Juma).

place. The expedition to Luxembourg to put LX7A on the air finished second and set a new European record. Third place went to NL7G. These boys compiled an unbelievable score from near the Arctic Circle. RB8M followed in fourth place. In the USA W3LPL won first place and ended up sixth in the world. Conditions were so good that Frank, W3LPL, said, "Now how do we top this?" Second place went to KY1H followed closely by K1ST and NR5M.

QRP Results

Four operators topped 1000 QSOs with 5 watts. That's quite a feat. It's hard enough to make a 1000 Qs with a 1000 watts. Their logs showed that the top scorers were able to run

stations at 40+ per hour. Of course, you still have to do a lot of tuning and calling. Thanks to all the stations who listened for the QRPers. Taking home the QRP trophy for the top score in the world was W2TZ. In close second place was G4BUE. YO3OH filled out the world third-place score.

Single Op. Assisted

The single operator assisted category sure looks like it filled a need. Not only does it allow you to make use of spotting nets, but it maximizes your club score. As of yet the log cover-sheet does not have a space to check for this category. Just put "assist" next to single operator. The winner was Doug, K1DG, who finished ahead of K3WW. Utilizing the Yankee Clipper Contest Club and Frankford Radio Club packet systems, respectively, both are to be congratulated for keeping one eye on the screen and another on the radio.

Team Contesting

In the team contesting category the Southern California Contest Club once again made life more interesting for all of us by sending operators all over the world. They won the team contesting award. Look at the picture in this article to get a close-up view of these experts.

Please notice that the rules for this category have been changed to allow any five operators to form a team.

Club Competition

In club competition the Frankford Radio Club sure can act as a model of how to mobilize club members in a combined effort. Putting togeth-

er expeditions, multis, and assisted entries, they set new world and USA club records with over 307 million points. Following in second place was the Yankee Clipper Contest Club, bettering their previous club record. The combined score of the FRC, YCCC, and PVRC was over 592 million points!

The DX club with the highest score ever was the Rhein Ruhr DX Association. Putting several high-scoring expeditions on the air pushed them ahead of the Hungarian DX Club and the Bavarian Contest Club.

New Records

The following stations enter the All-Time Records list found elsewhere in this issue:

World: 28 MHz—ZP0Y operated by LU8DQ; multi-single—EA9EA.

Europe: all band—ZB2X operated by OH2KI; 28 MHz—YZ6A operated by YT6AA; 21 MHz—OH6MCW; multi-single—LZ9A.

North America: 28 MHz—J79DX operated by AA5DX.

Asia: 14 MHz—4Z8DX operated by 4Z4DX.

Oceania: 21 MHz—N7DF/NH2; multi-single—KC6AA.

Africa: 5H3TW operated by K3TW.

USA: all band—K3TUP operated by K5ZD/3; 28 MHz—K1ZM; 21 MHz—W7WA; 14 MHz—K2EK; multi-single—K1AR; multi-multi—W3LPL.

Congratulations to these expert operators!

Comments

If you think your effort in the CQ WW will place your score in any of the top score boxes, please send us a diskette in addition to your

hand-written or hardcopy log. We are very grateful to anyone who sends us a diskette, and we wish to thank the over 150 stations who sent us diskettes on CW. All we require on the diskette is a chronological list of calls on each band. Include the time once per hour. The information should be IBM compatible (MS-DOS; ASCII file, K1EA.bin file, a file from an editor such as WordPerfect, Wordstar, etc). If you submit a disk, you get several dividends: a reduced penalty for errors, a printout of uniques in your log when compared against our 500,000 call data bank, a list of unique percentages (without callsign) of others in your category, and a list of activity in selected countries. Please help out yourself and us.

When you use a computer to create a log and summary sheet, make sure that you remember to include your club affiliation, statement of compliance with the rules, and your signature. Take another look at the rules, especially rule XI. Make sure that you are in compliance with these rules. All sent and received exchanges are to be logged. If they are not logged, they will be removed. It's alright to make a blanket statement on the coversheet such as "All sent and received reports are 59/599 unless otherwise shown." You still must report the zone for each QSO. Make sure all duplicate QSOs are removed from your log. Several logs in these results lost their relatively high position due to failure to remove duplicates from the log.

Computers, although they allow for massive data manipulation, eat up much time. For example, just to get the diskettes we receive into a our data bank requires about 100 hours. I wish to extend a special thanks to K2SS and N2AA, who have spent many hours arranging our data banks on CW and SSB, respectively. This is a thankless task and is really a labor of



CT3M finished as the world's top Multi-Multi. Congratulations! They also assembled the most international team ever in contesting. Check out the multi-ops page.

love for the contest. K2SS has developed our software to analyze logs, and because of his efforts the CQ WW contest is at the forefront of contest analysis.

Our other experts who scored and submitted the results you read on these pages are W9RE, WA8YVR, N3ED, K7RA, AD6C, K6NA, W2RQ, K1DG, K2VV, N6AW, KR2Q, W7EJ,

K5NA, K5ZD, and OH2MM. Other members who have contributed ideas and concerns are OH2BH, OH2KI, SM0GMG, F2CW, YT3AA, G3FXB, I2UIY, JE1CKA, PY5EG, and K3ZO. All of us appreciate all the operators for entering the game, and to all the winners, congratulations!

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

USA QRM

Really nice condx on high bands. First use K1EA logging—vy fb . . . K4PQL. Very good conditions. It is a lot different operating from home than it is being on the other end of the pile-ups from the Caribbean . . . K4LTA. Great fun—I'll be back next year . . . N4ZZ. Suggest exchange consist of zone and s/n in future contests—everyone uses 5nn for RST . . . KD1U/4. We really need a barefoot transceiver class in this contest . . . AA4GA. I took down 20 meter beam in prep of move. Interesting to see how a dipole would work. Just took a bit longer in pile-ups . . . W4NTI. First attempt at computer logging—hard disk crashed . . . W4RX. That second nite sure gets long . . . KK4SM. Flu and contests don't mix . . . WX4G. Fantastic opening to Japan on 10 meters. First time in test with modern transceiver . . . K6ETM/4. Marks my return to contesting after a 20 year absence . . . WA4JTI. My first contest—100 watts, no filter, bad ears, low score, lots of fun . . . KJ4VU. Lots of good DX at sunrise on 40 meters . . . WB8HDD/4. CW forever . . . KM4KJ. Great conditions on bands—especially first day . . . W3VT/4. House full of company, just played around for a change . . . NQ4I.

First time ever on top band—great . . . NO4J. It was a fun 6 hours. Looking forward to next year with more power and time . . . W5NBI. Guess most South Americans don't like or know CW . . . N5DB. Another good contest . . . W5FO. It is apparent that age is catching up with me after 55 years of contesting, but I still enjoy . . . N5RM. I had forgot how much fun 40 meters was—good conditions . . . WF5E. The eastern block activity gets better every year—with fewer JAs . . . AD5Q. The most DX—full 15 meters . . . WC5D. Amazing how DX keeps a person awake . . . WA5DTK. Printing out results 15 minutes after contest . . . W5PWG. I called CQ 6 times in 48 hours and never got a response . . . W5AT. Best contest ever . . . N5CR. Thought 40 meters was banned in SA—got skunked on zones 11, 12, and 13 . . . WM5K. Excellent conditions + good participation + skilled operators = outstanding contest

. . . W5UDA. No meters like 20 meters . . . N5AU (Opr. WN4KKN). Superb conditions . . . WA6TKT. Hurricane Hugo sure put a dent in contest operations from the West Indies . . . W6RCL. Great Europe activity . . . K6PU. Wow—106 countries on 10 meters during 1 weekend, conditions excellent . . . W6BIP.

First CW contest . . . K16YB. A lot of new countries on CW . . . WX6M. Best conditions on 10 meters ever experienced . . . K6BWX. Got back to rig with a cup of coffee to find 9K2AH calling CQ exactly on the frequency I left minutes before. Worked him on first call . . . K5KT/6. Made DXCC in less than 24 hours . . . N6GG. Great contest, superb conditions. Surprised how well 100 watts and very modest antennas can do . . . W6MVW. Conditions super . . . W6OVO. Super conditions; dog chewed on coax; no 160 this year . . . W6TMD. First serious CW contest effort . . . WW6I. Couldn't believe it when SU1RR responded on 40 meters . . . N6RJ. Sure miss hearing from zone 7 and the Caribbean . . . WB6JMS. For once CW weekend had better conditions than SSB weekend . . . W6YA. A real challenge with only a dipole at 30 feet . . . K6OY. Multipliers are tough to come by on the left coast . . . N2UN/6. Thanks for lots of fun . . . NF6V. Fantastic conditions. We will remember this one . . . N6RO (Opr. K3EST). Best conditions that I have ever heard to Europe on 21 MHz CW . . . W7WA. Thank you for a very enjoyable contest . . . W7ZMD.

CW is alive and well! A dying art? I don't think so. Great condx . . . K7ABV. The last contest effort from W7FU QTH. We're going to miss you, Gordy . . . KE7V. Being called by BY1PK for QSO number 8 . . . NF7P. What a thrill to run Europe for hours on end. Great conditions . . . N7RO. Lack of Latin America and South Pacific very noticeable . . . W7GUR. Finally working zone 34 in a contest . . . KA7T. Great conditions. Finally finished WAZ! . . . K7WA. My best score to date! . . . KR7L. No West Europeans on long path or short path. The antenna worked great anyway (3.5 MHz) . . . KC7EM. Flux = 262, A index zero, K index zero, GF quiet. The best condx for a contest . . . W7QN. The woodpeck-

Ameritron Linear loafs at full legal limit . . .

massive power supply capable of 2500 watts for half hour!

What makes the Ameritron AL-1200 stand out from other legal limit amplifiers?

The answer: a super heavy duty power supply that loafs at full legal power - it can deliver power for more than 2500 watts PEP two tone output for a half hour!

The heart of the AL-1200 power supply is a highly efficient Peter Dahl tape wound hypersil® transformer weighing 32 pounds. — it's equivalent to a 45 pound transformer using standard E-I laminations.

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You get genuine high current, full height computer grade capacitors with screw-on terminals — not short stubby, light duty soldered in "capacitors" that can't dissipate the heat generated by high current.

Why some filter capacitors explode

The failure of carbon equalizing resistors — used in most linear amplifiers — is the primary cause of filter capacitor failures.

When a carbon resistor gets hot its resistance drops, causing more current to flow, causing the resistor to get hotter.

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Carbon equalizing resistors can't fail in the AL-1200. Why? Because no-compromise wire wound SEVEN WATT 50 K ohm equalizing resistors — not the 2 watt 100K resistors others use — safely protect each filter capacitor. Plus, the lower value gives better regulation.

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Will the amplifier you're considering withstand a direct power supply short?

Eimac® 3CX1200A7: the durability of glass and the power of ceramic

The AL-1200 uses one of Eimac®'s

Legal limit antenna tuner

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\$399

Suggested Retail



Ameritron — the high power specialist — brings you the ATR-15 antenna tuner that's designed for legal limit amplifiers. It handles full legal power with ease.

Heavy duty silver plated bandswitch virtually eliminates switch failure. High power transmitting capacitors. 1.8-30 MHz. Peak reading SWR/wattmeter. 6 position antenna switch. Selectable 1:1 or 4:1 balun. 5¼ x 13¼ x 13½ inches. Meter lamps uses 12 VDC.



AL-1200

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Suggested Retail

toughest ceramic transmitting tubes — the high gain 3CX1200A7. It has the durability of glass tubes and the power dissipation of ceramic tubes.

3CX1200A7: 12 times tougher than the 3CX800A7

A 3CX1200A7 has a 50 watt control grid dissipation — that's more than 12 times tougher than the delicate 4 watts grid dissipation of a 3CX800A7.

delivers the same legal limit as a pair of 3CX800A7s that cost nearly twice as much. What do you get for paying twice as much? Twice as many parts to fail.

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The UPS shippable AL-1200 also gives you . . . all mode, all band coverage including WARC and MARS, Pi-network tuned input, Step-Start Inrush Protection™, multi-voltage primary, Pi-L output tank with silver-plated components, separate filament transformer eliminates poor regulation and surges, adjustable ALC, SSB/CW switch for best linearity and efficiency, operate/standby switch, transmit indicator LED, 12 VDC auxiliary output, 35% safety factor for tuning capacitors and bandswitch virtually eliminates failures, shielded RF compartment, quiet die cast blower has 4 speeds, two illuminated meters show continuous grid current, peak RF watts out, drive power/ALC, plate voltage and plate current, ball bearing vernier reduction drives on plate and load controls, optional QSK board, one year limited warranty and more.

Pair of 3-500Z tubes give you full legal output for . . . \$1995

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With a pair of 3-500Zs can't deliver full legal output because they use a lighter duty power supply. That's why the AL-82 costs a little more -- and why it's well worth it. Call for your best price today!

AL-82
\$1995
Suggested Retail



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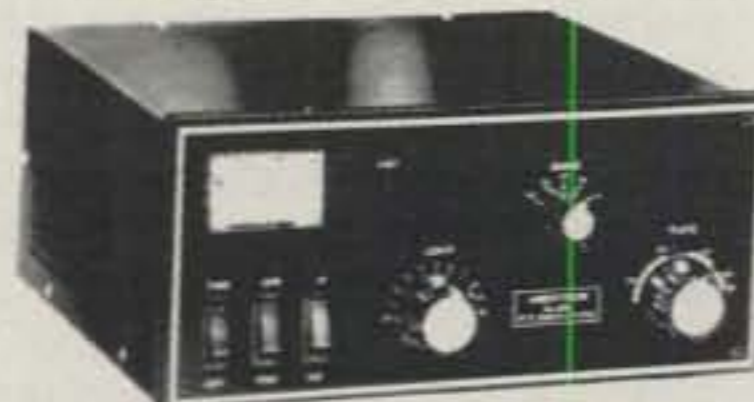
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USA CLUB SCORES

Frankford Radio Club	307,534,371
Yankee Clipper Contest Club	188,519,043
Potomac Valley Radio Club	96,362,094
Southern California Contest Club	83,496,117
Northern California Contest Club	66,231,876
Mad River Radio Club	33,827,641
North Coast Contesters	32,465,711
North Texas Contest Club	31,443,501
Southwest Ohio DX Assn.	29,245,338
Society Midwest Contesters	29,119,531
Southeastern DX Club	28,315,468
Dixie DXers	26,000,505
Western Washington DX Club	18,014,130
Rochester DX Assn.	13,656,013
Hoosier Contesters	13,525,781
Order Boiled Owls NY	11,357,320
San Diego DX Club	10,315,966
Mile High DX Assn.	10,065,625
Mississippi Valley DX Club	7,420,565
Fraser Valley DX Club	7,396,710
Willamette Valley DX Club	7,107,427
Eastern Iowa DX Assn.	6,918,679
Redwood Empire DX Assn.	6,918,414
Northern California DX Club	6,918,414
Central Florida DX Assn.	6,285,777
Kansas City DX Club	5,836,917
Grand Mesa Contesters	5,350,965
New Jersey DX Assn.	4,842,028
Western NY DX Assn.	4,827,716
Southern California DX Club	4,718,365
Southern Florida DX Assn.	4,605,501
Murphys Marauders	4,394,481
Utah Contest Club	3,304,983
Texas DX Society	3,181,964
Albany Amateur Radio Club	2,811,037
Delta DX Assn.	2,523,881
Salt City DX Assn.	2,492,730
Meriden Amateur Radio Club	2,208,619
Central Arizona DX Assn.	2,198,234
Columbia Amateur Radio Club	1,962,000

Northern Florida DX Assn.	1,814,875
Carolina DX Assn.	1,247,278
Long Island DX Assn.	1,204,293
Radio Central Amateur Radio Club	1,163,641
Woodbridge Wireless	1,090,183
Tyler Amateur Radio Club	1,069,176
Rubber Circle Contest Club	913,761
Alamo DX Amigos	796,726
Sturdy Memorial Hospital	526,506
Overlook Mountain Amateur Radio Club	159,436

DX

Rhein Ruhr DX Assn.	74,729,033
HADX Club (Hungary)	72,420,481
Bavarian Contest Club	58,897,269
Kaunas Polytechnic Radio Club	35,567,973
Northern Lithuania DX Group	35,049,712
Ukraine Contest Club	32,106,951
French DX Foundation	24,911,548
YUDX Club (Yugoslavia)	16,727,061
Alaska DX Assn.	12,246,345
Bullmertz (Sweden)	7,331,190
RadioKlub der DDR	7,251,670
Tohoku Univ. ARadio Club (Japan)	6,978,889
Eastern Canadian DX Assn.	6,283,984
Osaka Electro Comm. University	5,497,271
SPDX Club (Poland)	4,427,407
Chiltern DX Club	4,208,178
English School Radio Club	3,848,266
Shibaura Instit. Tech. Amateur Radio Club	2,909,783
GACW (Argentina)	2,245,786
UDRA (Dominican Rep.)	2,078,953
Uruguay DX Club	2,065,461
SDDXG (West Germany)	1,362,579
Lithuanian Contest Group	632,874
ES DX Club (Estonia)	631,356
Warsaw DX Club	544,302
Radio Club Tallinn	322,521
Tartu Radio Club (Estonia)	167,447
Nikolaev Radio Club (Ukraine)	44,232

er was not an issue this year on the USA west coast. Glasnost must be working... *K5MM/7*. CW is great! 100 watts + G.P. still feels competitive—working *D44BC*, *EL2CX*, and *EA9EA*... *KL7KG/7*. This is my best contest ever. It was great fun to work the world!... *K7WK*. Best of all contests... *K4FW/8*. Getting out on 40 meters (*G5RV* is inside attic!)... *W8MHW*. Great contest, my best score in 20 years of contesting... *W8GOC*. Working South Pacific area on 40 meters... *WA8MEM*.

More than doubled last year's score and broke the one million point barrier for the first time... *WG8M*. All that CW didn't affect me, did it? Dit-dah-dit-dit, dit-dit-dah-dit... *N8AGU*. While scientists ponder the state of the ozone layer, I think we can attest that the F2 layer is in great condition!... *KA8DJZ*. This is the first contest I have operated since the days of *K8LX*... *W8WA*. Just 3-element tribander at 35 feet—great conditions!... *K9BG*. Hi-lite of test was working *9M6NA*... *NJ9Z*. Worked *VS6BG*, *5H3TW*, and *BY1PK* for new countries—loved it!... *N9ACD*. Wow, what condx! First hours, propagation from all parts of world at once. Didn't know where to turn the beam next!... *NA9N*. CQ WW CW is still the best contest of the year... *K9UWA*. Murphy hit in oddest way: doorbell rang, nobody at home, ran out to sign for a registered letter, locked myself out of house... *W9GXR*. My first 1 meg score!... *N9AEJ*. Sure was crazy not to work zones 11 and 13 on 40 meters! Where were they?... *KS9O*. This log is dedicated to silent key *K9DGR*, who helped convince me to become a ham... *WB9YXY*. Truly great condx! Will remember this one when I'm an old man... *N4RR/9*.

BYs answering my CQs!... *N9NS*. Second CQ WW CW contest; increased score by 10.7 dB!... *WE9R*. Tried working 10 meters; keyer and radio locked up from RF... *NR0E*. Europe very loud on 40 meters... *W0RXL*. Super band conditions... *KZ0C*. Worked *SU1RR*, last zone I needed on 10 meters... *NX0I*. Nice to hear 10 meters open... *KF0Z*. Thank God for the JAs... *KJ0B*. Slept 6 hrs second night. Won't do that again!... *W0ZV*. FR4 zone 39 at end of contest... *W0JLC*. Topped last year's score in half the operating time... *WA0OUI*. Propagation did exist on 160 meters, but nobody was there... *K0CS*. The discourtesy of

some Stateside big gun operators was inexcusable, usurping obviously QRL frequencies... *KW0A*. Had a ball during our first try in the contest... *K1ULI*. Never, never make antenna changes just before the contest... *W1BK*. The crew on this end was the best ever assembled here... *N2RM*. 99% of the operating by *NW3B*—14 years old... *N3LR*. Best CQ WW conditions ever—14 MHz open all night... *W6BA*. All the local CW ops were at *J6DX*... *W8FN*. Best conditions I've ever heard on 40 to Europe... *WB8ZRL/0*.

New Single-Unlimited category is great!... *K1DG*. Suffered an attack of sciata in my leg the week before the contest. As a result, I operated the whole contest standing up. Whew!... *K1VR*. Beating *K1AR* in a pile-up for *JT1T*... *NO1I*. Lost 10 meter antenna, rotor, and power on Sunday, but still had fun... *WB2P*. *K1EA* computer logging is the only way to fly, especially in my first test... *WA2MKM*. First one I did on my own. I'll be back... *KD2RE*. Single Op Unlimited is great. Love those computers... *K3WW*. Rebuilding part of the antenna system two days before the contest due to 80+ mph winds!... *K3ND*. Catching *T32BE* on 40 meters as he first called CQ Sunday morning... *W3FTG*. My first contest with a beam antenna and amplifier. What a difference!... *KB4GID*. Still need *ZB2X* on 160—One of these years!... *W3YY*. Great condx. Worked 102 unique countries and 37 unique zones... *WA4CUG*. Missed *AT0Z* for last zone on 10 meters while neighbor pounding on the door—no QSO despite not answering door!... *K6MA*. Twenty meter RF drove hard disk nuts at one point. Part of log overwritten by other file, *ARGGHH*!... *NC7K*. Great contest, great operators, good way to spend the weekend... *W7WHY*. TVI and the flu severely curtailed my effort. Still managed two new ones for CW DXCC... *WD8IXE*.

DX QRM

Excellent conditions... *BY1QH*. Very nice for us to take part in contest

as a team. We really enjoyed it . . . *CE1LDS*. Next time we will be using a better setup . . . *CE3/OH6VR*. Disappointed we could not be multi-multi until we figured our score was very good for multi-single . . . *EA9EA*. We enjoyed the nice conditions, especially on 40 meters . . . *JA7YAA*. Thank you for the nice contest. We would like to join this contest again next year . . . *JA0ZRY*. We could not even work JA on 160 with the Butternut tuned at 1903 . . . *KC6AA*. Only big stations heard all bands . . . *9M2AX*. Thunderstorms and QRN on LF bands were a problem . . . *TL8CM (Opr. DL8CM)*. Temporarily back on the Drake Twins and it sure indicated the developments in equipment of the last few years . . . *ZL3GQ*. After a few minutes of trial, *PA0GAM/ST2* finally noticed my weak signal to complete my WAZ . . . *9V1XI (Opr. JR1MOO)*. Ten meter band was very patchy with occasional blackouts . . . *ZL2CD*. Some Stateside boys had trouble accepting the AT0 as a prefix for India and quite a few called me . . . *AT0U (Opr. VU2UR)*. This contest has to be the best . . . *KE9A/DU3*. Illegal use of 28 MHz in Zones 24, 26, and 27 is escalating! My apologies to those I couldn't hear . . . *VS6BG (Opr. KB7G)*.

Room reservations were cancelled so I had to start contest at the staircase landing to the roof top . . . *KH0AM (Opr. JE1CKA)*. Was my first contest in CW. No good propagation with Europe . . . *EA8EY*. Missed many hours due to weather and power off . . . *ZK1TB (Opr. W7TB)*. My first CW contest. How do you guys read at those speeds? . . . *ZS6HZ*. Last CQ WW from Zaire, heading Stateside July '90 . . . *9Q5DX (Opr. WN7S)*. Zone 33 was as big a battleground as the traditional Big Guns have in Zones 8 and 9. Thrilled to finally receive permission to operate on 160 meters. My last CQ WW from CN8 . . . *CN8FC (Opr. WA4UAZ)*. Now 75 years young and feel younger during contests . . . *HZ1HZ*. Found it pretty tough on 40 and 80 meters from here . . . *VK6LW*. Just got license and was on air for only 7 hours . . . *XT2KG (Opr. W6KG)*. Poor propagation and I couldn't use linear most of time because of TVI . . . *TA2BK*. A real thrill to work so many stations with all the homebrew equipment I built myself . . . *VU2PTT*. I will return to 9M6 for '90 CQ WW CW . . . *9M6NA (Opr. JE1JKL)*. 50 watts, 12 WPM no way to get many stations, but a new experience for me . . . *YC2HTD*. Things like blown linears, TVI complaints, and lost computer data really do happen . . . *VE3WAA*.

At age 73 the spirit is willing but the flesh weakens . . . *VE4JB*. Bands were in fantastic condition. The pile-ups were wonderful. Had the beam backwards by mistake . . . *DL4NN/TI2*. A crawling lizard kept detuning the Butternut vertical! . . . *VP5Q*. What fun with a dipole at 15 feet . . . *G6QQ/V21*. Nice contest, good propagation, 115 countries worked. See you next year . . . *ZW0F*. So many old friends on 160 . . . *VE3DO*. Our first CQ WW DX CW contest. 5B4 seems very much DX on CW! CU for sure next year . . . *5B4ES*. Lost 160 meters 1 hour before contest when the feed system of the tower went QRT (QRO—hi!) . . . *OE3GSA*. We had to abandon station for a while to rescue fellow member whose car had broken down . . . *EI4E*. Antenna stuck SE first six hours and memory keyer went QRT. What a fun way to run a contest. We will be back . . . *SK5EU*. FB condx with USA west on 40 meters the second morning. USA pile-ups are a model of disciplined operating. Congrats . . . *HB9CIP*. Biggest thrill: hearing YB on 160 meters . . . *OZ5WQ*. TNX LZ2XA who was 48 hrs non-stop on the computers. Same problems as last year: very low temperature, snow on the ground, and rotator problems. Anyway, fantastic contest. See you next year . . . *LZ9A*.

Special call IQ4A for 900 years of Bologna University . . . *IQ4A*. New prefix and 4.5% dupes. We need a computer . . . *SN3A*. Thanks to CQ for a super contest . . . *G3SZA*. Receiver audio failed after four hours. Super conditions! . . . *IK0NWE*. At last—good condx on 10 during the CW weekend . . . *OH6NIO*. Very poor the Caribbean stations! Hurricane Hugo? . . . *I3VJW*. My best work in CQ WW CW . . . *OK1DXW*. The best conditions ever in CQ WW . . . *OH6YF*. Three-element 7 MHz Telrex at 30 meters broke before the contest; had to use just a 4-band vertical . . . *ITALE*. First contest on 80 meters. Unfortunately, I fell asleep during the second night . . . *IK2GSN*. Thank you for the contest. It was two wonderful days . . . *SP4EEZ*. I enjoyed to take part in this contest and take it as an opportunity to work rare stations with my poor rig . . . *OK1FIM*. More and more problems with ops who do not identify their transmissions for few minutes—so, many dupes, time losing breaking pile-ups with "call?" etc. . . . *YT3AA*. Big problem for stations like me, without amplifier and beam, but very interesting! . . . *SV9ADH*. This is my 34th CQ WW CW contest! . . . *YU7SF*. I heard KN0E/KH3, but was great pile-up . . . *SP3SUX*.

Liberty for all peoples world! . . . *YO4CAH*. Excuse me for this delay, but we have had already big problems for our liberty . . . *YO4BQV*. Now many troubles in SP. However, better freedom . . . *SP9ZD*. Four hours before start a neighbor cut off 3-element wire W beam, but after 90 min. beam was ready again . . . *YT9V (Opr. YU1FJK)*. The worst rainstorm I

TOP SCORES

WORLD			USA			EUROPE		
Single Operator All Band			All Band			All Band		
P40GD	7,860,694	K3TUP	5,575,913	ZB2X	5,439,250			
D44BC	7,025,553	K1TO	5,192,840	OH0MM	5,413,760			
TU4B	6,668,200	K1CC	4,694,664	YT3AA	3,855,332			
8P9HT	6,571,184	N2NT	4,682,752	CR2A	3,820,320			
HC8U	6,031,176	W9RE	4,661,853	G3FXB	3,783,282			
9Y4H	5,710,159	W1KM	4,524,637	LY3BP	3,319,866			
K3TUP	5,575,913	N5AU	4,395,825	OZ1LO	3,269,467			
ZB2X	5,439,250	N2LT	4,205,460	OH4NRC	3,226,329			
OH0MM	5,413,760	N5RZ	4,044,612	GW4BLE	3,177,044			
SU1RR	5,218,467	AA1K/3	3,996,243	UB4MM	2,968,140			
28 MHz			28 MHz			28 MHz		
ZP0Y	1,692,429	K1ZM	732,564	YZ6A	766,746			
CW8B	1,520,001	K4XS	604,035	LZ1KDP	699,515			
YV3A	1,502,440	N8CXX	553,868	I3JSS	587,412			
LT8WW	1,490,512	W9SU	550,565	IT9TQH	559,790			
KH0AM	994,544	N4ZZ	541,926	IO3VJW	552,015			
J79DX	859,360	W4XJ	509,048	G3TXF	542,572			
21 MHz			21 MHz			21 MHz		
N7DF/NH2	1,205,776	W7WA	772,146	OH6MCW	775,620			
5H3TW	1,152,528	N6RO	677,292	YZ3A	695,959			
9Y4VU	1,058,772	K9BG	534,240	OH6AC	693,438			
EA8BPW	949,284	KJ9D	512,113	OH5BM	632,548			
CE3DNP	916,020	N4RR/9	508,944	LZ1V	516,000			
KH0/JF2SKV	831,546	NB2P	490,390	OY3QN	507,111			
14 MHz			14 MHz			14 MHz		
4Z8DX	1,156,148	K2EK	903,200	YU2W	786,510			
K2EK	903,200	W1RR	716,550	UA1DZ	765,545			
VE2ZP	807,234	N5CR	700,135	UQ2QD	709,195			
YU2W	786,510	WY7I	609,980	SM0AJU	638,312			
UA1DZ	765,545	W5FO	477,636	YT3T	556,792			
W1RR	716,550	W1YN	341,187	DF0DX	555,660			
7 MHz			7 MHz			7 MHz		
YW1A	740,375	K1NA	422,272	ON4UN	598,625			
ON4UN	598,625	KE7V	363,393	OH2HE	531,185			
OH2HE	531,185	W3GG	332,904	YT7A	398,790			
K1NA	422,272	K2ZJ	321,408	JW8XM	334,338			
YT7A	398,790	N6RJ	260,145	OH3UU	291,755			
KE7V	363,393	WZ4Z	237,998	Y21NE/A	231,030			
3.5 MHz			3.5 MHz			3.5 MHz		
TA2BK	362,378	W1FV	175,145	LY2WR	241,250			
LY2WR	241,250	KC7EM	90,072	HA8IE	230,268			
HA8IE	230,268	N2KK/6	53,898	UT5UGR	220,779			
UT5UGR	220,779	W0CD/8	41,904	YT9V	179,653			
YT9V	179,653	KB0G	34,080	LZ2KRU	170,156			
W1FV	175,145	KG4W	26,320	OH1AD	169,613			
1.8 MHz			1.8 MHz			1.8 MHz		
LY2BTA	97,524	K5UR	14,718	LY2BTA	97,524			
YT2R	48,576	K4TEA	13,068	YT2R	48,576			
OY9JD	47,040	KV0Q	7,224	OY9JD	47,040			
OK3TPV	39,195	AB4RU	3,952	OK3TPV	39,195			
OK1DQW	34,320	NO4J	1,740	OK1DQW	34,320			
VE1ZZ	29,448	KG9N	578	CT1AOZ	23,660			
Multi-Operator Single Transmitter			Multi-Operator Single Transmitter			Multi-Operator Single Transmitter		
EA9EA	11,755,566	K1AR	9,383,458	LZ9A	9,962,386			
EA8AGD	10,764,460	N2RM	8,612,840	OL8A	9,296,518			
LZ9A	9,962,386	N4RJ	7,811,622	HG5A	8,783,061			
K1AR	9,383,458	N3RS	7,681,856	IQ4A	8,205,495			
OL8A	9,296,518	K8AZ	6,458,385	HG1S	7,073,407			
4J5FV	8,786,700	K1IU	5,763,520	HG0X	6,869,716			
Multi-Operator Multi-Transmitter			Multi-Operator Multi-Transmitter			Multi-Operator Multi-Transmitter		
CT3M	32,031,744	W3LPL	16,221,259	LX7A	20,497,632			
LX7A	20,497,632	KY1H	12,589,938	RB8M	18,570,440			
NL7G	19,008,588	K1ST	12,451,612	4U0ITU	17,158,368			
RB8M	18,570,440	NR5M	12,302,131	PA6DX	13,613,952			
4U0ITU	17,158,368	K4VX/0	11,988,957	OH1AA	10,677,640			
W3LPL	16,221,259	K5NA/2	11,350,820	4N9N	8,952,965			

ever experienced—gave me 3 hours of rest by cutting the electricity . . . ZB2X. See you as GD4UOL in 1990 with a much bigger signal . . . GD4UOL. Still the best contest in the annual calendar . . . G3HCT. Enjoyable contest, conditions good on all bands . . . G3ESF. Curses! I beat the UK single-op record, only to hear on the grapevine that GW4BLE and G3FXB did even better . . . G3XTT. Great condx—recall when it was a big deal to break a million. Now 3–4 million is common! . . . G3FXB. Monobander (K8CC) built with the help of G4BKI the previous weekend worked a treat. Didn't expect so much interest in 28 MHz from G-land. Paperwork a chore. Might try K1EA next year . . . G4BUO. My best score yet—wish I had a "proper" antenna on 10 met. as . . . G4FZE. Main rig failed at switch on Sunday morning, interrupted by XYL showing prospective buyers round the house, bad TVI complaint forced early close-down—but a great contest! . . . G3NKS.

Putting up my highest score ever with homebrew World War II gear . . . G3GGS. Very good conditions. 28 MHz the best band for me . . . G4ZME. Conditions must have been fantastic; 935 QSOs in 18 hours with only a wire antenna. Fourth major contest running K1EA, totally painless, especially the log chores afterwards! . . . G4BKI. Forty meters is a lot different (as DX) than stacked 4 over 4 at NR5M . . . G0/K5TU. Always much pleasure to participate in CQ WW, super 10 meters! To next year! . . . F1JCB. My best entry in this contest. A great event! . . . F1JDG. Excellent propagation about 0730 to 1930 GMT . . . F1LJY. Biggest thrill—5T5BG and 5T2UIT . . . F2DE. They call me "Crazy Keyer" . . . TM5T (Opr. FD1LMJ). A big success your test. On CW 250 Hz filter was "hot"! . . . F6AUS. For the WW DX SSB I was on the FY0P team. I prefer to operate multi-single all bands in DX place. Hi . . . F6BFH. Was tired before starting the contest and had many equipment failures. I shall try again next year . . . F6BEE. Very good contest be I am limited because I am 83 years old . . . F8TM. Fantastic conditions. It was a great contest . . . EI3DP.

Some stations are too fast for my ears. Nice contest . . . EA6GP. Very good test but sorry for my CW. Is my first CQ test CW, and only 7th month in CW activity . . . EA6ZS. I worked all weekend. Until next year . . . EA2CKP. HZ new country for me—only QSO out of Europe (with 40 watts and indoor antenna!) . . . EA4BV. This is my first CQ WW DX Contest on CW. It is difficult with the OMs with their "high Power," hi . . . EA4VA. Mni tnx fr FB contest. Hope to work again all ops in 1990—age 77 in February . . . DL1TH. Water in the traps made my 80 meter dipole work like a dummy load, hi . . . DL3YBM. Used KV0I real-time contest program, fb condx, Sunday solar flare disturbing bands . . . DJ5JH. LIDs and QRM hindered my call to be taken by 4U1UN who had my suffix ok . . . DJ5AV. Joined this fb test for the first time. I will take part next year again; K1EA program very FB . . . DL5JQ. Poor conditions—not a single W on 160 or 80 . . . DL8ZAJ. Best wishes for the coming holiday season . . . DL9PU. A good 1989 final but a very bad aurora on Sunday evening . . . DF0DX (Opr. DL1YAW). Nice to work DXCC in one weekend . . . DL0IU (Opr. DL4AAE). FB contest—good condx. But aurora around 1800 terminated things. Best QSO CE0ZIG . . . GM3CFS.

Just a token effort from an old timer (80 years) . . . GM8SQ. I wish someone would run the test from the Shetlands. This would stop ops sending "Are you Shetlands?" all the time . . . GM4OBK. Being recognized by various stations through 40 years of participation in WW—how much longer? Now 72 years old! . . . GW3JI. It was a funny contest. TNX . . . HB9DFY. Now 40 years of Ham Radio, still with you in WW CW contest . . . HB9KC. Great to get through pile-ups from DU, PY0F, BY, etc. . . . HB9DCQ. Traveled to Svalbard to give as many as possible a JW in the contest. Will be there in 1990 for a more serious effort . . . JW8XM. This is unfair competition; small pistols to fight in the same class as big guns. Where else do you find such unsporty game (hi)! I have always loved contest, but I am longing for a 100–200 watt limit class. It would have made it all more exciting to fight with more equal weapons . . . LA4YW. I joined the contest first time 40 years ago. Just as much fun as in the old days! . . . LA6PB. Zones 22, 26, 34 always difficult in contests. Did some zones not take part? . . . LA6FC. Nice test! The band was crowded from early morning to the middle of the evening. My first CQ WW on CW but not the last . . . LA9DFA.

Log completed by K1EA contest program . . . LA9HW. Used K1EA program for first time and love it. Really thrilling to see score growing with every contact. . . . LA0CX. Had great fun, but hard job to come through when surrounded by "big guns" . . . OY1CT. Used K1EA Program with no practice before the contest . . . OZ1LO. Nice to be in this contest again and still improving my score. Within the next 10–20 years I will be a real threat to the local OZ guys. Hi! . . . OZ1BIZ. Serious breakdown on hard disk lost all contacts for 8 hours and kept us off air another 8 hours . . . OZ1OXZ. This is my first test as I'm new amateur but enjoyed it very much . . . OZ4ACK. Thanks for another contest with great activity and fb condx on 40 and 80. . . OZ6PI. Duplicates checked by

computer. The best condx I've ever had in this contest. Must be lazy; should make at least 1000 QSOs . . . OZ8AE. It is strange to work under own call—former member of PA0KHS crew . . . PA3ADJ. For the first time in many years home again, instead of in YB3 or other places . . . PA0LOU. Condx on 28 and 21 were excellent; on 14 heard stns via SP and LP at same moment, thence shaky and jumping sigs . . . PA3AMA. Nice contest as always . . . PA3EOB.

PA60 is for 60 years ham radio in PA-land . . . PA60DIN. First contest about 30 years ago. Still like it, glad meet old friends . . . SM7TV. I worked over 1000 QSOs in 48 hours for the first time! . . . JA1YAG (Opr. JG2TSL). CT (by K1EA) made me so happy!! . . . JH1GIV. I could not work 80 meters so much due to interference . . . JR1JVV. Final score for this year increased 20% due to better propagation . . . JA1IFB. Enjoyed very much Cycle 22's good conditions, especially on 28 and 21 MHz . . . JA1AIU. Averaged 100 Q's per hour for the five hours I had to operate . . . 7J1AAI (Opr. K8HVT). I got three new countries during this contest. VY glad . . . JA1EMQ. This score (on 80 meters) was two times my last year's . . . JE2LPC. Biggest thrill was working W1 area with this 75 watt rig . . . 7J2AAF (Opr. W1END). If Saturday were a holiday, the contest would have been more enjoyable for me . . . JA3YKC (Opr. S79M). Band condx not so good, but I enjoyed the contest . . . JH3CXL. Thanks very nice contest on 28 MHz, but could not QSO with Zone 2 . . . JF3LOP. Antenna is no good, so I couldn't win the pile-ups for CT3 and CN0; but thanks, I enjoyed the contest . . . JA4UIT.

I joined the contest with a PC logging and keying program which I designed . . . JA5BJC. I couldn't work any US station on 160 except NL7G. I wish I couldn't sleep during the contest . . . JA8RWU. This time my first entry to CQ WW, so always excited, impressed, and surprised . . . JE8MFG. JW8XM picked up by weak signals on 7 MHz . . . JR9DKJ. I really enjoyed this contest. Thank you . . . JA0NCE.

STATION OPERATORS Multi-Operator Single Transmitter

4J5FV: UB5I0K, RB5IJ, RB5II, UB5-073-1151, UB5III, UB5IFZ, UB5I0N, UB5IFN, UB5-073-307. **4N2D:** YT2GA, YT2ID, YT2TL, YU2CQ, YU2DZ, YU2FK, Luksa, Mato, Roko. **4N2N:** Denis, Kreso, Pero, Sale, Sasha. **4U1UN:** K2GM, K2SS, K2TW, N1XX, N2AA, NA2K. **5B4ES:** 5B4WN, 5B4XN. **BY1PK:** BZ1AA, BZ1AB, BZ1AI, BZ1AL, BZ1HAM. **BY1QH:** AA5NK, BY1BA0. **BY1SK:** Mr. Chen, Miss Li, Gong Ke Lu, Mr. Meng, Miss Sun, Mr. Wang. **BY4AA:** He Li-Jun, Hu, Yu Shun-Zhao, Xin Yao-Nan, Xu Ru, Zhou Lou. **BY4SZ:** Chen Bin Yong, Chen Shi Wai, Goa Jun, Jing Jin Feng, Wu Zhi Yuan, Xu Gen Nuan, Zhao Ji Ren. **CE1LDS & CE1GKM, CE1IDM, CE6/OH6VR & OH6NTO, CN0A:** F2CW, F6ATQ, F6BQY, F6DOW, F6EEM, F6FYP, HB9CUI, NX1L, TK5EL. **DA1WA:** DA1DS, DA1SC, DA2EN, DA2HS, DA2JL, DJ1MU, DJ9CB, DL1A0. **DF0RR:** DK6QI, DL4EBY, DL4FT, DL7AEN, DL7ALM, DL7PV, DL7SI.

DK0OI: DB50D, DJ3XD, DJ7MG, DK1II, DK3FX, DK8KW, DL2RC, DL3LP, DL50AP. **DK0TZ:** DF3SV, DJ5AI, DL1SBF. **DL1DAS & DK2YI, DL0ER & DK7FP, DL1EFD, DL8DAV, DL9XY, DL0LR:** Club. **DL0RL:** DF8AN, DJ1YJ, DL2AAZ, DL6AAL. **DL0WU:** DJ4AX, DJ8SW, DK4TP, DL1HX, DL2ZAE. **DX1CW:** DU1CWO, DU1CWT, DU1MDS, 4F1AED, 4F1ARC, 4F1AKH, 4F1BYN, 4F1DWY, 4F1FZ, Andy, Caloy, Darwin, Kiko. **EA3VY:** EA3AIR, EA3AVV, EA3DXD, EA3FER, EA3KU, EA3LL. **EA8AGD:** OH6DK, OH6EI, OH6LK, OH6OS, OH6UI, OH8LP, OH8PF. **EA9EA:** EA3GAS, EA4BB, EA5BRA, EA7ALG, EA7TL, EA9EO, EA9EU, EA9GK, EC7DMU. **E1AE:** E12AR, E13ER, E15GC, E16FA. **FF6KMG:** F6BCW, F6EQN, F6ESW, F6HBR, F6IIE. **FF6KPO:** F5CQ, F6CTS, F6DZD, F6ETI, F6IFI, F6IPW, FB1LWX, F11HMB, F11HME. **G3LNS & G3MXJ, G3SZA & AA6MC, G3SED, HB9CIP & HB9AJM, HB9BLQ, HB9CAT, HB9DCW, HB9FAF, HB9YC.**

HA3KHC: Cspike, Nemeth, Tardi. **HA3KNA:** HA3FO, HA3OU, HA3OV, HA3NU, HA3NS. **HA8KCK:** HA8EK, HA8FW, HA8KH, HA8DT, HA8FT, HA8DZ. **HA0KLL:** Club. **HG1S:** HA1TJ, HA1DAC, HA1DAE, HA1AH, HA1SV, HA1TD, Nemeth. **HG5A:** HA5GF, HA7RY, HA5IW, HA5ML, HA5WE, HA5OM, HA5LN, HA5MK, HA5BNL, HA5FM, HA5AWH. **HG5C:** HA1AG, HA5MO, HA5OG, HA7SB, HA7XQ, HA8UB. **HG6N:** HA6ND, HA6ON, HA6NY, HA6NO, HA6OQ, HA6NF, HA6PX. **HG0D:** HA0HG, HA0DR, HA0NAR, HA0ER, HA0HV, HA0BK. **HG0X:** HA0DU, HA0LC, HA0MK, HA0MM, HA0NNN, HA0OB, HA0VI, HA0VN. **IP4T:** I1XPO, I1ZEU, I1LAI, I20EW, I2VXJ, I2K2BH, I2EGL, I4USC, I4UFH, I4YSS. **IQ4A:** I4EAT, I4IKW, I4IND, I4LCL, I4RNL, I4TJE, I4VEQ, I4K4CF, I4K4DCT, I4K4EKW, I4K4NPD. **IY2A:** I2UIY, I2YSB, I2DVG. **JA1YAD:** JA9UFS, JH7UC, JH9AMJ, JN1HYU, JS1DSC. **JA1YDU:** JH0LFE, JH0NZN, JP1NWX, JP1NBQD.

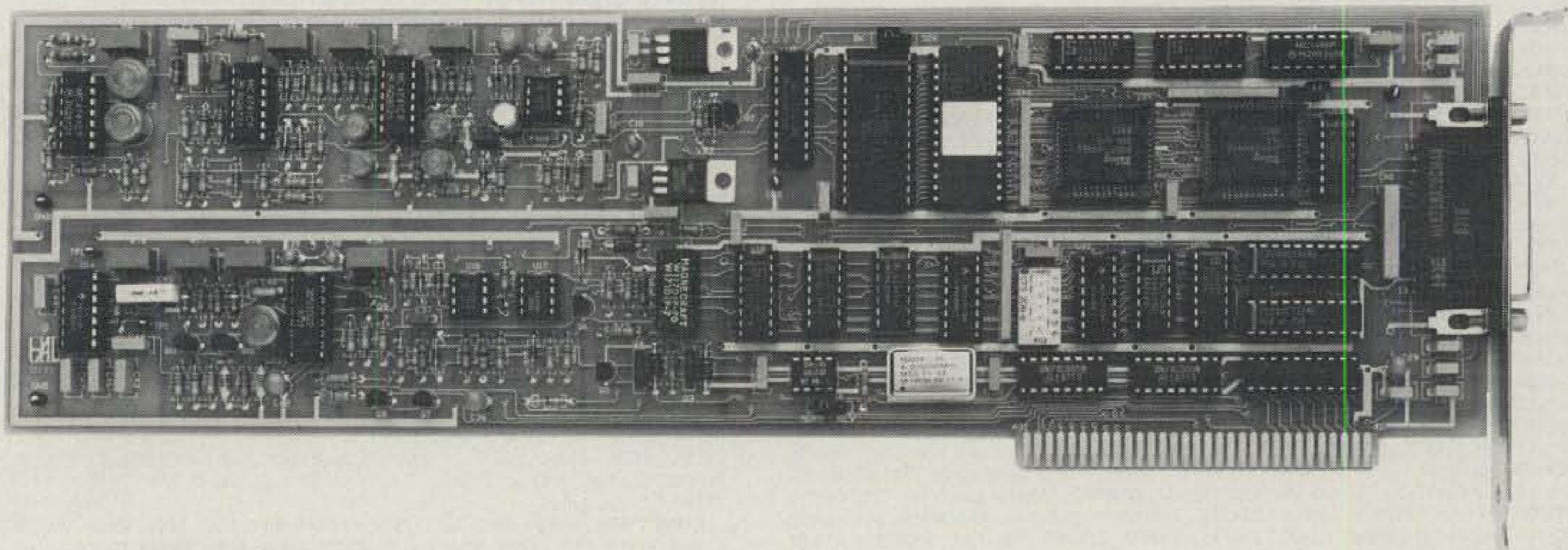
JA1YFG: JE7WBI, JJ3DLZ, JL1BLW, JQ1IDL, JQ1RUR, JP10GL, JQ1BRW. **JA1YXP:** JG1TNX, JG2QHQ, JH0RRR, JI1UTP, JO1JQZ, JO1SBZ, JP1KAJ, JP1SMR, JQ1UXN, JS1DRL, JS1INN. **JA3YBF:** JF4FUF, JG4CLV, JJ3IMX, JJ3KGS, JO3VIZ. **JA3YDI:** Atushi Furuta, Yoshitaka Hirano, Kenichi Tamura. **JA3YDD:** JEGMYI, Akio Horie. **JA6YBR:** JE6WME, JF1DHS, JF6DEA, JI6BRB, JR6GKT. **JA6YCL:** JE6EKC, JE6UWK, JF4CZL, JI6DUE. **JA6YJS:** JF4ETK, JIKYKY, JS1PWV. **JA7YAA:** JA9PPC, JE7HLZ, JE7JZC, JE0AWL, JH0ORW, JJ3CNL. **JA0ZRY:** JH5XDD, JH0ILL, JI2IAW, JN1JVA, JP1NOM, JP1QGO, JR0TGT. **JT1T:** JT1BJ, JT1BX, JT1CP. **K0RF & W0UA, K0RWL & K0UAA, K0VBU, KM0L, NW0F, WA0GKZ, K1AR & K1EA, K1GQ, KC1F, K1IU & KD2SX, NQ1F, NS1F, K1ULI & K2TE, K3QIO, NQ1V, WA1UAX, K2SG & WA2SRQ, K3DI & KB3HH, N3FZB, NG1W, K3TM & NB30.**

K8AZ & K3TUP, K8BL, K8NZ, KQ8M, N8AA, N8ATR, N8DMM, W8CAR, W8KIC, WT8C, K8NN & N8COP, KA1KPH & NC1B, KA1LSZ & KC1QN, KA5W & KS1G, KB3MM & N3ARK, KC5DX & WQ5W, KC6AA: K1XM, KQ1F, NT2X. **KX6OI & KX6GL, KX6HE, KX6WS, LA1T:** LA4BQ, LA9UX. **LY1BWF:** LY2BNZ, LY2BQT, LY3BAD. **LY1BXF:** LY2BAI, LY2BHD. **LY1BYK:** LY2BFY, LY2BJV, LY2BDB. **LY1BZR:** LY2PBC, LY2OM, LY2BTX. **LY2WW:** LY1BA, LY2BIJ, LY2BKW, LY2BMW, LY2PX. **LZ1KCO:** Bogdanow, Kostow, Vekow. **LZ1KNP & LZ1N143, LZ1N151, LZ1KVF:** LZ1PM, LZ1C181, LZ1C187. **LZ2KSL:** Club. **LZ9A:** LZ2BE, LZ2CC, LZ2DF, LZ2HE, LZ2II, LZ2PO, LZ2PP, LZ2PS, LZ2TT, LZ2UA, LZ2UU, LZ2XA, LZ2E41, LZ2E72. **N2NU & K2WI, WA2IUO, N2RM & KB2BF, K2ZS, KM3T, N2ME, WM2H, N3BB & AA5BT, N5DU, N5GM, WB5VZL, WD5N, N3HW & N3RW.**

N3LR & NW3B, N3RS & KQ2M, N3RD, N4RJ & K3JT, KM9P, N4NX, W8ZF, W8PHI, N5EA & K5RVK, N5CJQ, W5ASP, NA3K & K3IE, NM3W, NF6S & KF6VU, N6SKF, N0BT & AA4NC, N4TQ0, OE1XTU: OE1BKA, OE1JNB, OE3DSA, OE4BKU. **OH7NTM:** OH7MHL, OH7WV. **O16AX:** OH3MEP, OH6NEQ. **OK1KHA:** Club. **OK1KNC:** Club. **OK1KOK:** Club. **OK1KQJ:** Club. **OK1KSL:** OK1AHG, OK1DSL, OK1FAK, OK1FEL, OK1FIL, OK123544, OL1BQU, OL1BSP, OL1BUJ. **OK1OFM:** OK1DRQ, OK119973. **OK1OPT:** Club. **OK2KDS:** Club. **OK2KJU:** Club. **OK2KMR:** Club. **OK2KOD:** OK2BDI, OK2BGR, OK2BNX. **OK2KOJ:** Club. **OK2KVI:** Club. **OK2KYC:** Club. **OK2OII:** OK2BX, OK2FD, OK2PTW. **OK3KEG:** Club. **OK3KFO:** OK3PC, OK3TGT. **OK3KGO:** OK3CLL, OK3THG, OK32351. **OK3KUN:** Club. **OK3KZA:** Club.

OK3RJB: OK3CKW, OK3COD, OK3CSQ, OK3TCL, OK3TRJ. **OK3RKA:** OK3CPC, OK3CQR, OK3TDP, OK327545. **OK5R:** OK1ADM, OK1ADS, OK1ALW, OK1DIM, OK1RI. **OK5W:** OK1AEZ, OK1AII, OK1APJ,

A Winning Combination . . . The PCI-3000 and SPT-2 from HAL!



The HAL PCI-3000/PC-AMTOR system is designed to put your PC on the HF bands with outstanding performance at an affordable price. Amtor allows you to get through when other methods fail. If you've ever been DX-ing with someone on Amtor when 20 meters dies out in the evening, you know what we mean. Things may slow down, but you can usually keep up the QSO!

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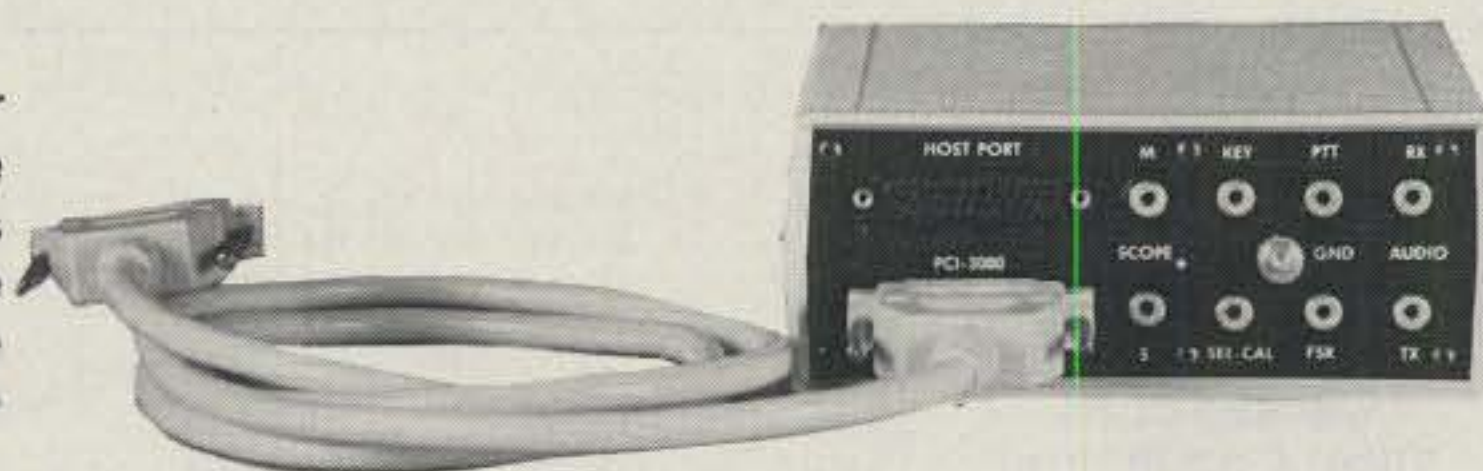
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PCI-3000/PC-AMTOR with software **\$395.**
SPT-2 Spectra-Tune with cable **\$169.**
FIL-1 Amtor/RTTY filter (installs in SPT-2) **\$69.**

(Low tone export models available.)

OK1CF, OK1JJB, OK1WC, OK1WT, **OL8A:** OK2PZW, OK3CBU, OK3CDV, OK3CTL, OK3EA, OK3GI, OK3JW, OK3LA, OK3LU, OK3LZ, OK3NA, OK3TAP, OK3TLU, OK3TMM, OK3YEC, OK3YX, **ON6AH & ON5AV**, ON6MH, ON6QR, ON6VL, ON7PC, ON7ZV, **OZ5WQ & OZ3PE**, OZ3ZW, **PA63DHR:** NL1059A, NL10363, NL10373, PA3AQL, PA3DHR, PA3EXI, **PI4DEC:** PA3ATA, PA3AWW, PA3BXD, PA80UE, PA80UK, **RB4EXN:** Shabelsky, Vailo, Bojko, **RB4IWE:** UB5-073-4328, UT5SI, UB4IRI, **RB4IYJ:** RB4IUU, UB5-073-4364, UB5-073-5972, **RL1P:** UL7PAE, UL7PCZ, UL7PL, RL7PHL, RL8PY, UL7PGA, **RQ7W:** UQ2GAG, UQ2OC, UQ2GDW, RQ2GG, UQ2GJR, UQ2GUB, UQ2GP, UQ2-037-116, UQ2-037-83, **SK3AH:** SM3CDW, SM3COL, **SK5AJ:** SM5AD, SM5C8N, SM5CNO, **SK5EU:** SM4HAK, SM5GLC, SM5MLL, SM5ODQ, **SL8CB** SM3LGO, SM4QSR, SM5NZY, SM6MYF, SM6SJJ, SM6SZS, SM7MXO, SM8NSJ, SM8QGO, SM8RGH, SM8RVW, SM8TIF, **SN3A:** Jerzy Smoczyk, SP3ASN, SP3GEM, SP3RBI, SP3RBR, **SN9C:** SP9DTI, SP9JPA, SP9RPT, **SP4KTO:** Club, **SP9PDF:** SP9MDS, SP9NRD, SP9TVC, SP91573KA, **SP9ZHR:** SP9EMI, SP94315KA, **T32BE:** WC5P, WD5F, **UB4MWU:** UB5M8M, RB5MRE, UB5-059-751, UB5-059-745, **UB4MZX:** RB5MJS, RB5MRE, **UB4IZA:** UB3IBZ, UB5-073-342, UB5-073-4246, **UB4TWL:** Club, **UB4SWB:** RB5SJ, RB5NQ, RB5EX, **UB4QWW:** UB4QW, UB5-064-866, **UB4WYA:** UB5WDW, UB5WCG, UB5-068-309, **UB4WZA:** UB5WBY, UB5WCX, UB5-068-997, **UB4LWY:** Pyzh, Gubenko, Belousov, Okhotin, Nuzhny, **UB4WZB:** UB5-068-1013, UB5-068-1014, **UC1IWR:** UC2-008-197, UC2IBM, **UC1AXG:** UC2AFC, UC2-188-2, **UC1AWC:** UC2CFP, UC2SDD, UC2-005-323, UC1-010-220, **UC1CWB:** Zubarev, Baby, Kravchenko, **UC1CWR:** UC2CBR, UC2-006-107, UC2CFD, **UC1AXA:** RC2AB, UC2ACX, UC2SAI, UC2AFG, **UI9AWX:** UI8ACI, RI8AK, **UL8CWW:** UL7CT, UL7CC, UL7CAA, UL7-028-272, **UP1BZG:** UP2DA, UP2BCD, UP2BCT, UP2BCW, UP2BTS, **UP1BZO:** LY2NK, LY2BDV, LY2BDW, LY2BFN, LY2BMX, LY2BKZ, LY2BQA, LY3BX, LY-346, LY-1751, **UR1RWX:** UR2RRR, UR2RJD, UR2RJ, UR2RHF, UR2RNG, UR2RNA, UR2RNT, **UW9CYA:** UW9CK, UW9CZ, UB5FFZ, **UZ8QWA:** UA0QDL, UA0QBR, UA0QBN, **UZBZWA:** Laurentiev, Pchelín, Tishkov, **UZ1AWQ:** Timofeev, Onishenko, Doszenkov, **UZ1AWD:** UA1AAF, UA1-169-900, UA1-169-848, **UZ1AWT:** UA1ALZ, UA1AFN, UA1-169-823, UA1-169-2475, **UZ1TWS:** RA1TE, UA1UM, UA1TFL, **UZ1OWJ:** UA10AA, Kucherin, Sadakov, **UZ2FWA:** UA2FJ, UA2FM, UA2FX, UA2FZ, UA2FC, UA2FEA, UZ3AA, **UZ3AXH:** UV3FL, UA3AMQ, UA3-170-849, **UZ3AWR:** UV3AEV, UV3AFL, UA3ABJ, **UZ3DWW:** UA3-142-998, RA3ABN, **UZ3DWX:** UA3-170-998, UA3DLW, **UZ3QWX:** Club, **UZ3QYA:** UA3-121-2251, UA3-121-1512, **UZ3XWB:** UA3-127-200, RA3XA, UA3XBP, UA3-127-204, UA3-127-216, **UZ4AXM:** UA4ALJ, UA4AIY, UA4ADQ, **UZ4AYN:** Karaichev, Kochenkov, Gerasimov, **UZ4CYL:** Repetun, Orlov, Kondrashov, **UZ4FWA:** UA4FZ, UA4-148-360, UA4FEQ, UA4-148-363, UA4-148-141, **UZ4HWS:** Milenin, Lozgachjov, Shevchenko, **UZ4HXX:** UA4HOX, UA4HVX, UA4HNJ, **UZ4LXA:** Gorbunov, Bogoutdinov, **RZ4PWO:** Bulatov, Osipov, Mironov, Fedotov, **UZ4PWW:** RA4PO, UA4PAZ, UA0KG, **UZ4SWF:** Radushin, Mamontov, Loctev, **UZ4WWA:** UA4WA, RW4WA, UA4-095-729, **UZ4WWB:** Blinov, Sajfulin, Enoktaev, Nekrasov, Korotayev, **UZ4WWY:** UA4WW, RW4WR, UA4WI, UA4WES, RW4W0, **UZ4YWY:** RA4YM, UA4YGM, UA4YGT, **UZ5AXS:** Mandriika, Bessarab, Chumathenko, **UZ6HWA:** UA6HSV, UV6HTV, UV6HSI, **UZ9CXE:** UV9CP, RA9CQE, UA9-154-2350, **UZ9XXM:** Bugrimov, Shebolkin, Procopenco, **UZ9XWV:** UA9XC, UA9-090-1053, UA9-090-1056, UA9-090-393, **UZ9YXI:** Proskuryakov, Putincev, **UZ9YXL:** Club, **VE3WAA:** VE3AGR, VE3DTR, VE3IIN, VE3IJE, VE3LFA, VE3OE0, VE3OEQ, VE3PCT, VE3RDN, **VK3EVT & VK3CGH, VK3MVC, VP5Q:** K2LE, W2AX, W2GGE, **VU2TEC:** VU2HNY, VU2JRM, VU2TEW, VU2WZY, VU2ZMZ, **WBNA & W0AR, W0CW, W0CY, W0QZP, W0RLX & K0KR, N0QI, W0WP & K0AT, W0ZZ & K4UVT, K16EZ, W6XB, W1AF:** K3UOC, KA1KCN, KA1SSQ, KM1G, K010, N1FME, NV1L, NZ1W, WB9UDQ, Holly, Mark, **W1BK & W1AVAR, W1HAB & K2NA, W2UI & N3KR, W3XU & KN5H, W6BA & K7JYE, N6AV, N6AW, W8FN & KU8E, N8BJQ, NZ4K, WB3LFZ & WB3FIZ, WB3HAZ, W8BK & K8YSE, W8CZN, W8GMH, W8JGU, W8XD, W8BBN, W8RCN, W8BLLD & K8ZH, N8FLS, N8BR, W8BAUB, WU7T & DL1UF, WA7KPH, XF4T:** XE2DBG, XE2MX.

Y32CN: Y24LN, Y32TN, Y44PF, **Y35L:** Y26BL, Y26WL, Y27FL, Y33TL, Y33UL, Y33VL, **Y41CM:** Y21RM, Y24AM, Y41YM, Y41ZM, **Y51CA:** Y22PA, Y22SA, Y25MA, Y66QA, **Y57CA:** Y31PA, Y57ZA, **Y59CA:** Y33MN, Y59IA, Y59ZA, **YT2D:** Gal, Y2TSC, Y2TSS, YU2SD, YU2SW, YU2TS, Zvonko, **YU3AI & YT30T, YT3RN, YU3BM, YU3BS, YU3EO, YU3ES, YU3MM, YU4CMN:** Club, **ZM2A:** ZL2AGY, ZL2AMI, ZL2AJJ, ZL2IN, **ZW0F:** PY1DF, PY7JJ, PY7XC, PY7ZZ, PY0FF.

Multi-Operator Multi-Transmitter

4N9N: YU1ZB, YU1MSU, YU3IW, YU1AO, YU1CL, YU1EW, YU1LA, YU6AR, YU7AX, Vlada, Slavko. **4U8ITU:** G3SXW, HB9AMO, K5VT, KC7V, N2IC, N7BG, N7NG, W6MSG, W6QUL, W6RGG, W7CB, WZ6Z. **9M600:** K8CW, N200, W82KXA. **CT3M:** CT1BQH, CT1DIZ, CT3BX, CT3EE, CT3EF, DF5UL, DJ2YE, DJ8VC, DK3KD, DL1EFT, DL1EK, DL3HAH, DL5EBE, DL5XX, EA4DAS, EA7CEZ, HB9CEY, HB9CRV, OE1ETA, OE2VEL, OH1EA, OH1NOA, PA3CEF, UA3DEA, UO2MU. **DF2RG & DF7MV, DG2RCH, DHSMBB, DJ1OJ, DJ1US, DK6WL, DL1MAJ, DL3MAA, DL8KF:** DF3LP, DF3LZ, DF6LI, DJ2BV, DJ4FZ, DJ6TK, DJ6TN, DJ7SW, DK7LJ, DK8LD, DK9AV, DL22T, DL4LBK, DL8PY, DL4MEH, DL5R8W, DL6MAO, DL7MAE, DL8RBR, DL4MCF, DL8XE, **DF3QG & DJ1FC, J6DX:** AC8S, K6GXO, K9BQL, K86ZBI, N9AG, NC8Q, NR8Z, VP2EXX, W8ILC, W8NJR, W8OK, W8QID, W89CFC. **JA7YCO:** JF7HYZ, JI7GBI, JI7LZL, JA7-30336. **JA9YBA:** JA9LNL, JA9OTX, JA9QCE, JA9VDA, JH0CAZ, JH9ETC, JN3OCB, JR0ELG, JR9FNN, Fujita.

JE2YRD: JR2SCJ, JR2SQU, JI2KVV, JF2DQJ, JI3JGJ, JI3ERV, JK3GAD, JH4RHF, JR7OMD, JA9-10148, JF2ECC, JH2BNL, JF2XJE, **JR1ZTT:** JR3NRI, JL2ALL, JM1UII, JN1MSO, JP1MWB, K1ST & K1FWE, K1MNS, K1RX, KA1R, NB1H, N1BL, NX1H, W1IHN, **K2TD & KY2Y, W2BR, W2YOF, K4VX/8 & AG9A, K4XU, K9ZD, N4CC, NS0Z, K9BGL, N9JF, W9WI, W00G, K5NA/2 & KU2Q, N2EK, NG2X, W2RQ, W2B0, K6UA & K6SSS, K6VI, KD6XM, W6CCP, W6KUT, W6UOF, K6ZM & AD6E, AK6T, K4UVT, N86L, K07N & K7B0V, N0XX, W7IL, WA7TDZ, W67N, WJ7R, KQ20 & K2NJ, NR2H, KS3F & NE3F, W3AP, KY1H & AA6RX, KB1W, KY1K, N2KW, N2MG, NB1Y, NQ2D, NS1M, NV1J, LX7A:** DF3CB, DF4SA, DF6RI, DF7RX, DF9LJ, DJ0IP, DJ1AT, DJ2BW, DJ2EH, DJ3TF, DJ5PA, DK2GZ, DK2OY, DKZDO, DK3GI, DK5PD, DK5WL, DK7PE, DK8FD, DK9IP, DL1HCM, DL1SBR, DL1VJ, DL2HBX, DL2NBU, DL3LAB, DL3NCI, DL4NAC, DL4RDU, DL5MAE, DL5RDO, DL6FBL, DL6RAI, DL7AV, DL7MAT, DL9RDL, LX1II, LX1MK, LX1RQ, LX1WW, Angela.

K1ZMM & NF2L, N6DX & AD6C, AE6E, K2BA, KA6SAR, N6IC, N6VI, N6VR, NM5M, WA7ZTN, N6ND & K1ZKM, K6JYO, K6ZH, K9VV, K16MS, KT6V, N6CW, N7CW, N16W, OH1AA: OH1CO, OH1DL, OH1HD, OH1JD, OH1KO, OH1LD, OH1MD, OH1SY, OH1WR, OH3GI, OH7XE, **PA6DX:** PA8CLN, PA8COR, PA8ERA, PA8JM, PA8LV, PA8SKP, PA8VAJ, PA3AAV, PA3ABA, PA3BAS, PA3BFM, PA3CTM, PA3CWM, PA3DFT, PA3DOW, PA3DSS, PA3EGH, PA3ETH, PA3FLS, **PI4RTZ:** PA3AAM, PA3ALP, PA3BLU, PA3BUO, PA3BWD, PA3CAL, PA3DMH, PA3ELX, PA3ERC, PA3EWP, PD0MCL, PE1LWN, **NR5M & K2TNO, K2UA, K5DX, K5GA, K5GN, K5LZO, K5WA, KE5IV, K13L, WB4LZG, W5BIR, R88M:** RB4MF, RB5MA, RB5MF, RB5MT, UB3MM, UB3MN, UB4ML, UB5MDA, UB5-059-12, UB5-059-353, UV6HRS, **SP3QKV:** SP30AK, SP3SLB, SP3SUL.

UZ6LWZ: UA6LV, UA6LFO, RA6LRT, UA6-150-1103, UA6-150-1336, UA6-150-1403, UA6-154-1410, **VE7ZZZ:** VE7ARS, VE7AV, VE7DP, VE7DPS, VE7EME, VE7ENS, VE7SK, **W3AIH/9 & W3WJ, W3UC, W3UO, N8NO, K89S, K80T, K8FVH, N8BSH, N89C, KN0V, KM00, W3GM & K3ND, KY3N, N3AT0, N3HOR, W3VF, W3LPL & K3RA, K3ZZ, KA1GD, KD9J, KF3P, KT3Y, N3GB, N8II, ND3A, NW5E, W3EKT, WA8MAZ, WB2EKK, WB3FSB, W4AXM, YE2C:** YB2HM, YB2VJ, YC2FHB, YC2HAF, YC2HRY, YC2HTD, YC2JXN, YD2HAX, YD2IHB, **YU1AST:** Trajko, Milijia, Petar, Milovan, Strahinja.

WORLD TOP QRP All Band, 5 W Input

1. W2TZ 994,889	6. F1BEG 595,680
2. G4BUE 928,440	7. K1CGJ 585,365
3. YO3OH 848,046	8. 7J6CAM 574,938
4. K7SS 693,034	9. UB5PAG 564,335
5. YU2TY 641,950	10. SM0DJZ 515,478

Team Contesting

1. Southern California Contest Club, 30,736,256: D44BC (N6TJ), TU4B (N6AA), SU1RR (N6ZZ), HC8U (WA6OTU), 9Y4H (K6NA).
2. Chiltern DX Club, 9,749,102: G3FXB, G3XTT, G3TXF, G4BUO, XE1RYQ (G3YDV).
3. YUGO Team, 9,480,788: YT3AA, YU3BO, YU3EA, YU3OH, N6RO (K3EST).

WA2ASQ ..	490,962	608	85	197	K2MFY ..	214,038	530	35	106
NQ20 ..	486,540	558	95	211	W2HG ..	189,888	507	34	95
K2XA ..	448,548	540	92	201	K82HEE ..	2,007	43	11	18
KN2Q ..	431,703	557	77	194	NB2P 21	490,390	1143	37	108
W2MT ..	415,152	514	78	201	N2DTW ..	245,700	635	36	94
KB2XZ ..	409,698	517	79	202	W2FXA ..	242,570	639	34	93
KW2J ..	311,655	419	81	182	WB2CJL ..	76,755	253	32	73
NA2M ..	302,978	389	88	183	K2EK 14	903,200	1902	38	122
W2KHQ ..	286,671	426	71	160	W2DX ..	35,802	162	24	57
KD2YP ..	278,480	404	66	170	WJ2L ..	27,170	146	17	48
KT2D ..	276,860	385	70	184	KA2PQY ..	22,951	152	17	42
N2DU ..	264,393	366	82	179	K2ZJ 7	321,408	886	32	90
WB2ABD ..	212,266	351	60	151	K2RW ..	71,868	235	26	80
WT2F ..	207,828	366	55	152	W2XL ..	21,560	130	16	40
N1CC/2 ..	197,694	417	38	124	W2KKZ ..	14,337	87	17	42
KD2YG ..	193,404	238	77	207	K3TUP A	5,564,656	3212	155	431
W2BHM ..	182,850	240	86	179					(Opr. K5ZD)
W2GKZ ..	166,635	295	66	141	AA1K/3 ..	3,996,243	2615	145	378
WA2UDT ..	147,573	300	53	118	K3NA ..	3,970,153	3030	124	327
WR2G ..	142,464	303	47	121	W3BGN ..	3,861,102	2718	140	343
W2TO ..	135,293	482	67	126	K3ZO ..	3,562,120	2237	154	391
NS2K ..	115,752	259	47	109	W3UM ..	2,570,910	1718	142	368
W2AWF ..	112,832	224	43	129	K3VW ..	2,083,585	1721	111	302
WA2C ..	100,464	226	61	100	K3WUW ..	1,915,371	1498	123	314
K2AW ..	97,779	446	74	197	K3NW ..	1,674,606	1348	119	307
K1JUL/2 ..	96,792	226	42	106	K3TEJ ..	1,411,111	1301	105	272
W2WD ..	94,680	184	67	113	W3UJ ..	1,143,094	1083	99	259
K2SWZ ..	92,157	234	42	97	K3WJV ..	771,120	754	105	252
W2FUI ..	77,851	210	37	90	W3OV ..	698,208	726	107	229
W2HCA ..	67,734	163	55	104	K3JGJ ..	680,862	728	88	213
W2KTF ..	61,275	165	46	83	W3FG ..	663,600	657	102	248
AB2E ..	60,088	149	48	100	K4JLD/3 ..	656,016	659	106	240
K2DOX ..	53,535	158	44	85	K3H ..	642,678	695	91	227
KB2NU ..	45,864	157	30	68	W3HVQ ..	637,602	808	75	91
KM2P ..	40,432	117	55	78	W3NX ..	616,707	612	104	247
WK2H ..	35,853	120	42	69	K3SA ..	446,472	508	98	214
K2TR ..	33,333	99	45	78	N3CXV ..	420,096	563	87	169
NM2C ..	27,846	100	28	63	W3EVW ..	373,932	471	89	193
KB2EMU ..	25,916	121	24	52	K3LR ..	314,188	544	59	137
KA2AQV ..	18,568	94	22	46	KU3K ..	305,100	480	60	65
K2KTT ..	17,510	74	32	53	NX3A ..	251,580	418	62	148
W2XM ..	16,416	83	22	50	W3FW ..	248,630	377	78	152
KD2BW ..	14,256	80	20	46	W3GW ..	179,118	330	63	123
WM2U ..	13,464	69	23	49	KU3X ..	151,888	302	51	125
K2ONP ..	4,600	35	18	28	NK3U ..	105,424	221	54	122
N2KA ..	1,161	15	13	14	W3QIR ..	61,053	161	44	97
KB2HUN ..	486	14	8	10	K3YDX ..	47,944	163	36	68
K12M/2 28	732,564	1447	37	134	W3CPB ..	36,153	100	42	75
N2AU ..	495,276	1123	37	111	K3YD ..	35,631	122	40	71
N2DT ..	490,200	1095	36	116	K3IE ..	33,553	129	32	57
KD2RD ..	489,552	1170	34	107	K3EI ..	33,440	120	30	65
NK2D ..	396,606	937	35	112	K2QF/3 ..	32,700	104	38	71
KA2AEV ..	325,000	890	33	92	W3EAN ..	19,824	118	26	58
WB2QYH ..	287,700	700	36	104					

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

CW RESULTS SINGLE OPERATOR NORTH AMERICA United States

K1TO A	5,192,840	3346	129	395
K1CC	4,694,664	2985	141	392
W1KM	4,524,637	2884		

Zone Leaders Single Operator

Zone	Call	Score	Zone	Call	Score
1	KL7RA	2,293,792	21	HZ1HZ	1,987,968
2	VE2ZP	807,234	22	AT0T	401,750
3	K5MM/7	2,898,266	23	UA0YO	265,837
4	VE6OU/3	3,148,977	24	VS6BG	2,961,739
5	K3TUP	5,564,656	25	JA5DQH	3,220,154
6	XE1RYQ	2,045,868	26	No entry	
7	TI100D	139,896	27	KE9A/DU3	2,788,612
8	8P9HT	6,571,184	28	9M6NA	3,307,764
9	P40GD	7,860,694	29	VK6LW	1,959,694
10	OA4ZV	1,167,312	30	VK2DXI	2,376,880
11	ZP0Y	1,692,429	31	KN0E/KH3	4,705,938
12	CE3DNP	916,020	32	ZK1TB	355,716
13	CW8B	1,520,001	33	CN8FC	1,575,750
14	ZB2X	5,439,250	34	SU1RR	5,218,467
15	OH0MM	5,413,760	35	D44BC	7,025,553
16	UB4MM	2,968,140	36	9Q5DX	2,840,992
17	UA9SA	4,003,832	37	5H3TW	1,152,528
18	RZ9UA	2,302,790	38	ZS6BCR	1,080,759
19	UW0LT	4,131,000	39	No entry	
20	4Z8DX	1,156,148	40	JW9XG	1,000,362

N3CGK	10,120	63	18	37	N4IJ	209,076	550	32	99	W6UE	459,378	569	91	191
N3GLK	3,157	32	17	24	AA4V	197,640	586	29	91					
K3UA	453,065	1004	36	119	N4UA	168,187	539	26	83	K6DR	357,544	515	82	157
W8FJ/3	393,965	922	35	110	WA4JT	163,248	491	30	84	K6EID	329,794	422	94	175
KJ3L	279,030	724	33	98	N6BFM/4	162,890	432	33	97	N6AN	307,816	492	79	139
WA3EEE	67,415	243	25	72	N4HF	104,496	334	30	82	N6IP	262,104	338	90	178
WB3BRF	48,209	235	23	48	WB8HDD					K6YK	255,944	417	74	140
W3GN	5,880	50	16	26	/4	53,618	238	20	63	K6GA0	198,625	324	88	139
N3EC	26,760	106	29	61	ND4Y	36,992	201	18	46	K6HIH	195,700	362	64	126
W3GG	332,904	860	32	100	KC4CSD	26,026	123	18	59	W6NKR	190,968	298	75	144
N4AR	3,416,300	2159	146	392	W4JKC	18,544	110	14	47	K6BWX	125,430	238	68	117
K4PQL	3,376,892	2386	134	348	W4KMS	5,616	50	9	30	W6WB	116,620	205	66	130
W4RX	3,139,272	2272	134	338	KG4W	26,320	129	22	58	WW6I	113,225	230	62	113
N6AR/4	3,087,492	1885	159	404	K4TEA	13,068	77	16	50	WW6D	110,334	275	56	86
WZ4F	3,026,844	2100	136	362	AB4RU	3,952	42	11	27	WAGUFY	94,365	243	52	83
WX4G	2,589,498	1697	144	382	N04J	1,740	39	12	18	WAGCTA	92,246	214	48	106
W3VT/4	2,321,984	1570	140	371	N5AU	4,395,825	2840	148	377	NGNF	79,344	191	54	90
K4LTA	1,511,510	1384	108	277						N6TIB	75,509	168	57	104
K4GKD	1,406,946	1073	126	328	N5RZ	4,044,612	2423	153	419	N6F6V	63,656	230	35	74
W6OKX/4	609,587	601	110	257	AD5Q	2,384,348	1820	134	324	AG1H/6	63,150	142	48	102
N8LM/4	543,390	617	85	222	NT5G	1,549,978	1009	167	371	N6OU	62,328	154	60	87
AA4UJ	532,858	589	97	217	N5AW	1,432,242	1024	133	353	WX6M	49,580	129	47	87
K4PB	505,736	573	91	217	N5M	964,590	850	122	273	WAGTKT	48,941	137	42	67
N4DW	471,062	516	93	224	W5UDA	879,186	837	106	257	KI6YB	44,649	128	48	75
KK4SM	457,132	536	88	210	N5RM	604,241	638	106	231	W6CN	29,639	96	38	69
AA4GA	438,703	501	94	213	W5PWG	600,184	571	114	263	N6ADK	2,178	24	15	18
WB4FOT	374,640	472	91	189	W5CD	448,200	472	110	232	W6YA	454,358	982	38	119
W5OG/4	345,705	426	84	201	N5HB	428,366	511	92	201	W6NV	427,481	980	37	114
K4FPF	338,247	434	75	198	W5VX	380,525	848	38	117	K6PU	405,426	972	35	112
AA4XU	330,264	589	56	142	WA5DTK	233,289	397	64	143	A16V	368,010	923	35	100
W1UA/4	281,775	389	83	172	K5XK	167,066	271	59	147	N6MU	200,514	498	33	105
W4DXI	239,038	390	64	150	WA5SOG	157,795	269	64	145	K6PJY	162,866	463	33	88
W4WKQ	236,400	418	69	131	W5NBI	145,728	280	56	128	KD9E/6	159,390	400	36	102
N04I	233,478	373	71	147	W5RZ	134,460	266	62	118	W6BIP	123,060	303	34	106
K6ETM/4	172,078	317	66	128	KI3L/5	109,492	304	41	93	A16Z	92,512	286	31	81
N4UH	170,520	292	58	145	KA5IAU	76,049	227	35	78	N2UN/6	81,634	285	28	70
KA2DIV/4	133,250	189	84	166	WA5G1K	56,007	160	46	81	W6RCL	47,040	204	23	57
K4E2	119,051	272	46	103	W5E1J	51,051	157	40	79	W6OVO	35,850	90	26	49
AB4IO	116,529	201	76	141	WK5K	48,125	141	50	75	N6RO	677,292	1509	37	117
AA4KD	114,879	268	43	106	W5G5Q	47,401	150	42	65					
W4YN	85,068	201	55	98	N5KEA	7,475	41	27	38	K4TKM/6	204,255	521	37	98
N4KE	71,050	140	68	107	KG5VK	5,658	53	17	24	WAGFGV	145,452	506	30	72
K2UFT/4	60,984	136	65	103	K5RX	406,464	950	34	112	NJ6P	141,934	464	32	74
WA4CTC	39,975	110	47	76	WD5JZL	239,022	671	33	93	K6OMB	86,520	286	33	70
NY1H/4	37,072	114	35	77	KM5H	114,894	340	33	84	N6GG	185,843	456	35	104
K0EJ/4	36,708	166	26	50	N5DX	81,423	267	30	79	N6RJ	260,145	678	37	98
KM4KJ	36,400	131	34	66	W5AT	58,432	240	25	63	W6PU	186,381	544	33	84
N14Y	33,677	101	42	77	W50T	51,423	240	25	63	K5KT/6	138,650	404	33	85
W4JVN	20,355	101	20	49	WB5CRG	45,864	179	28	63	K60Y	63,220	187	31	85
N04K	15,756	73	31	47	W5BE	8,113	50	25	36	N2KK/6	53,898	236	27	51
AA2X/4	15,652	61	35	56	W5BUDX	264,795	707	36	91	W6PM	5,808	50	15	29
N4MM	12,768	77	20	36	K5BZU	103,887	303	34	85	K5MM/7	2,898,266	2055	143	339
K4KUZ	10,320	55	34	46	K5FUV	84,240	279	30	74	NN7L	2,715,012	2272	124	290
K4XS	604,035	1320	37	118	N5CR	700,135	1545	37	118	A17B	2,509,713	2035	132	299
N4ZZ	541,926	1209	36	118	W5FO	477,636	1050	38	121	N7TT	1,344,915	1119	132	297
W4XJ	509,048	1130	36	116	AA5HV	3,468	37	13	21	KR7G	1,025,817	943	121	256
K12P/4	434,973	1021	36	111	WF5E	161,650	468	31	91	KY7M	1,012,926	908	126	275
N4MO	280,446	742	32	97	WMSK	155,208	455	30	86	WE7B	915,430	1057	104	206
KD1U/4	78,678	288	26	68	K5UR	14,718	127	21	45	K7LR	802,219	913	99	214
W4GW	70,808	280	31	75						K7WK	742,917	717	111	246
WC4E	65,326	250	26	63	W6TMD	1,497,489	1207	129	298	KS7T	692,175	894	84	191
KX4R	43,425	194	21	54	W6JTI	1,106,640	919	129	295	K7ABV	675,414	750	96	218
W4RKV	34,839	190	22	41	W6AE	981,240	883	127	243	K6XO/7	622,776	651	108	229
AA4S	14,800	104	20	30	W6AUE	853,128	833	120	249	K7RA	553,386	641	98	200
KJ4VU	14,732	89	19	39	N6EK	849,090	902	110	220	N7HUS	440,891	564	89	180
N4VZ	456,489	977	38	121	W6FSJ	787,035	766	109	246	W7IIT	409,475	506	92	183
N3JT/4	275,493	724	34	97	W6ISQ	763,196	681	125	263	NT7E	408,170	579	72	173
KJ4VH	60,134	196	32	75	WB6JMS	573,927	612	115	224	W7ZMD	380,613	453	90	199
K4BAM	17,655	110	18	37	W6BSY	537,420	584	91	217	WA7UVJ	309,696	574	68	124
WB4UBD	11,742	70	19	38	W6UJX	532,656	571	110	214	W7KJJ	295,550	402	91	166
W4NTI	129,954	361	26	95	W6MWW	485,760	620	93	183	K7XX	285,430	439	80	150
WZ4Z	237,998	647	32	95						K7WA	265,591	323	89	200

W7XN	251,250	348	82	168	W9LNQ	28,531	101	44	59
K7UOT	249,480	403	68	148	K9CC	1,197	21	8	11
N7JXS	239,196	444	60	126	W9SU	550,565	1290	34	111
N0AX/7	238,678	388	58	151	K9UWA	504,594	1126	34	119
W7HS	235,458	411	74	132	WB9YXY	491,253	1072	34	123
N7IRR	217,770	332	67	143	KC9T	453,620	1034	35	113
W70N	165,020	314	69	116	W9YIG	288,680	703	34	106
WC7S	112,880	240	55	111	W9GIL	178,434	438	33	105
W7KSA	111,639	187	70	129	W9DDP	39,624	180	18	60
KR7L	109,671	277	47	92	KR9J	12,090	70	22	40
W7GUR	108,997	239	59	102	W9J00	9,128	55	21	35
KA7FEF	46,455	179	39	56	K9BG	534,240	1166	37	122
KX7J	43,848	131	34	82	KJ9D	512,113	1164	36	112
W7VIH	19,120	114	30	50	N4RR/9	508,944	1243	36	102
K7EFB	16,948	76	27	49	K9PPY	485,742	1119	37	109
K7CU	2,205	22	14	21	N9AGN	64,216	2		



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FL-53A 250 Hz CW filter (2nd IF).... 115.00 109⁹⁵
FL-70 2.8 kHz wide SSB filter..... 59.00



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UT-30 Tone encoder..... 18.50

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SP-7 Small external speaker 51.99
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SM-8 Desk mic - two cables, scan 89.00
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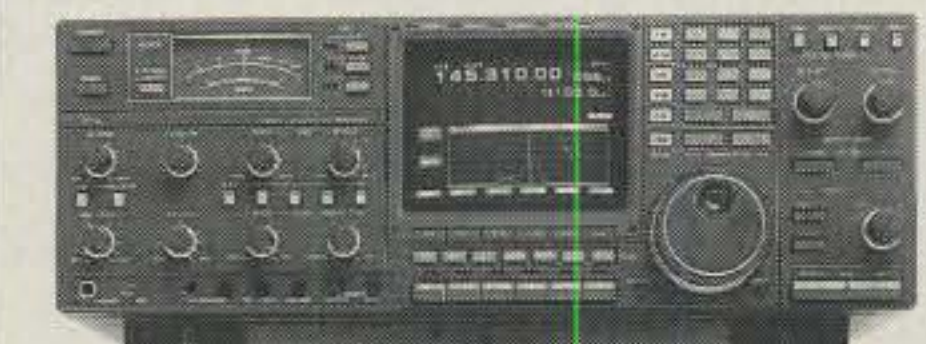
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1. K1DG	5,048,802	6. K1VR	3,000,578
2. K3WW	4,427,698	7. W2REH	2,696,110
3. KE3Q	3,652,453	8. K8MR	2,560,404
4. N3AD	3,327,488	9. KR2J	2,529,072
5. N4KG	3,091,600	10. NN3Q	1,792,973

LZ1OZ	"	36,537	441	15	42
LZ1KZM	1.8	5,152	163	4	28
LZ2CT	"	4,536	120	6	30

Crete

SV9ADH	A	668,116	1290	83	215
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Czechoslovakia

OK2SSS	A	2,477,856	2203	127	360
OK3DX	"	2,156,000	1770	137	402
OK28HV	"	1,890,552	1939	113	331
OK2RU	"	751,125	1028	100	275
OK2PDT	"	660,504	954	86	221
OK3IAG	"	585,330	845	94	264
OK3CND	"	515,230	784	90	245
OK2ABU	"	508,053	878	79	194
OK2PCF	"	500,682	916	73	200
OK1VD	"	493,592	720	95	221
OK3PO	"	388,332	660	73	179
OK3YCA	"	380,688	641	80	184
OK1MNV	"	354,816	674	68	163
OK3FON	"	342,240	513	83	193
OK1DXW	"	317,955	709	65	170
OK1MKU	"	303,548	548	77	182
OK3CEL	"	297,472	707	56	168
OK2EC	"	286,754	495	88	181
OK1KJA	"	282,892	604	57	140

(Opr. OK1AJN)

OK2HI	"	268,352	592	67	157
OK3COZ	"	195,891	604	56	111
OK1AJY	"	156,625	395	55	124
OK3DT	"	147,680	478	46	111
OK2B8Q	"	133,369	452	49	148
OK2BND	"	114,208	403	51	115
OK1OH	"	88,320	323	40	98
OK3PC	"	81,240	378	39	81
OK3TAY	"	78,208	294	27	101
OK1AXB	"	77,190	268	48	107
OK1KZ	"	76,791	302	41	102
OK1MZO	"	72,670	228	55	114
OK3CWF	"	68,096	354	38	95
OK2PGT	"	67,230	259	50	162
OK2BCZ	"	65,065	294	38	105
OK2BLD	"	45,870	226	36	74
OK1BB	"	33,705	133	44	61
OK3TFY	"	33,320	173	26	59
OK1FGS	"	33,269	145	40	63
OK2KJU	"	31,066	180	36	62
OK3BA	"	30,132	157	29	52
OK1FIM	"	23,474	112	37	60
OK1CWF	"	21,671	354	38	95
OK3CXS	"	20,735	125	28	37
OK1MNV	"	20,705	83	41	60
OK2BCI	"	11,730	52	35	50
OK1DZB	"	10,149	206	8	43
OK3CSQ	"	9,956	47	35	41
OK2BVG	"	9,180	80	19	35
OK1FTX	"	2,960	46	15	22
OK3CNS	"	2,656	44	10	22
OK2PAY	28	335,223	1094	33	86
OK2SG	"	197,241	601	32	97
OK1FKI	"	53,466	298	23	44
OK1KT	"	49,308	228	25	59
OK2ON	"	45,720	277	19	41
OK1UCW	"	35,208	260	19	35
OK2QX	"	22,680	121	27	43
OK1CSU	"	5,544	64	13	23
OK1DXL	"	5,402	64	14	23
OK2PO	"	5,280	67	12	18
OK3CTX	"	3,552	32	16	21
OK2BFN	21	378,144	1088	37	107
OK2CES	"	24,081	199	19	50
OK1JST	"	18,460	166	16	36
OK2PEM	"	10,474	79	19	35
OK3CFS	"	7,866	85	12	26
OK2SWD	"	3,887	60	11	12
OK1DIL	14	87,447	358	29	74
OK1MKI	"	65,110	432	23	62
OK2PBZ	"	50,934	348	21	57
OK1FKW	"	46,501	343	21	52
OK1AUS	"	38,380	226	25	51
OK3CAB	"	34,038	342	14	47
OK1FZM	"	17,018	113	18	49
OK1JDJ	"	8,228	82	13	31
OK2PAU	"	8,062	104	10	19
OK2AJ	"	6,422	93	10	28
OK3YDP	"	1,197	27	8	13
OK3DU	"	180	6	4	6
OK1FUA/P	7	204,355	925	29	85
OK1FKM	"	137,709	614	24	76
OK3KZY	"	105,200	456	26	74

(Opr. OK3TPW)

OK3CGN	"	36,330	258	17	53
OK1MSP	"	30,096	171	17	55
OK1PFJ	"	22,880	172	22	43
OK1AES	"	6,228	155	8	28
OK1FGC	3.5	21,050	371	10	40
OK1MAW	"	20,184	285	9	49
OK2PLH	"	19,920	317	11	37
OK3ZMD	"	18,286	404	9	32
OK2BWW	"	12,915	273	9	36
OK3CMS	"	11,176	244	8	36
OK2BRH	"	11,088	145	11	33
OK2PFX	"	10,962	131	10	44
OK2BGD/P	"	9,204	170	9	38
OK1FOG	"	576	101	1	5
OK2BCF	"	252	18	4	10
OK3TPV	1.8	39,195	551	12	55
OK1DDW	"	34,320	447	12	54
OK1DRU	"	10,580	229	7	39
OK1DWJ	"	10,476	180	8	46
OK1JDX	"	7,744	176	9	34
OL7BTG	"	5,328	145	6	30
OK2BQU	"	2,242	68	6	27
OL9CUD	"	1,984	61	5	27
OK2BQU	"	1,836	66	6	26
OK1DQT	"	1,536	34	7	25
OL7BTJ	"	1,058	50	4	19
OL3BUF	"	989	46	4	19
OK2BTK	"	560	36	4	12

Denmark

OZ1LO	A	3,269,467	3043	128	339
OZ1BIZ	"	438,780	711	80	204
OZ9BX	"	96,111	282	61	120
OZ4ACK	"	49,280	258	39	71
OZ1FAO	"	42,723	184	49	92
OZ8AE	28	171,396	487	36	102
OZ1KPB	"	34,832	260	17	39
OZ1ASP	"	29,890	208	19	42
OZ1AXG	"	3,624	55	11	13
OZ8E	"	2,923	31	10	27
OZ5XT	21	684	19	7	11
OZ7HT	14	371,070	1433	30	84
OZ4UN	"	102,102	490	25	77
OZ7YL	"	55,728	355	21	51
OZ7GF	"	1,848	38	10	14
OZ5MAY	"	408	24	4	13
OZ1FTE	7	197,472	710	34	98
OZ6PI	"	6,665	73	11	32
OZ1HZI	3.5	54,978	658	13	53
OZ1IIZB	1.8	288	18	2	14

England

G3FXB	A	3,783,282	2916	126	367
G3XTT	"	2,843,998	2451	121	345
G3ESF	"	509,138	899	71	216
G4ZFE	"	440,634	1016	65	141
G4BKT	"	418,405	935	56	149
G3GGS	"	325,404	526	67	195
G4ZME	"	73,482	319	31	80
G6NK	"	45,500	201	32	68
GB/K5TU	"	19,201	97	34	57
G3TXF	28	542,572	1334	37	121
G4BUO	"	533,390	1406	37	106
G4CNY	"	512,584	1481	36	100
G3HCT	"	490,050	1433	35	100
G3NKS	"	214,410	854	30	75
G3KHZ	"	174,944	503	36	106
G4UZN	"	123,585	480	29	76
G4OKN	14	30,438	297	15	42
G3IGW	7	169,074	847	24	77
G4ARI	3.5	24,786	380	11	40

Faroe Islands

OY1CT	A	544,887	1236	69	210
OY3QN	21	507,111	1927	33	88
OY9JD	1.8	47,040	590	13	57

Federal Rep. of Germany

DJ5JH	A	941,514	965	112	294
DL1JF	"	833,239	1031	99	260
DF5BM	"	709,650	895	88	254
DL3LU	"	658,000	773	115	285
DL3YBM	"	547,362	876	81	201
DL8KJ	"	507,517	707	85	232
DJ6GT	"	502,268	769	84	254
DF4PD	"	469,800	681	97	227
DL7CF	"	440,147	645	81	208
DL5JQ	"	434,700	798	70	200
DL2SCQ	"	422,564	615	82	216
DK8KC	"	389,789	675	76	183
DK7ZT	"	321,818	645	73	181
DJ7IK	"	311,472	595	72	180

DJ1YH	"	302,005	529	75	214
DF9FM	"	297,750	570	76	174
DL8SCG	"	227,183	504	64	145
DJ1DB	"	213,180	537	59	145
DK3LM	"	196,390	431	56	149
DJ5AV	"	186,264	456	53	146
DL9VDQ	"	184,280	324	60	211
DF1IK/P	"	169,400	361	58	142
DL9PU	"	158,500	457	51	74
DF30L	"	146,605	260	84	185
DL5XAS	"	144,072	407	50	124
DF4ZL	"	128,205	337	53	112
DL1ZQ	"	121,636	375	52	136
DF2UQ					

MFJ's Deluxe 300 Watt Tuners

... gives you ham radio's most popular tuner with *built-in dummy load*, a *peak reading* (and average) Cross-Needle meter, *full 1.8-30 MHz coverage*, antenna switch, balun and a full one-year *unconditional* guarantee for only ... \$149.95

Made in U.S.A.

MFJ-949D

\$149⁹⁵

- Peak reading meter
- Built-in dummy load
- Covers 1.8 to 30 MHz
- 1 year guarantee



You won't find all the MFJ-949D features in any other 300 watt tuner, not even at twice the price — or twice the size.

Put the most power into your antenna

The MFJ-949D Deluxe 300 watt tuner matches your rig to virtually any antenna from 1.8-30 MHz so you get maximum power out.

It tunes out SWR on verticals, dipoles, inverted vees, random wires, beams and mobile whips fed by coax, balanced lines and wire.

Lighted peak reading meter

MFJ's *peak* (and average) reading Cross-Needle meter shows you SWR, forward and reflected power — all in a glance. Shows peak SSB power.

The meter is illuminated for easy reading in dim light. Has light switch. Lamp requires 12 V.

Built-in dummy load

A built-in 300 watt 50 ohm dummy load makes tuning up your rig soooo easy. It reduces needless QRM and saves your finals.

You'll find it handy for testing and repairing your rig, setting power level, adjusting your mike gain and more.

An external dummy load can cost you *another \$30* — plus it takes up valuable space at your operating position and requires another cable.

Full 1.8 to 30 MHz coverage

Make sure the tuner you're considering covers *all* the HF bands ... the MFJ-949D does.

Plus more ...

You get an antenna switch that lets you select 2 coax lines (direct or thru tuner), random wire

or balanced lines and built-in dummy load. You get a 4:1 balun for balanced lines.

Unconditional Guarantee

You get a full one year unconditional guarantee. We will repair or replace your MFJ-949D (at our option) *no matter what* for a full year.

Others may give you a 90 day limited warranty. What do you do after 90 days? Or before 90 days if they say, "Sorry, it's your fault"?

SWR and maximum power into your antenna.

After all, isn't that why you use a tuner?

High efficiency and a compact size

The MFJ-949D uses a single high-Q airwound coil that takes up a minimum of space without mutual coupling problems.

You get a highly efficient tuner that puts maximum power into your antenna *and* a compact 10x3x7inch size that fits right into your station.

Competing tuners using two tapped coils require a large cabinet — not just to house the coils but also to help reduce detrimental coupling between the inductors. The result? *A tuner that's bigger than your radio.*

Easy to tune

With the MFJ-949D once you select the correct inductance, you can turn on your transmitter and tune *both* capacitors for minimum SWR.

Tuners with *two* tapped coils make tuning clumsy, slow and tedious.

You have to turn off your transmitter *each time* you adjust either of the two inductors. Then turn it back on to readjust the capacitor and to check for acceptable SWR.

MFJ tuners — Made in the USA

You get the most tuner for your money because MFJ tuners go directly from our factory to your dealer. We're not just an import-er adding profits, tariffs and import charges.

Get yours today!

Why settle for an imitation when you can own an MFJ original? Get your MFJ-949D today!

New MFJ Deluxe 300 Watt Tuner



MFJ-948

\$129⁹⁵



If you don't need a dummy load but want *all* the other features of the MFJ-949D choose the new MFJ-948 for only \$129.95.

The MFJ-948 features a *peak reading lighted* meter with a built-in lamp switch, a one year unconditional guarantee and is made in the USA.

Remember, with MFJ you're getting proven performance and reliability from the most trusted name in antenna tuners.

Precise control for minimum SWR

The MFJ-949D gives you more precise control for minimum SWR than any tuner that uses two tapped inductors.

Why? Because the two continuously variable capacitors in the MFJ-949D give you infinitely more positions than the limited number on two switched coils.

This gives you precise control to get minimum

Why Choose an MFJ Tuner?

Hard-earned Reputation: There's just no shortcut. *MFJ is a name you can trust* — more hams trust MFJ tuners throughout the world than all other tuners combined.

Proven Reliability: *MFJ has made more tuners for more years than anyone else* — with MFJ tuners you get a highly-developed product with proven reliability.

First Rate Performance: MFJ tuners have earned their reputation for being able to match just about anything — *anywhere*.

One year unconditional guarantee: That means we will repair or replace your MFJ tuner (at our option) *no matter what* happens to it for a year.

Continuing Service: MFJ Customer Service Technicians are available to help you keep your MFJ tuner performing flawlessly — no matter

how long you have it — just call 601-323-5869.

Your very best value: MFJ tuners give you the most for your money. Not only do you get a *proven* tuner at the lowest cost — you also get a one year *unconditional* guarantee and *continuing* service. That's how MFJ became the world's leading tuner manufacturer — by giving you your very best *value*.

Choose your MFJ tuner with confidence! You're getting proven performance and reliability from the most trusted name in antenna tuners. Don't settle for less. Get yours today!

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CIRCLE 89 ON READER SERVICE CARD

MFJ's 1500 Watt Tuner

MFJ-962C

\$229⁹⁵



For a few extra dollars the MFJ-962C lets you use your barefoot rig now and have the capacity to add a 1.5 KW PEP linear amplifier later. It covers 1.8 to 30 MHz.

You get MFJ's new peak and average reading Cross-Needle SWR/Wattmeter.

You also get a 6-position antenna switch and a teflon wound 4:1 balun with ceramic feed-thru insulators for balanced lines. Measures just 10 3/4 x 4 1/2 x 14 7/8 inches.

11VTX	12,000	77	26	74	Portugal					SM7TV	40,824	346	15	48	RV6AGG	783,696	1171	97	251	Karelia-Finnish						
I3JSS	587,412	1534	38	110	CR2A	A	3,820,320	2478	129	375	SM0BVO	37,741	200	21	52	UA4LCR	722,196	1241	90	144	UA1NDR	A	765,658	1378	83	224
I03VJW	552,015	1536	37	104	CT4KQ	14	32,482	137	38	71	SM7AHW	37,570	498	18	47	RA4AV	546,385	933	91	244	UA1NDY		25,134	159	30	183
		(Opr. I3VJW)			CO8UW	14	9,168	91	16	32	SM6HVR	28,768	222	18	44	RA6YA	464,744	744	88	213	Latvia					
11XSG	116,842	523	30	64	CT4DX	7	53,820	317	19	50	SM6IY	17,368	172	15	37	RA4HX	401,764	857	67	186	UO2GOV	A	37,932	194	30	79
IK0ADY	24,512	209	17	47	CT1AOZ	1.8	23,660	254	12	53	SM7LAZ	2,236	50	9	17	UV3WT	342,608	640	82	184	UO2GKO		29,896	366	13	61
I5MPN	84,027	351	27	84	Romania					SM0CCE	157,976	781	28	76	UW3DW	323,806	757	58	171	UO2PJ		52,202	252	25	61	
I3VHO	65,380	728	16	54	Y02DFA	A	347,050	767	75	200	SM6DOI	79,440	518	21	59	UA3DK	260,876	563	78	200	UO2GII	28	1,920	32	9	15
IK2GSN	48,396	536	14	60	Y07DO		309,358	614	62	204	SM7FHJ	2,226	38	10	11	RA3RN	246,370	347	104	243	UO2GRP	21	138,565	592	31	76
Luxembourg					Y04CAH		152,125	254	47	198	Switzerland					UO2GSM		38,055	293	17	42					
LX2AA	14	31,360	269	16	48	Y05BRZ		58,380	224	37	68	HB9AGA	A	532,818	920	78	219	UO2GHB		39,675	285	20	49			
The Netherlands					Y08DH		1,782	54	8	25	HB9KC		251,346	490	78	179	UO2GND	14	709,195	2271	36	109				
PABLOU	A	811,756	978	107	311	Y05AIR	28	31,570	238	17	38	HB9CVO		182,325	393	66	155	UO2GEO		30,318	197	20	42			
PABINA		435,420	646	87	208	Y03RK	21	48,389	281	23	60	HB9DFY		150,876	322	50	148	UO2GIZ	3.5	61,446	629	15	62			
PABABM		293,355	460	85	180	Y04BEK	14	24,552	207	17	45	HB9RE		138,958	438	42	92	UO2GGE		13,255	188	11	44			
PA63ERL		111,044	323	54	88	Y04BOV		16,470	218	16	45	HB9AGH	28	85,358	347	30	68	UO2GUD		1,593	56	6	21			
PA3BTH		71,435	219	54	103	Y07ARY		5,704	106	8	38	HB9CSM		6,171	88	15	18	UO2GON	1.8	2,272	66	6	26			
PA63BNT		61,290	241	43	92	Y08MF		4,192	70	5	27	HB9DX	21	23,010	92	31	87	UO2GSC		1,232	64	4	18			
PABYN		46,560	212	41	79	Y08KOS	7	75,592	524	20	68	HB9DCQ	7	53,369	318	22	61	UO2PPP		581	28	4	17			
PA3AMA		19,170	83	41	49	(Opr. Y08AXP)					Wales					Lithuania										
PA3BNH		4,350	53	18	32	Y08CDC		32,214	233	17	61	GW4BLE	A	3,177,044	3057	110	318	LY3BP	A	3,319,866	2937	131	355			
PA3CCF		2,829	31	16	25	Y05OAG		4,867	109	7	24	GW3JI		395,808	829	62	186	LY3BA		2,497,584	2271	132	356			
PA8KHS	28	13,450	124	16	34	Y04AAC		2,656	67	7	25	GW5NF	28	361,771	1455	28	81	LY3BU		1,195,380	1589	95	253			
PA62CHM		9,180	105	13	23	Y05BPE	3.5	6,264	179	6	30	GW3GWX	1.8	2,380	67	5	29	LY3BO		1,090,284	1427	96	281			
PA63CNF		1,785	49	8	7	Y06BTY		525	37	4	11	Yugoslavia					LY2BKP		652,372	1158	80	372				
PA62REH	21	197,024	954	30	54	Sardinia					YT3AA	A	3,855,332	2675	153	451	LY2BNC		471,744	893	72	216				
PA6BUV		58,960	353	21	59	IS00MH	A	201,020	571	46	144	YU380		2,362,830	1915	121	378	LY2PAQ		359,800	743	73	184			
PA3DKX		20,140	127	19	57	IS0FPH	1.8	3,852	97	5	31	YU3EA		1,737,288	1357	148	419	LY2BZ		322,149	760	57	162			
PA3DDG		5,247	86	12	21	Sicily					YU20B		1,231,022	1302	112	307	LY2BTD		295,692	742	65	181				
PA3ADJ	14	41,130	226	25	65	IT9TQH	28	559,790	1532	38	116	YU208		641,950	853	96	274	LY2BIM		287,784	655	62	170			
PA6BPLN		9,400	125	12	38	IT9BCC	7	2,079	65	7	20	YU2TY		467,700	826	89	211	LY2BOS		285,216	642	60	162			
PA3E0B	7	15,701	152	16	41	Scotland					4N4D		467,700	826	89	211	LY200		278,542	615	79	163				
PA60DIN		11,058	110	12	45	GM3YOR	A	666,976	1154	77	227	YT7KW		283,526	574	72	197	LY2DZ		241,536	522	58	146			
PA63ACC		798	22	5	14	GM40BK		39,762	141	49	92	YU4AV		138,288	588	71	212	LY380		234,260	523	70	142			
Norway					GM3CFS	28	85,002	410	24	69	YU7SF		118,524	338	50	116	LY38Y		203,412	686	51	150				
LA7MFA	A	1,995,064	2585	103	275	GM8SQ		8,680	100	7	28	YU7LS		74,798	233	54	95	LY2FBM		97,917	476	35	92			
LA6YN		799,796	976	96	220	Spain					YU4EXA		45,214	343	20	54	LY20U		87,508	240	51	116				
LA8CX		558,754	673	100	273	EA4EP	A	347,900	595	72	212	YU7KM		44,625	187	39	86	LY2BLW		27,200	261	20	60			
LA4YW		363,660	608	82	208	EA30B0		337,110	598	74	181	YU1PJ		29,999	108	47	84	LY2BHK		9,010	128	14	39			
LA8EW		293,178	646	73	189	EA7CA		286,465	602	69	166	YU2CCH		12,738	156	18	48	LY2BKA		6,063	51	19	28			
LA9MB		140,436	337	64	124	EA3BOW		276,297	571	66	157	YT2TA		5,720	50	22	33	LY2PCI	28	474,150	1301	37	108			
LA8CE		86,520	207	66	102	EA7XC		142,663	355	56	123	YZ6A	28	766,746	1963	39	123	LY3BN		267,995	790	32	101			
LA3WBA		30,132	160	35	58	EA1AK		138,336	340	53	123	(Opr. YZ6AA)					LY2BEJ		151,524	479	29	93				
LB7FC		29,866	178	29	80	EA1JO		131,182	335	58	156	YU7DR		438,900	1112	37	117	LY2BAT		61,700	250	31	69			
LA7LJ		3,836	47	15	13	EA4VA		86,375	342	41	84	YU2NW		394,704	1040	38	106	UP2BDN	21	214,049	750	32	89			
LA9HW	28	132,132	692	26	58	EA4DUL		55,500	228	38	62	YU3QV		328,530	918	37	104	LY2FF		22,072	181	20	42			
LA9DFA		17,861	127	17	36	EA5CZ		21,105	85	42	63	YZ2S		323,544	971	34	102	LY2BEI	14	128,472	613	27	74			
LA20G		11,385	107	15	30	EA2CEM		13,978	115	22	36	YU38U		294,386	927	32	95	UP2BF		25,368	241	15	41			
LA6PB		2,716	67	11	17	EA3DCM		13,520	134	16	24	YU2QU		180,668	601	33	91	LY2BB		23,220	170	15	39			
LA6FC	21	79,408	303	33	79	EA1CNL		10,570	110	14	21	YU7FT		59,280	298	25	53	LY2ND		18,576	193	17	37			
LA1DHA	14	35,574	312	19	47	EA5FMJ		9,794	52	35	48	YZ3A	21	695,959	1877	38	113	LY2BBL		12,060	145	813	32			
LA9PEA	7	11,220	115	15	45	EA3DVJ		5,206	54	16	22	(Opr. YZ3AC)					LY288I	7	116,699	629	26	77				
Northern Ireland					EA2CKP		4,320	52	15	21	4N4I		478,125	1610	35	90	LY2BIP		92,769	396	27	80				
GI48BV	A	396,927	784	65	176	EA0BBA/EA	28	556,376	1994	35	101	4N3E		447,876	1473	33	99	LY2SA		89,059	583	20	63			
Poland					EA4KD		158,738	480	30	109	YU3MF		70,840	258	30	80	LY2WR	3.5	241,250	1201	29	96				
SP9DWT	A	527,404	752	95	221	EA5YU		36,036	217	18	48	YU2W	14	786,510	2194	37	125	(Opr. YZ2FI)								
SP1AEN		472,760	850	76	189	EA7CP		11,327	119	16	31	YT3T		556,792	1613	37	121	4N4GD		483,664	1548	38	110			
SP9BBH		338,590	678	64	181	EA2CR		10,633	110	13	36	(Opr. YU3B0)					UA1ZAS		23,790	244	18	47				
SP8NTO		335,790	814	69	177	EA5BZM	21	54,239	346	20	53	YU4BR		228,872	886	34	100	UA4WFC		22,950	201	17	37			
SP9AKD		279,173	546	100	257	EA5GGV		40,832	204	26	62	YU7BJ		116,802	722	22	59	UA1WEN		16,465	204	17	30			
SP9CTW		159,891	314	71	168	EA4BV		2,040	40	9	8	4N49D		15,423	146	17	36	RA4PQC		15,777	150	15	36			
SP3HC		138,475	345	55	136	EA3GF	14	6,498	74	15	23	YT7A	7	398,790	1581	31	104	UA1CAJ		13,840	138	14	26			
SP8GEY		102,453	362	39	72	EA5ND		4,725	63	11	16	(Opr. YU70A)					UA1DZ	14	765,545	2067	38	117				
SP2JGK		68,432	369	28	76	Svalbard					YU3QI		120,225	559	28	77	UV1AA		158,894	790	30	76				

BEST OF MFJ

MFJ, Bencher and Curtis team up to bring you America's most popular keyer in a compact package for smooth easy CW



MFJ-422B

\$134⁹⁵

The best of all CW world's -- a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle!

This MFJ Keyer is small in size but big in features. you get iambic keying, adjustable weight and tone and front panel volume and speed controls (8-50 WPM), dot-dash memories, speaker, sidetone and push button selection of automatic or semi-automatic/ tune modes. It's also totally RF proof and has ultra-reliable solid state outputs that key both tube and solid state rigs. Use 9 volt battery or 110 VAC with MFJ-1305, \$12.95.

The keyer mounts on a Bencher paddle to form a small (4-1/8 x 2-5/8 x 5/2 inches) attractive combination that is a pleasure to look at and use.

The Bencher paddle has adjustable gold plated silver contacts, lucite paddles, chrome plated brass and a heavy steel base with non-skid feet.

You can buy just the keyer assembly, MFJ-422BX, for only \$79.95 to mount on your Bencher paddle.

Deluxe 300 W Tuner



MFJ-949D

\$149⁹⁵ MFJ-949D is the world's most popular 300 watt PEP tuner. It covers 1.8-30 MHz, gives you a new peak and average reading Cross-Needle SWR/Wattmeter, built-in dummy load, 6 position antenna switch and 4:1 balun -- in a compact 10 x 3 x 7 inch cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Antenna Bridge

MFJ-204B \$79⁹⁵

Now you can quickly optimize your antenna for peak performance with this portable, totally self-contained antenna bridge.

No other equipment needed -- take it to your antenna site. Determine if your antenna is too long or too short, measure its resonate frequency and antenna resistance to 500 ohms. It's the easiest, most convenient way to determine antenna performance. Built in resistance bridge, null meter, tunable oscillator-driver (1.8-30 MHz). Use 9 V battery or 110 VAC with AC adapter, \$12.95.



SuperActive Antenna

"World Radio TV Handbook" says MFJ-1024 is a "first rate easy-to-operate active antenna ... quiet ... excellent dynamic range ... good gain ... very low noise ... broad frequency coverage ... excellent choice."

Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz to 30 MHz.

Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED. Switch two receivers and aux. or active antenna. 6x3x5 in. Remote unit has 54 inch whip, 50 ft. coax and connector. 3x2x4 in. Use 12 VDC or 110 VAC with MFJ-1312, \$12.95.



MFJ-1024 \$129⁹⁵

VHF SWR/Wattmeter

MFJ-812B \$29⁹⁵

Covers 2 Meters and 220 MHz. 30 or 300 Watt scales. Also reads relative field strength 1-170 MHz and SWR above 14 MHz. 4 1/2 x 2 1/4 x 3 in.



MFJ Coax Antenna Switches



\$34⁹⁵ MFJ-1701



\$21⁹⁵ MFJ-1702B



\$59⁹⁵ MFJ-1704

Select any of several antennas from your operating desk with these MFJ Coax Switches. They feature mounting holes and automatic grounding of unused terminals. They come with MFJ's one year unconditional guarantee. MFJ-1701, \$34.95. Six position antenna switch. SO-239 connectors. 50-75 ohm loads. 2 KW PEP, 1 KW CW. Black alum. cabinet. 10x3x1 1/2 inches. MFJ-1702B, \$21.95. 2 positions plus new Center Ground. 2.5 KW PEP, 1 KW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 ohm. 3x2x2 in. MFJ-1704, \$59.95. 4 position cavity switch with lightning/surge protection device. Center ground. 2.5 KW PEP, 1 KW CW. Low SWR. Isolation better than 50 dB at 500 MHz. Negligible loss. 50 ohm. 6 1/4 x 4 1/4 x 1 1/4 in.

"Dry" Dummy Loads for HF/VHF/UHF



MFJ-260B \$28⁹⁵

MFJ-262 \$69⁹⁵

MFJ-264 \$109⁹⁵

MFJ has a full line of dummy loads to suit your needs. Use a dummy load for tuning to reduce needless (and illegal) QRM and save your finals. MFJ-260B, \$28.95. VHF/HF. Air cooled, non-inductive 50 ohm resistor. SO-239 connector. Handles 300 Watts. Run full load for 30 seconds, derating curve to 5 minutes. SWR less than 1.3:1 to 30 MHz, 1.5:1 to 150 MHz. 2 1/2 x 2 1/2 x 7 in. MFJ-262, \$69.95. HF. 1 KW. SWR less than 1.5:1 to 30 MHz. 3x3x13 in. MFJ-264, \$109.95. Versatile UHF/VHF/HF 1.5 KW load. Low SWR to 650 MHz, usable to 750 MHz. Run 100 watts for 10 minutes, 1500 watts for 10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 inches.

MFJ Ham License Upgrade Theory Tutor



MFJ Theory Tutor practically guarantees you'll pass the theory part of any FCC ham license exam. Versatile MFJ software is the best computer tutor ever tailor-made for ham radio. You can study the entire FCC question pool, selected areas and take (or print) sample tests. Auto. saves each study session (ex. sample tests), gives you all FCC test graphics (ex. mono.), explanations of hard questions, pop-up calculator, weighted scoring analysis, color change option and more. Order MFJ-1610-Novice; MFJ-1611-Tech.; MFJ-1612-Gen.; MFJ-1613-Adv.; MFJ-1614-Ex. for IBM compatible. For Macintosh: MFJ-1630-N; MFJ-1631-T; MFJ-1632-G; MFJ-1633-A; MFJ-1634-E. \$29.95 per license class. MFJ-284 or MFJ-286

MFJ Speaker Mics

\$24⁹⁵

MFJ's compact Speaker/Mics let you carry your HT on your belt and never have to remove it to monitor calls or talk.

You get a wide range speaker and first-rate electret mic element for superb audio on both transmit and receive.

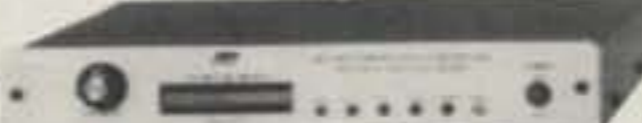
Earphone jack, handy lapel/pocket clip, PTT, lightweight retractable cord. Gray. One year unconditional guarantee.

MFJ-284 fits ICOM, Yaesu, Santec. MFJ-286 fits Kenwood.

MFJ-1278 Multi-Mode Data Controller

MFJ-1278 \$279⁹⁵

Use computer to transmit/receive in all 9 digital modes: Packet, AMTOR, ASCII, CW, RTTY, FAX, SSTV, Contest Memory Keyer and Navtex receive. Easy-Mail™ Personal Mailbox, Built-in printer port, 20 LED tuning indicator, AC power supply, Host/KISS, 32K RAM, Multi-gray level FAX/SSTV modem, CW key paddle jack and tons more. Options include 2400 baud modem (MFJ-2400, \$79.95) and software starter packs with computer cables, \$24.95 each, for IBM compatible, Commodore 64/128, Macintosh and VIC-20.



12/24 Hour LCD Clocks



\$19⁹⁵ MFJ-108B \$9⁹⁵ MFJ-107B

Huge 5/8 inch bold LCD digits let you see the time from anywhere in your shack. Choose from the dual clock that has separate UTC/local time display or the single 24 hour ham clock.

Mounted in a brushed aluminum frame. Easy to set. The world's most popular ham clocks for accurate logs. MFJ-108B 4 1/2 x 1 x 2; MFJ-107B 2 1/4 x 1 x 2 in.

Cross-Needle SWR/Wattmeter

MFJ-815B \$69⁹⁵

MFJ Cross-Needle SWR/Wattmeter has a new peak reading function!

It shows you SWR, forward and reflected power in 2000/500 and 200/50 watt ranges. Covers 1.8-30 MHz.

Mechanical zero adjusts for movement. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Deluxe Code Practice Oscillator

MFJ-557 \$24⁹⁵

MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable because it runs on a 9-volt battery (not included) or an AC adapter (\$12.95) that plugs into a jack on the side.

Earphone jack for private practice, Tone and Volume controls for a wide range of sound. Speaker. Key has adjustable contacts and can be hooked to your transmitter. Sturdy. 8 1/2 x 2 1/4 x 3 3/4 in.

MFJ Multiple DC Outlet

MFJ-1112 \$29⁹⁵

New MFJ DC Power Outlet saves you space and money. Hook it to your 12 VDC power supply and get 6 DC outlets for connecting your accessories. RF bypassing keeps RF out of power supply from DC line outlet. 13 1/2 x 2 3/4 x 2 1/2 in.

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Thanks to TL8CM (DL8CM), TL appeared in lots of logs. Shown here are TL8CM, TL8WD, and their wives.



Looks like Jaime, CE0ZIG, has his crew lined up for a Multi-Single effort this year. Photo by CE0ZAA, Jaime's wife.



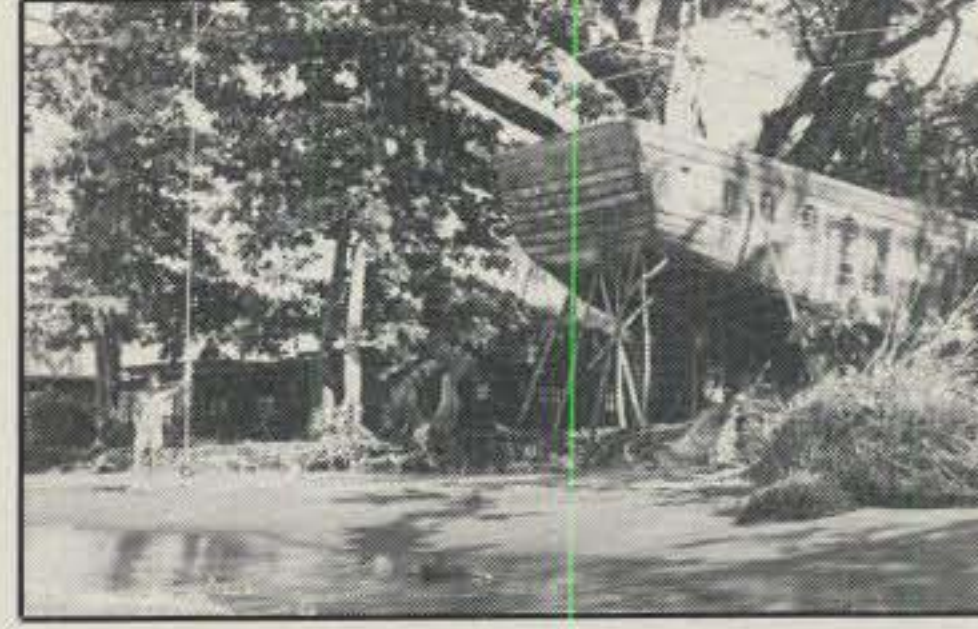
Jorma, ZB2X(OH2KI), assembling his antenna just before setting a new European all-band CW record.



Andy, K2LE, Jack, W2GGE, and Larry, W2AX, made a big noise from VP5Q.



Here is part of the antenna farm (located on a real farm) of OL8A.



Ron, J79DX (AA5DX), uses a real boat to anchor his fine 28 MHz effort.

UZ3DWX	41,895	165	25	80
UZ3QYA	9,114	139	16	33
UZ4SWF	6,020	98	17	26

Kaliningrad				
UZ2FWA	3,645,474	3161	131	380
Latvia				
R07W	8,198,411	5191	170	519

Lithuania				
LY2WW	5,132,160	3591	150	490
UP1BZG	5,104,000	3380	152	486
LY1BYK	3,014,283	2303	162	507
LY1BZR	175,935	444	55	130
LY1BWF	125,650	427	43	132
LY1BXF	122,672	510	37	127

Ukraine				
UB4WZA	2,279,448	2148	127	361
UB4QWW	2,229,843	2016	133	406
UB4SWB	1,574,664	1918	112	300
UB4IZA	1,182,320	1578	110	298
UB4LWY	503,573	799	92	209
RB4IYJ	457,728	969	69	187
UB4MWU	392,235	847	66	171
RB4EXN	219,232	532	64	157
RB4IWE	180,670	537	56	147
UB4WYA	160,043	569	45	124
UB4TWL	60,898	253	40	78
UB4WZB	27,734	143	32	66
UB4MZK	24,510	169	28	58

OCEANIA				
Australia				
VK3VT	645,840	1067	76	119
East Kiribati				
T32BE	1,662,980	2558	89	131
Marshall Islands				
KX60I	3,016,824	2745	133	240
New Zealand				
ZM2A	20,735	121	32	33
Palau				
KC6AA	5,002,664	3917	136	300
The Philippines				
DX1CW	1,075,088	1792	68	135

SOUTH AMERICA				
Chile				
CE1LDS	2,160,435	2060	1108	255
CE3				
/OH6VR	366,670	678	74	111

Fernando de Noronha				
ZW0F	4,375,301	3182	134	335

**MULTI-OPERATOR
MULTI-TRANSMITTER
NORTH AMERICA**

United States				
W3LPL	16,221,259	6866	190	619
KY1H	12,589,938	5819	180	567
K1ST	12,451,612	5878	175	547
NR5M	12,302,131	5613	181	570
K4VX/B	11,988,957	5791	185	542
K5NA/2	11,350,820	5266	180	565
W0AIH/9	10,290,761	5379	176	507
N6ND	7,781,088	4072	179	493
K07N	7,752,240	4518	169	423
N6DX	7,645,128	4002	177	501
K6UA	7,036,176	3626	182	506
W3GM	6,806,822	3624	159	479
KQ2D	4,940,298	2845	143	451
KS3F	3,841,581	2416	150	397
N2MM	3,415,929	2075	147	414
K6ZM	1,515,954	1193	136	310
K2TD	1,330,652	1075	119	309

Alaska				
NL7G	19,008,588	11337	166	468
Canada				
VE7ZZZ	7,784,920	5859	152	368
Saint Lucia				
J6DX	15,623,712	9742	162	480

AFRICA				
Maderia Islands				
CT3M	32,031,744	14473	172	596

ASIA				
Japan				
JE2YRD	9,043,812	5091	175	443
JA9YBA	7,128,318	4563	161	393
JR1ZTT	935,088	1425	84	147
JA7YCQ	597,756	974	74	144

EUROPE				
Czechoslovakia				
OK3KYH	65,520	412	29	101
European Russia				
UZ6LWZ	6,452,742	4900	172	470
Finland				
OH1AA	10,677,640	7628	161	471

Federal Rep. of Germany				
DF2RG	6,761,232	5108	157	491
DL0KF	6,581,232	6304	158	504
DF30G	810,832	1106	106	268
4U-Geneva				
4U0ITU	17,158,368	12372	167	569
Luxembourg				
LX7A	20,497,632	12735	189	705

The Netherlands				
PA6DX	13,613,952	8969	173	553
PI4RTZ	1,565,529	2223	103	278
Poland				
SP3KQV	338,985	730	65	178
Ukraine				
RB8M	18,570,440	9931	199	613
Yugoslavia				
4N9N	8,952,965	6170	173	524
YU1AST	430,908	769	82	216

OCEANIA				
East Malaysia				
9M600	2,235,566	2765	105	169
Indonesia				
YE2C	1,187,318	1291	106	213

QRPP					
W2TZ	A	994,889	1094	88	223
G4BUE	"	928,440	1191	98	262
YU30H	"	848,046	1143	91	255
K7SS	"	693,034	654	113	260
YU2TY	"	641,950	805	96	274
F1BEG	"	595,680	850	86	279
K1CGJ	"	585,365	634	87	232
J76CAM	"	574,938	803	96	177
UB5PAG	"	564,335	1004	80	215
SM0DJZ	"	515,478	756	88	230
UL7JW	"	513,454	734	94	204
SM5CCT	"	472,230	903	72	193
KE7X	"	460,600	584	95	185
AD1C	"	450,182	568	71	203
HB9ADD	"	427,944	730	77	187
UD6OFF	"	389,367	503	90	207
N7IR	"	379,088	570	75	157
N1AFC	"	322,272	508	59	157
UA4YJ	"	309,118	631	71	183
LZ1KHB	"	300,120	608	70	174
Y05CYH	"	286,220	624	69	151
UA6LIG	"	278,970	760	67	188
JR4GPA	"	277,992	607	59	103
NU4B	"	275,802	380	81	177
Y25NA	"	267,344	580	69	179

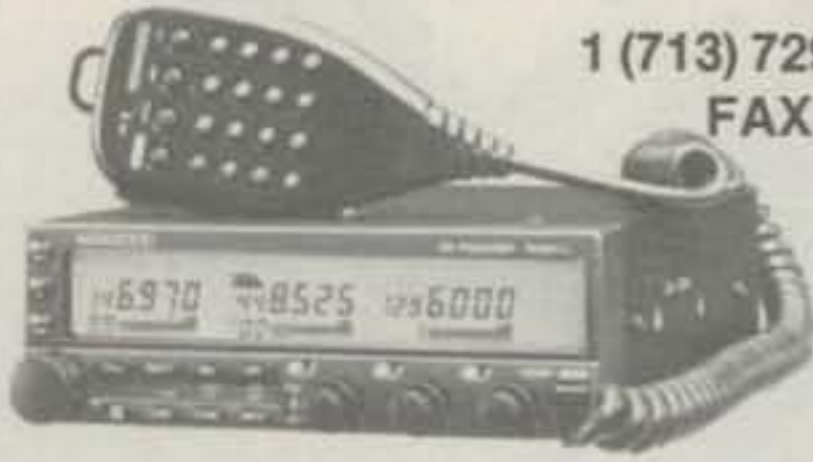
LA9VDA	**	204,918	456	74	172
K9PNG	**	195,621	356	64	133
UT4UB	**	175,959	501	48	123
UA0SAU	**	174,346	368	59	120
UA9MEK	**	174,000	383	54	120
Y21XC	**	171,039	444	56	163
IS0LYN	**	158,400	361	61	137
Y23TL	**	150,689	411	56	153
G4JFN	**	142,990	438	45	136
W0KEA	**	125,080	365	31	87
YO5BQ	**	117,813	443	33	140
OZ1JVN	**	116,460	413	50	130
HA7YS	**	110,216	363	43	141
I0KHP	**	92,648	305	42	106
KE0UI	**	81,900	240	32	85
KA1CZF	**	76,440	190	46	101
DK4CU	**	69,960	256	38	94
W0NGB	**	69,552	199	41	85
UA9XGB	**	68,284	283	24	62
N0CNV	**	63,308	199	44	75
PA60PUR	**	60,720	276	35	53
EA1GT	**	59,470	358	25	70
PAG0ADT	**	54,236	273	33	58
Y26JD	**	47,728	245	24	52
K0IYF	**	38,906	135	34	64
KI0G	**	38,236	176	28	51
NQ2W	**	30,260	120	28	61
DJ5QK	**	21,658	124	30	68
W6YVK/7	**	17,204	93	32	36
VE2BLX	**	15,470	96	26	39
OK3TUM	**	15,343	210	15	42
OK2PBG	**	14,652	112	22	44
VE7HR	**	13,624	117	32	20
UM8MDX	**	10,400	53	35	45
JK2VHU	**	8,520	60	29	31
PA0TA	**	4,410	69	16	33
WD9IWP	**	2,590	73	15	22
WS7U	**	2,508	36	15	18
Y24XH	**	1,820	34	11	15
KR2Q	**	1,740	22	12	17
OK1DZD	**	221	8	7	6
Y04CXD	**	210	15	5	10
W5VGX	28	168,475	504	30	85
JR3RWB	**	159,565	580	27	70
UL7ACI	**	151,902	544	28	69
KG5U	**	132,595	395	31	84
JE1WBA	**	95,760	353	27	68
UQ2GTF	**	81,473	465	29	84
RB5FO	**	68,850	337	28	62
KB0U	**	53,770	194	29	66
JA0GCI	**	51,460	215	27	56
NI9C	**	46,986	200	22	60
OK1NR	**	44,346	314	18	39
W8VSK	**	38,219	149	24	67
UB5WAB	**	26,403	146	21	43
UV6AAX	**	24,640	378	11	44
EA1KC	**	20,360	216	17	43
RB5UU	**	20,988	189	16	28
NJ9C	**	20,460	121	19	41
RA4AI	**	10,428	121	14	30
P33RAH	**	8,214	78	15	22
YC6INU/P	**	8,208	81	14	22
OK2PCN	**	7,310	75	16	27

YO2AQB	**	5,880	64	18	24
UB3MN	**	5,673	81	8	23
YU4XA	**	3,780	50	12	16
JH5NTL	**	1,180	21	7	13
JR7OEF	**	1,020	20	9	11
N9AW	21	103,875	287	35	90
WB4BBH	**	93,625	301	31	76
UR2CR	**	76,752	451	21	57
W8IQ	**	70,200	248	29	71
JA8BMS/1	**	62,960	277	25	55
KJ4VH	**	60,134	196	32	75
UQ2GFU	**	59,760	359	24	56
SP4GFU	**	57,196	352	22	57
G3VMY	**	54,242	362	20	54
N6UU	**	35,697	171	22	51
UB5PCS	**	32,118	288	17	36
JA8RJE	**	30,261	140	24	53
UA9SG	**	28,652	364	17	35
JF8LPB	**	28,288	162	23	41
I4KRF	**	27,269	407	18	49
OK1DRE	**	20,286	198	16	33
G3DOP	**	13,083	169	13	36
LA8WG	**	7,406	109	14	33
W3CEI	**	6,290	63	13	24
JR7HOD	**	1,394	33	9	8
Y49ZL	**	50	5	5	5
YT3FM	14	79,928	446	26	71
UL7ABA	**	60,514	267	27	51
OK1AAW	**	48,575	358	19	48
UB4AR	**	46,500	305	23	52
W8QZA/6	**	25,232	118	24	52
G3LHJ	**	18,849	133	16	45
NE1E	**	11,526	80	12	

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SINGLE OP. ASSISTED

United States

K10G	A	5,048,802	2904	155	438
KE3Q/1	"	3,652,453	2532	137	360
K1VR	"	3,000,578	1872	153	400
AK1A	"	1,778,917	1314	127	342
K8LT/1	"	1,403,820	1237	104	292
NO1I	"	1,158,924	918	123	319
K8PO/1	"	1,014,022	924	107	279
KT10	"	815,326	865	96	230
NK1I	"	520,866	534	106	236
W1BIH	"	375,720	632	57	145
A13E/1	"	368,445	407	98	221
N2AIF/1	"	275,456	358	76	193
AG1C	"	241,344	301	91	197
N1AU	"	157,090	238	76	154
K1ZZJ	"	153,278	310	51	122
WA8SWM/1	"	144,281	247	70	153
KC8PE/1	"	114,304	222	62	126
K1BG	"	34,892	103	53	69
W2REH	A	2,696,110	1747	146	384
KR2J	"	2,529,072	1731	131	373
W1GD/2	"	1,032,087	867	107	306
WB2P	"	996,996	620	156	416
W2VJN	"	704,990	649	114	263
WA2MKM	"	597,766	765	81	196
KD2RE	"	401,489	449	96	227
W2GMA	"	204,800	289	84	172
K20WE	"	199,120	320	79	183
K3WW	A	4,427,698	2422	157	486
N3AD	"	3,327,488	2146	136	400
NN3Q	"	1,792,973	1454	122	305
WB3JRU	"	1,743,007	1212	140	359
AA3B	"	1,493,580	1179	118	320
N3II	"	1,201,750	887	132	343
K300	"	1,129,598	999	110	284
K3ND	"	752,192	598	140	308
N3RR	"	698,340	621	128	284
N3NA	"	621,818	711	96	206
KX2A/3	"	567,388	628	95	237
N6CQ/3	"	544,698	511	118	275
W3KV	"	518,661	535	101	240
W3AZ	"	481,325	534	97	228
K3ZA	"	444,154	587	79	195
KW3F	"	435,404	479	94	229
NC3C	"	413,760	527	94	226
NW3Y	"	302,364	500	71	156
AJ3H	"	291,018	378	80	193
KQ3F	"	248,148	384	66	160
K3RL	"	185,420	262	83	171
N13P	"	92,400	186	82	118
W3FTG	"	57,155	178	34	81
W3MA	28	475,840	1018	37	123
N4KG	A	3,091,600	1820	158	432
K84GD	"	1,168,036	1064	110	276
K4MF	"	1,079,960	912	108	298
W3YY/4	"	1,065,130	927	127	294

WB4MAI	"	492,063	446	135	268
AA4DO	"	415,188	434	114	228
WA4CUG	"	377,600	423	107	213
K4PR	"	344,256	469	77	187
KX3Q/4	"	254,505	374	73	162
W4LVM	"	103,191	221	57	102
KQ4G	"	74,752	212	44	84
N3RC/4	"	40,051	113	40	81
N4TL	"	17,325	78	26	51
K1ZZI/4	7	466,956	1275	32	94
KW5P	A	1,110,956	1291	94	214
AA6PB	A	900,102	798	121	285
AF6S	"	676,368	655	116	250
AJ6V	"	260,496	432	74	142
WA7G/6	"	258,500	404	78	142
K6MA	"	255,088	324	103	195
K16X	"	100,717	261	55	96
K6LRN	"	64,574	142	64	102
K6SMH	"	34,170	93	46	88
W8LLY/6	"	29,785	90	43	72
AA4M/6	28	257,686	643	36	107
K7RIE	A	932,856	892	111	265
W7ZR	"	850,454	993	103	216
NC7K	"	776,620	677	129	283
WA7FAB	"	661,710	956	92	182
W7WHY	"	520,515	696	82	187
N7KZN	"	378,000	530	82	168
KA7CSE	"	216,108	391	68	139
NO7F	"	51,435	164	52	83
K7IDX	21	23,278	86	35	78
NX7K	28	104,640	345	31	78
K8MR	A	2,560,404	1791	135	354
KV8Q	"	1,147,050	905	132	318
K8CX	"	628,192	763	85	208
WD8JXE	"	227,735	426	51	134
KC8JH	"	41,875	120	40	85
W8CAR	"	9,576	58	22	41
K9RS	A	1,738,030	1237	137	353
K9OSH	"	168,048	282	77	139
N9AU	7	82,244	250	31	85
W9XT	28	344,586	863	34	104
W8CG	A	1,695,778	1410	114	299
NC8D	"	283,230	371	83	187
WB8ZRL/8	"	224,250	273	90	209
W8SR	"	185,724	266	81	171

Japan

JA7UES	A	232,206	504	62	107
JH8GNM	"	37,856	146	52	60
JH8VPO	7	585	16	7	8
JH1XUZ	28	160,062	539	32	71

Federal Rep. of Germany

DJ2YA	A	673,455	708	120	297
DA1KM	A	54,626	215	47	96

Norway

LA9ML	28	3,190	50	12	17
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CHECKLOGS

Our thanks to the following stations who sent in check logs: AA5HR, CX8DT, DK5OS, DL4DBR, DL9PU, EA1CYL, EA4KD, EA3JJ, EA5EGD/7, EA7AT, EA7OM, EC7DEB, GI5TK, HA1UB, HA2EOA, HA5FA, HA0IR, HA0LG, HB9CSM, HK3DDD, HK6LNO, IT9ZGY, JW8XM, K9UIY, KA1CLV, KG0A, KK6H, KL7UR, KO4D, KR0U, KS7V, LA1FW, LA2KD, LA3FE, LA4KQ, LA4NE, LA4NG, LA4NJ, LA4OGA, LA4WJ, LA5MT, LA5RBA, LA5XX, LA7XE, LA8LA, LA9FFA, LA9HF, LA9HW, LA9DI, LA9UF, LY2BB, LZ1AG, LZ1LG, LZ1MC, LZ1NJ, LZ1QO, LZ1UH, LZ1VQ, LZ1WZ, LZ1ZP, LZ2DD, LZ2HK, LZ2KAD, LZ2KKK, LZ2OV, LZ2PS, N4RUM, N5MLL, N9GPF, NW4Y, OH2BXT, OH3MIG, OH3QU, OH5FA, OH5MMG, OH5PT, OH5QY, OH5YX, OH6AA, OH6NH, OK1ARN, OK1CSU, OK1DFT, OK1DMP, OK1DOW, OK1FAI, OK1JDJ, OK1MHI, OK3CGN, OK3KJF, OK3KVU, OK3TDO, OK3TRJ, OL8CVU, OY7ML, OZ1CAR, OZ1CBW, OZ1EUO, OZ1JNR, OZ1JSZ, OZ1KWG, OZ1OXZ, OZ2E, OZ2J, OZ3LF, OZ3Q, OZ5PA, OZ5UR, OZ6PI, OZ7JQ, OZ7OP, OZ8AE, PA0LRK, PA3BFH, PA3DRZ, PY1RO, PY2NZP, PY2ORF, PY2YN, PY3CJ, PY5BVL, PY7FNE, RA1ACW, RA1AI, RA1CU, RA1OA, RA3ALA, RA3ATM, RA3DEQ, RA3DEV, RA3DN, RA3EF, RA3RRU, RA4CD, RA4NEW, RA4SA, RA4SAE, RA6LB, RA9AAA, RA9FI, RA9UNR, RB4LWX, RB4MYC, RB5CA, RB5CO, RB5CW, RB5HM, RB5PE, RB5RR, RB5UX, RF6FO, RR2RU, RV4LA, RV6AF, RV9CFP, RW3DD, RW3RO, RW6AC, SK5PZ, SM0BFJ, SM0CMH, SM0CSX, SM3AVW, SM3C8R, SM4A0H, SM4ASI, SM4AWC, SM4LEB, SM4SCK, SM4SWF, SM4TU, SM5APS, SM5CVC, SM5FNU, SM5FUV, SM5IMO, SM5MLE, SM5OL, SM6AHS, SM6BWO, SM6CDN, SM6GDR, SM6ID, SM6LL, SM7AIL, SM7CKZ, SM7CZC, SM7KWE, SP2BRN, SP2BSF, SP2ERZ, SP2EQW, SP2FAP, SP2GKQ, SP2GOW, SP2GUV, SP2JXN, SP2JXN, SP2NA, SP2ZFJ, SP2ZT, SP3CDO, SP3JA, SP4EEZ, SP4ETO, SP4GDC, SP4JFR, SP5BYF, SP5DZE, SP5ILO, SP6CXH, SP6FER, SP6TPM, SP6GSC, SP9DGO, SP9DTH, SP9EML, U0AG, U2RA, UA0ABB, UA0JB, UA0KBC, UA0KCL, UA0QGL, UA0QJN, UA0UAG, UA1AKT, UA1AUA, UA1CUQ, UA1OFU, UA1OLL, UA1OT, UA1ZAS, UA3ACJ, UA3AGU, UA3AGW, UA3DFV, UA3DGA, UA3DSS, UA3EAY, UA3ECJ, UA3ECO, UA3EDH, UA3EHL, UA3ET, UA3IAK, UA3ICJ, UA3LDU, UA3PTW, UA3QAM, UA3QBX, UA3RB, UA3RBO, UA3RLZ, UA3SET, UA3TAM, UA3TDO, UA3TJW, UA3XBB, UA3XDF, UA3XGM, UA3ZSG, UA4CC, UA4CJP, UA4FEU, UA4HRZ, UA4NBD, UA4NBH, UA4PNV, UA4UDC, UA4WFL, UA4YBV, UA4Y6, UA4YS, UA6HPK, UA6HPT, UA6HSN, UA6LAX, UA6LDF, UA9AKW, UA9CDT, UA9CSY, UA9KDP, UA9MCM, UA9OS, UA9SAW, UA9SGN, UA9SK, UA9TS, UA9UY, UA9YNC, UB3JM, UB4JIF, UB4JN, UB4LI, UB4UFT, UB4WWT, UB5CEU, UB5EW, UB5FDL, UB5GHG, UB5IFG, UB5ITB, UB5JNW, UB5JX, UB5KV, UB5MEC, UB5QBC, UB5QGD, UB5QJA, UB5SBF, UB5VNF, UB5XBV, UB5ZBG, UB5ZKE, UC2AAN, UC2AT, UC2CBC, UC2IU, UC2LB, UC2LCW, UC2OM, UC2OS, UC2WAS, UC2WD, UD6DKZ, UG6GG, UH8ED, U18BA, UL7BW, UL7LAH, UL7TJ, UL8RWR, U05OAL, U05OEW, U05OOW, U05WU, UP2BF, UQ2GII, UQ2GLQ, UQ2PP, UR1RXB, UR2RND, UT4UH, UT4UWL, UTSLF, UT5UDI, UT5UJO, UT5UNF, UV0BB, UV3DA, UV3DAV, UV3DFL, UV3DN, UV6AAX, UV6HLC, UV9CAO, UV9CBI, UW3DU, UW3PK, UW3RN, UW3ZV, UW6AJ, UW6HO, UW9AD, UW9YM, UZ8QXU, UZ1AXZ, UZ1CXF, UZ10WW, UZ3SWX, UZ3XWM, UZ4AZQ, UZ6LWA, UZ9CXA, VE1ACK, VE7BSB, VE7UBC, VK2EKY, VK4XW, VO1AW, VU2IN, W1BIH, W4RKV, W4XD, W8FJ/3, WW7M, Y21CL/A, Y21DH, Y21UD, Y21XF/A, Y22TO, Y23PF, Y23RJ, Y23UE, Y23YM/A, Y24AM/A, Y24HJ, Y24SG, Y24WJ/A, Y24XD, Y25MG, Y25OF, Y26XM, Y27KO, Y32EK, Y36XN, Y37XJ, Y43RF, Y52ML, Y54ZA, Y55SC, Y56UE, Y56ZE, Y71KA, Y75YL, Y03LX, Y08COQ, YU3HA, ZW1J, ZY5AKW, ZZ8WHL.

Addendum SSB Results: K3ND, Assisted category, Score 975,800, QSOs 730, Zones 122, Countries 354. P40V, VE7NKI, an op of P40V, was incorrectly listed as VE7KNI.

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TM-2530A - 2M, 25W TM-2550A - 2M, 45W
TM-2570A - 2M, 70W TM-3530A - 220, 25W
TR-751A - 2M, SSB TH-75 - 2M/70CM HT
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IC-2400 - VHF / UHF Mobile Xcvr.
IC-228A - 2M - 25W Mobile Xcvr.
IC-228H - 2M - 45W Mobile Xcvr.
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202 / 204 Nx Bridges 59 / 79
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MODEL	AMPS	ICS	PRICE
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Models With "M" Suffix Have Meters.

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Standard 8 Conductor Rotor Cable.
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Telex HAM4 - 15 SQ. FT.
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Yaesu G500A Elevation Rotor.
Please Call For Prices On Rotator!

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A4S - 4 Element Triband Beam.
A743 / A744 - 30/40 Kit For Above.
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AP8 - 80-10M Vertical Antenna.
D40 - 40M Rotatable Dipole.
40-2CD - 2 Element, 40M Beam.
A50-5 - 5 Element, 6M Beam.
215WB - 15 Element, 2M Beam.
230WB - 30 Element, 2M Beam.
4218XL - 18 Element, 2M Beam.
3219 - 19 Element, 2M Beam.
ARX2B - 2M Vertical antenna.
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HPTG2100I - 2100 Lb. Rating. \$.36
HPTG4000I - 4000 Lb. Rating. \$.59
HPTG6700I - 6700Lb. Rating. \$.79
Phillystran Guy Cable is Non-
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Longer Uses Potting Heads, But
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All Models Shipped
Factory Direct - Prepaid.
Features: All Steel - Hot
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Supporting - With Rotor
Shelf and Wench.

Model	Height	Load
HG37SS	37 FT.	9 S.F.
HG52SS	52 FT.	9 S.F.
HG54HD	54 FT.	16 S.F.
HG70HD	70 FT.	16 S.F.

Accessories For Hygain Towers
Are Also Available For Immediate
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New DX88 HF Vertical Antenna.
7-2 Discoverer - 2 El., 40M Beam.
7-3 Discoverer - 3rd El. add-on Kit
Explorer14 - 3 Element Tribander.
QK710 - 30/40M Add-on Kit
V2S - V3S - V4S - VHF/UHF Vert.
TH5MK2S - 5 El., Triband Beam.
TH7DXS - 7 El., Triband Beam.
205BAS - 5 El., 20M Beam.
155BAS - 5 El., 15M Beam.
105BAS - 5 El., 10M Beam.
204BAS - 4 El., 20M Beam.
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18AVT/WBS - 80-10M Vertical.
18HTS - 80-10M Hytower Vertical.
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HEIGHT	25G	45G	55G
50	849	1229	1549
60	939	1389	1939
70	999	1719	2159
80	1199	1869	2369
90	1289	2039	2579
100	1369	2199	2989
110	1449	2459	3209
120	1669	2619	3429

These Towers Are Shipped Com-
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Hardware, Base Section, Rotor
Plate; According To ROHN Specifi-
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Are Shipped Freight Collect From
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Model	Height	Load Cap.
FK2548	48 Ft.	15.4S.F.
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Here's an interesting idea you might keep in mind at the next amateur fleamarket you attend.

How To Operate Two Antenna Rotators With One Control Box

BY JOHN R. SOMERS*, KC3YB

Recently I came upon a rare deal. A shortwave listener (SWL) who lives near me had dropped his antenna rotator control unit and smashed it into pieces. Although he had trashed it before I learned of his misfortune, he still had the tower-mounted rotator unit. Having purchased a new rotator and control of a different brand, the old motor unit was of no use to him.

It was of use to me, though, being the same as what I was using, so I was able to pick it up for a song. When I contacted one of the amateur equipment distributors with which I deal, I was shocked to find out how expensive the control unit alone was. It seemed that one way or another my good deal really wasn't so great. I was either going to have to fork

over \$100 for a new control or let the rotator gather dust in my garage.

One night in the shack it occurred to me that I scarcely had room for a new control even if I bought one. Other amateurs viewing my radio room for the first time always offer the same two comments: "It sure is little!" and "Boy, you sure have a lot of stuff in here!" Space is definitely at a premium. What I needed was a way to make one control box do double duty.

It was a simple matter to come up with an idea that would allow me to operate two separate rotators by means of one control. I briefly considered a rotary switch, which would certainly work, provided I could find one with enough poles and adequate current-handling capacity. Actually, with the proper switch, several rotators could be used by merely switching the several wires from the control to each rotator in turn.

Although I didn't have the proper switch on hand, I did have a couple of four-pole/double-throw relays and decid-

ed to go with them. With a contact rating of 3 amps they should be capable of handling the heaviest duty rotator with ease. As my control cable has only six wires, I went even further and doubled up on the two heaviest wires in the cable, connecting them each to two relay contacts instead of one. This halves the resistance between the contacts, which is insignificant anyway, and provides even more protection against burning the contacts due to excessive current. One thing the relays I used have over a rotary switch is that they are sealed and are less likely to get dirty than a switch.

Fig. 1 shows the circuit I used to operate the relays. It is nothing more than a simple full-wave power supply. The purpose of R1 is to drop the voltage produced by the power supply to the 12 volts required by the relays. If you use different relays, you will have to recalculate the value of R1 based on the current requirements of the relay coils.

Be sure to use care in connecting the wires from each rotator to the proper

*93-25 Beachwood Place, Crisfield, MD 21817

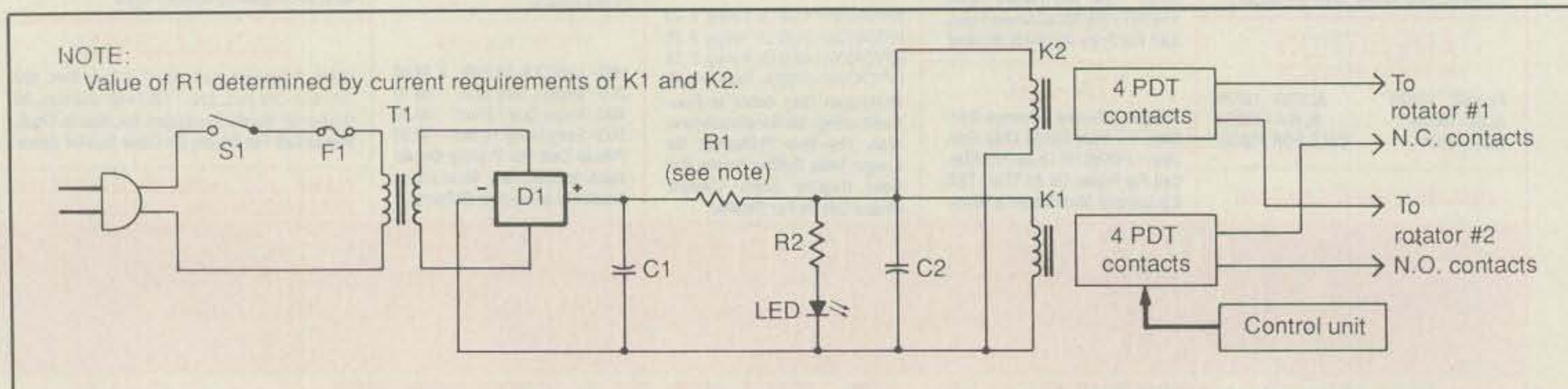


Fig. 1- The control-unit switching device consists of a simple power supply and two relays which serve the function of switching the existing rotator controls between two rotators.

CQ REVIEWS:

The Ameritron AL-1200 HF Linear Amplifier

BY JOHN J. SCHULTZ*, W4FA

The Ameritron AL-1200 HF linear amplifier is certainly a "heavy-weight" entry in the HF amplifier field. It can deliver a full 1500 watts carrier output in any mode on any band. It is a self-contained unit weighing 77 lbs. with almost half of that weight being taken up by the power transformer. It is a reasonably large unit (18½" D × 17" W × 10" H), but yet not so large that it cannot be accommodated on an operating table or on a small side table. Since it is a self-contained unit, a minimum of interconnecting cables to a transceiver and antenna system are involved.

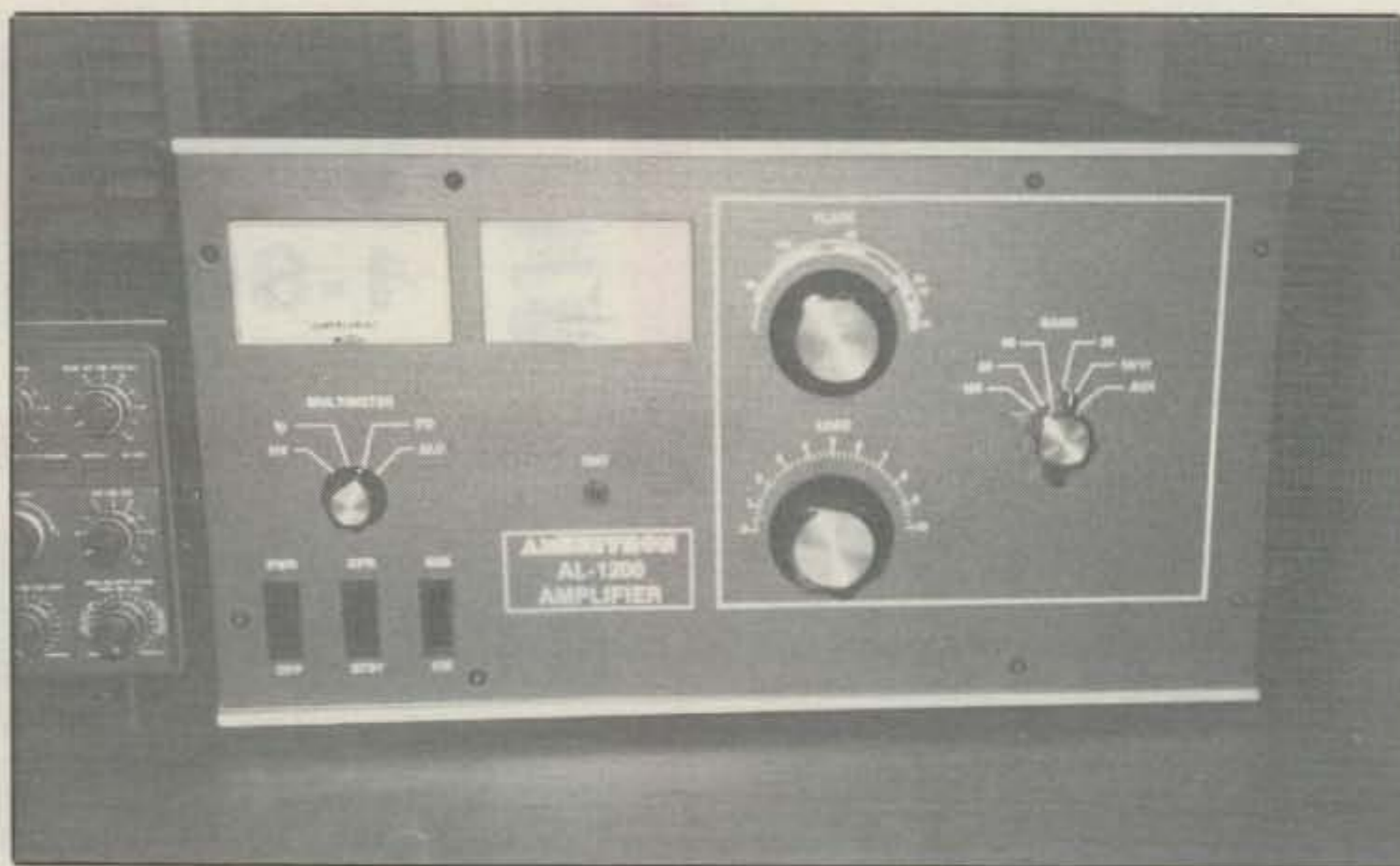
The amplifier features modern design using a single Varian/Eimac 3CX1200A7 ceramic/metal power triode. The price tag, at slightly over a dollar per output watt, is relatively modest, especially for a completely assembled amplifier. I thought the unit deserved a detailed examination and test workout.

General

The AL-1200 uses the 3CX1200A7 in a grounded-grid cathode-driven circuit. The nominal driving power required for 1500 watts output is 100 watts. The nominal input power required is 2500-plus watts from the AC line at full output. The AL-1200 is factory wired for a 230 volt, 50/60 Hz primary line voltage, but it can be rewired for a 120 primary if a line with sufficient power-handling capability is available (which is rarely the case).

Cooling for both the power tube and power-supply components is provided by a large squirrel-cage blower assembly in the amplifier.

Two panel meters are used. One is dedicated to the monitoring of grid current, and the other meter can be switched to measure plate voltage, plate current, peak power output, and ALC. The amplifier does provide an ALC output voltage to a transceiver, but such a connection is not absolutely necessary and in fact is



The front panel of the AL-1200 is very functional with self-explanatory controls. Both the plate and load controls have vernier drives.

not possible with some transceivers. The amplifier does have an internal ALC loop to prevent over-power operation.

The front-panel controls as shown in fig. 1 are extremely straightforward with just a power on/off switch, operate/standby switch, SSB/CW mode switch, band-switch, and tuning controls for "plate" and "load." The latter controls have vernier drives and are very easy to adjust. Once the amplifier has been properly tuned for an operating frequency, it is available for "instant-on" operation. There is essentially no warm-up time, although inrush current limiting is provided to limit stress on the power-tube filament.

The amplifier itself is capable of being used for semi-break-in, but not for full QSK. If the latter is required, as for AMTOR operation, a PIN-5 QSK Switch is available as an accessory item; it can provide T/R switching in microsecond time regions. You can install the PIN-5 on a do-it-yourself basis, or factory installation is available. I didn't use the PIN-5 unit, so I cannot comment on any details.

Table I lists the frequency coverage of

the standard AL-1200 and the AL-1200X which has been user "modified" for 10 meter coverage. "Modified" is actually a rather misleading word. Ameritron will supply information on how to activate 10 meter coverage to any licensed amateur who purchases the unit. The bandswitch already has a 10 meter detent position, and the 10 meter modification involves nothing more than cutting a wire lead. However, the wire is not obvious.

The amplifier is shipped in three separate packages. One package contains the amplifier itself, and then there are two smaller packages for the power transformer and power tube. The tube, with its glass chimney, simply plugs in place. You have to connect the plate lead. The power transformer has to be tightened in place using 7/16 inch nuts. The wire leads have to be installed using a combination of ring terminals and simple push-in connectors. Only simple hand tools are required. There is a certain very minor inconvenience in having to mount the tube and transformer, but I would prefer it that way. I can recall several horrible experi-

*302 Glasgow Lane, Greenville, NC 27858

The AL-1200 will operate with full output on all WARC bands except 24.5 MHz. The AL-1200X (export model) will operate with full output on all WARC bands.

STANDARD FREQUENCY COVERAGE

AL-1200		AL-1200X	
160 meters	1.8-2.0 MHz	160 meters	1.8-2.0 MHz
80 meters	3.3-4.4 MHz	80 meters	3.3-4.4 MHz
40 meters	6.3-8.3 MHz	40 meters	6.3-8.3 MHz
20 meters	9.5-15.5 MHz	20 meters	9.5-15.5 MHz
15 meters	15.5-21.5 MHz	15 meters	15.5-21.5 MHz
		10 meters	24-29 MHz

Table 1- Total frequency coverage for the AL-1200 and the AL-1200X. The AL-1200X is simply the AL-1200 "released" for 10 meter coverage.

ences over the years when I have shipped or received heavy pieces of equipment with transformers installed only to find that the transformers broke loose and caused extensive internal damage.

Circuitry

Fig. 2 is the schematic of the AL-1200. The input is via a bandswitched Pi-net-

work for each of the six band positions. The input SWR is less than 1.2:1 at the center of each band and rises to no more than 2:1 at about 20% off the center frequency. Slug-tuned coils are used, and you can adjust them individually if you really have some special reason to optimize the input SWR over a specific frequency range.

The output circuitry for the 3CX1200A7

is a Pi-L configuration. The Pi-L configuration provides a better harmonic suppression on all bands and allows the use of more reasonable-size LC components, especially for 1.8/3.5 MHz operation.

Two transformers are used, a 32 lb. hypersil type from the Peter W. Dahl Co. as the high-voltage transformer and a smaller one to provide filament/relay power. The secondary of T1 connects into a rectifier board marked FP-141. The board contains a full-wave rectifier assembly with five diodes per leg. The FP-143 board contains eight 210 μ F capacitors in series for an effective output capacitance of 26 μ F. Each diode has a spike protective capacitor across it, and each filter capacitor a voltage equalizing resistor. The no-load output voltage from the power supply is 3600 volts and drops only to 3300 volts under full load (at up to 900 ma, in fact, which is over the maximum input power that should be used to produce 1500 watts output).

The FP-142 board contains RF rectifier circuitry so the RF output can be measured by the panel meter and a rectifier assembly which provides a negative-going ALC voltage back to a transceiver. Potentiometer R1 can be used to set the ALC voltage output level. The FP-140 board contains a rectifier assembly for 12 VDC

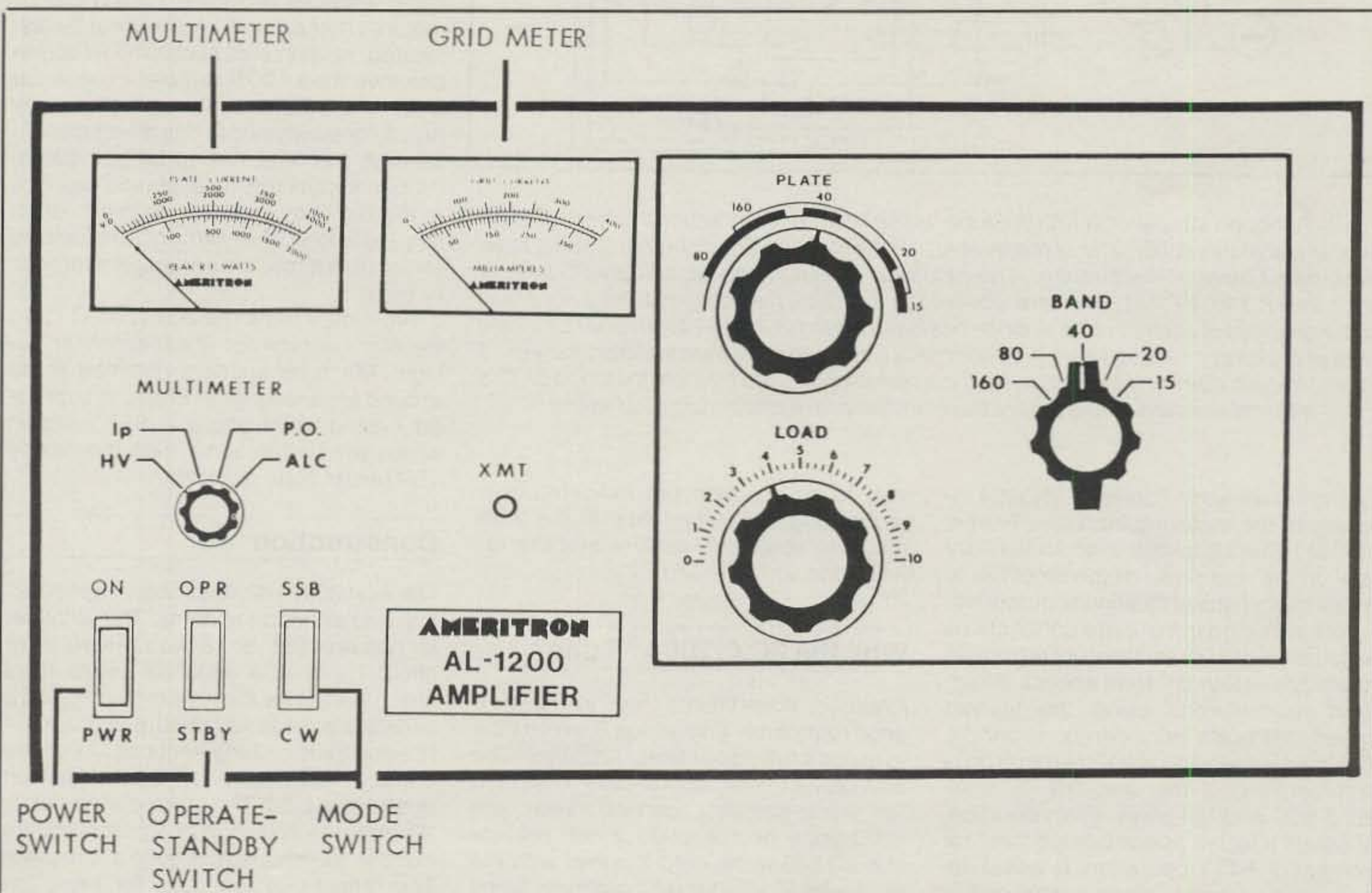


Fig. 1- Front-panel controls on the AL-1200. There is a detent position on the bandswitch. Both the plate and load controls incorporate vernier drives.

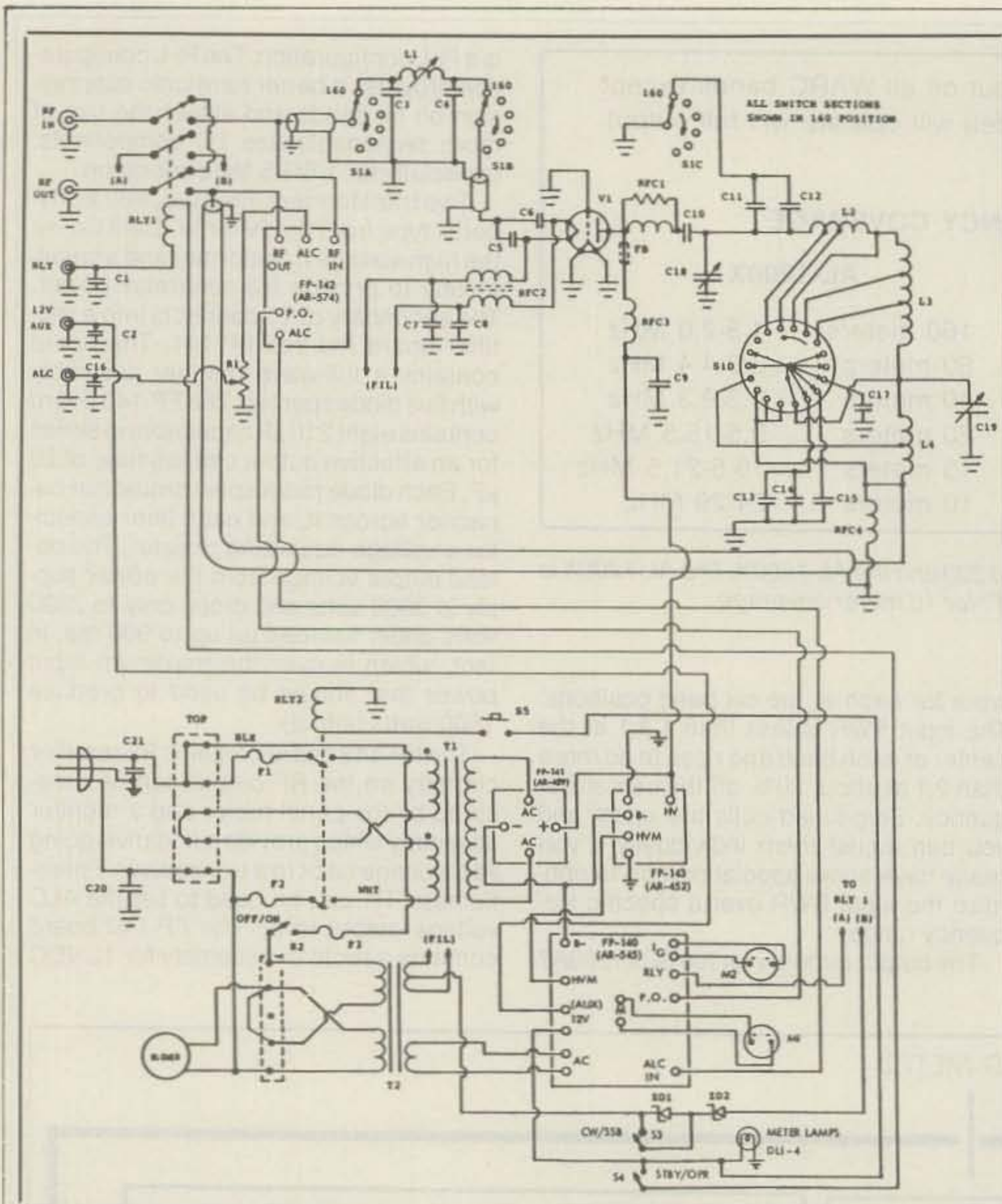


Fig.2- Although V1, the 3CX1200A7 tube, is the heart of the "action," it seems to be almost lost in this schematic of the total AL-1200 amplifier. The schematic does, however, detail most of the circuitry. The functions of various sub-assembly PC boards such as FP-140, FP-141, etc., are covered in the text. This diagram does not show some changes in current units. A diode has been added in the B- lead to act as a fuse in case of an internal tube short. A 10 ohm resistor is relay switched in the primary of T1 to limit in-rush current. Filament in-rush current is controlled by a combination of T2's internal resistance and that of the filament choke and associated wiring.

for the relays and to power a 2N3904 involved in the metering circuitry. Twelve VDC at 100 ma is available on an auxiliary jack on the rear panel of the amplifier to power miscellaneous station accessories.

Not indicated in fig. 2 are connections which allow you to set the cooling blower to any one of four different speeds. Ameritron recommends using the highest speed that noise considerations permit. The lowest speed is rated by Ameritron to sufficiently cool the amplifier for standard SSB and full-power CW operation, although a higher speed is suggested for contest or RTTY operation. It would appear easy enough to place a small switch on the rear panel to choose between at least two different blower speeds, if you

wish to do so. Also not indicated is a neutralizing tab placed next to the tube anode to absolutely ensure stability on the bands above 18 MHz.

Why the 3CX1200A7 Tube?

A subject almost guaranteed to provide a good roundtable discussion is which tube to use in a full-power linear amplifier! The 3CX1200A7 was specifically designed for linear-amplifier service. With just 3000 volts on the plate it will provide about 1600 watts output power with the third- and fifth-order IMD products being -35 and -47 dB, respectively. The driving power required is 100 watts peak. At

its absolute maximum ratings it can handle almost 5 KW input, so it is not being stressed at the 2.4 KW input level necessary to obtain 1.5 KW output. Its grid dissipation of 50 watts is very respectable.

It is not a cheap nor an expensive tube. Ameritron quotes the replacement cost in the low \$300 range. However, will you ever have to replace it? Field reports indicate it is a very, very dependable tube. Eimac warrants the tube for 3,000 hours of filament time (prorated after 300 hours). However, my experience with similar tubes is that you can expect at least 6,000 to 9,000 hours. WWV at Fort Collins, Colorado showed me some Eimac tubes years ago that had logged over 25,000 hours! Divide the hours by the hours you might expect to use a linear amplifier each day!

You should be aware, however, that the 3CX1200A7 is designed to run "hot," a fact with which most amateurs are not familiar. The external surfaces of the tube can reach temperatures of over 200°C! The tube is not going to be damaged by such temperatures, but you sure are going to be if you try to touch the tube before it has cooled down, a process which may take an extended time. The forced-air cooling coming from the tube can seem to be fiercely warm, but that is normal.

In any case, normal operation of any linear amplifier providing 1.5 KW output requires that around 1 KW of heat be dissipated, at least until such time as someone invents a 100% efficient linear. So whether the warm air is conducted away rapidly or slowly and in one direction or in several, the heat has to be dissipated. Proper ventilation in a station using a really high-power linear is more often needed to keep the operator comfortable rather than a modern ceramic/metal power tube!

All in all, I think the 3CX1200A7 is an excellent choice for linear amplifier design. The tube appears destined to be around for a long time. Eimac is supposedly going to introduce a "D7" version which will be the same tube but having 1500 watts plate dissipation.

Construction

The AL-1200 exhibits excellent construction and attention to detail. The amplifier is constructed on a heavy-steel-base shell. There is a separate pressurized steel chassis for the tube mounting and a separate shielded enclosure for the input Pi-network matching sections. All of the components seem to be of excellent quality material. The silver-plated 10/15/20 meter output coil of 3/16 inch square copper, for instance, is quite impressive. The output-circuitry coils for the other bands are of heavy-gauge silver-plated wire, and no ferrite cores are used, even

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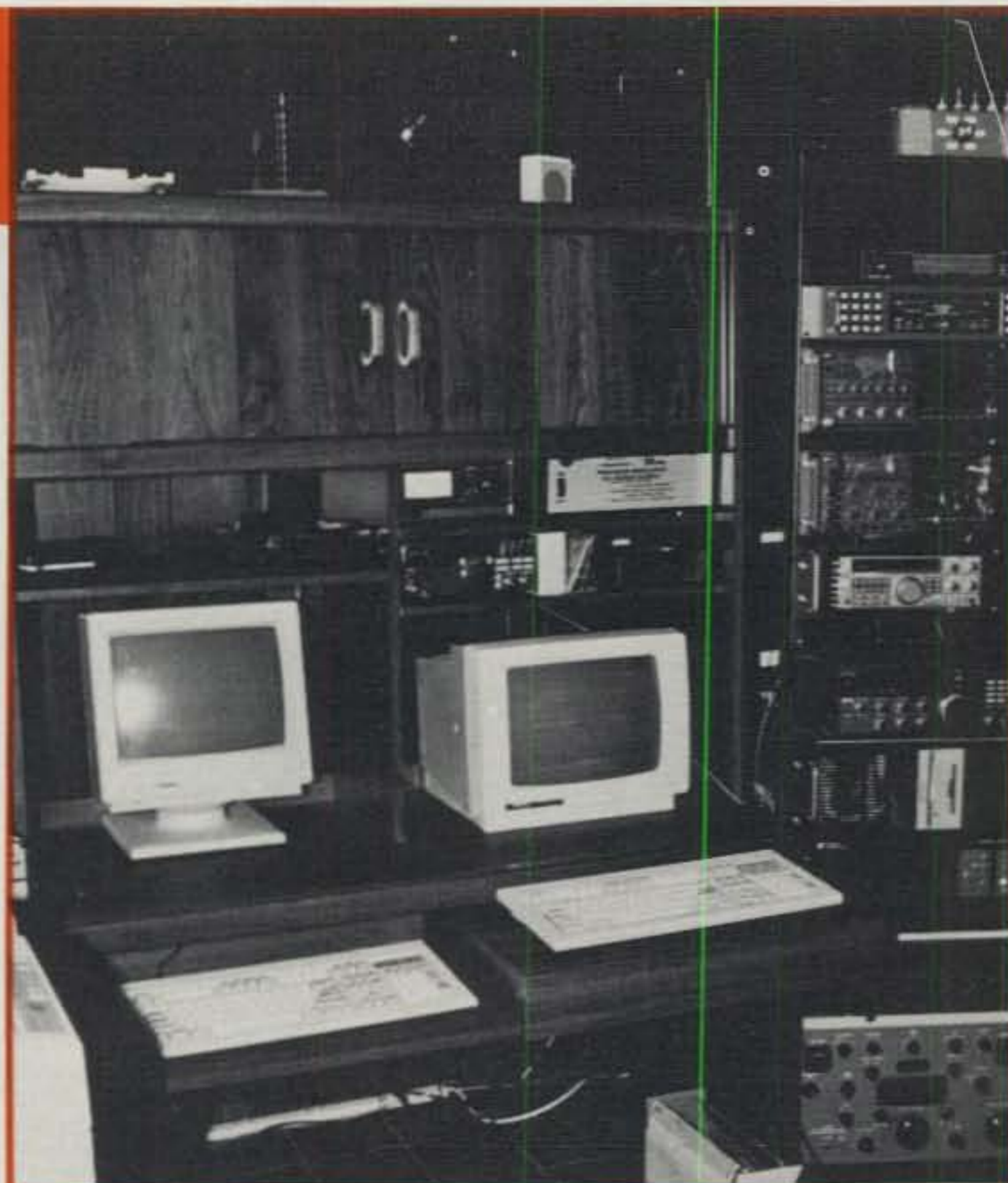
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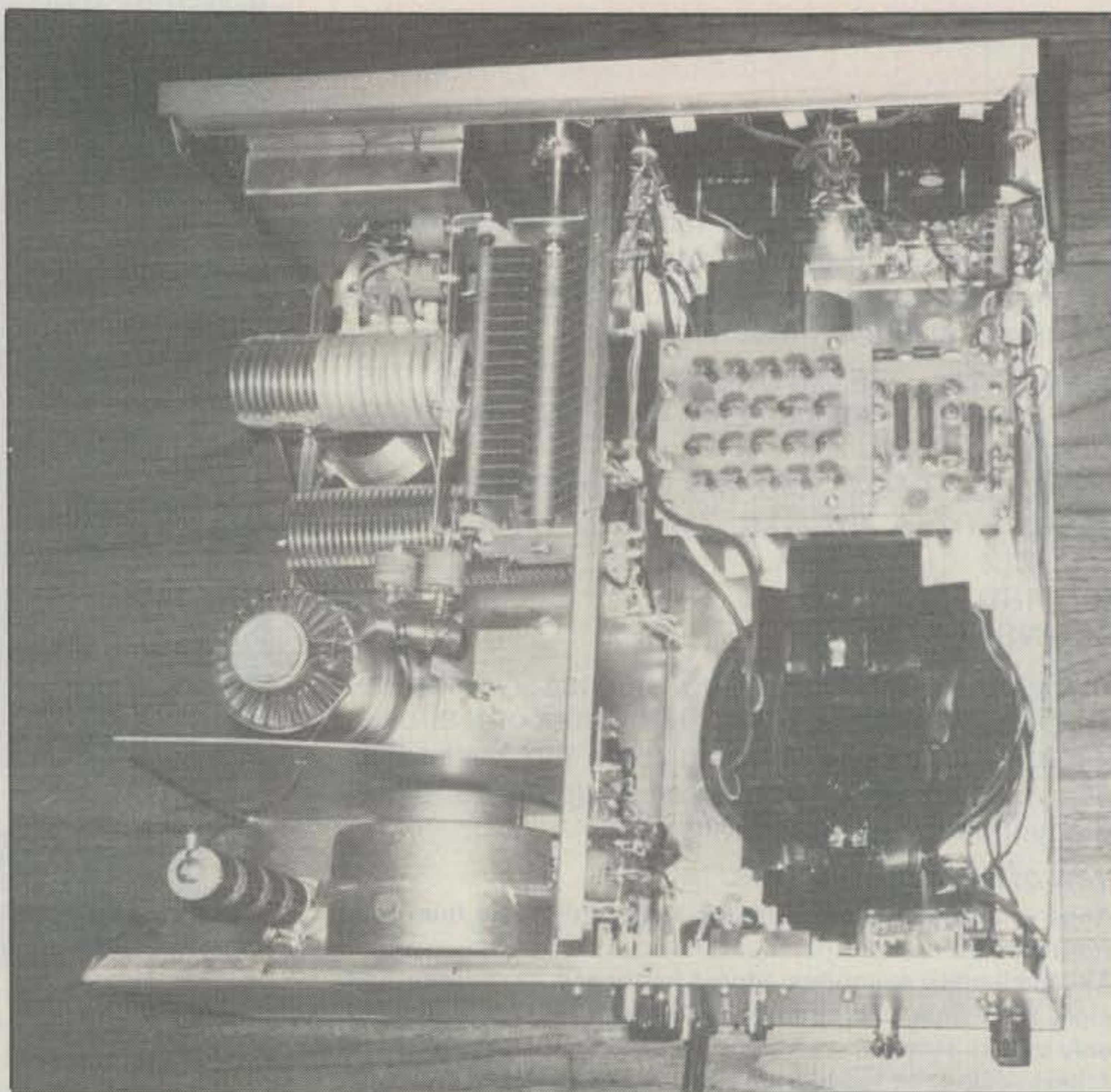
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A look inside. Note the large high-voltage transformer at the bottom right. In front of it are two PC boards. One contains the rectifier assembly and the lower one the filter capacitor banks (the latter are hidden from view). On the other side of the shield are the blower (lower left) and the RF assembly.

for the 160 meter band. There is an extensive use of good, old-fashioned hardware with no pop-rivets to hold things in place. The soldered connections are impressively clean with no traces of leftover flux. And everything is soldered that can be soldered. The front-panel switches are obviously meant for push-on wire connections, but gratefully, the wire connections have been soldered.

The air-flow arrangement is well done in that air is taken in from the front of the power-supply side and discharged on top above the power tube. Therefore, the air flow goes across the power-supply components and then through the tube anode. There is not all that much heat dissipated in the power-supply components, but the air flow across the rectifier/filter capacitor banks undoubtedly will prolong the life of the components involved.

The one-piece cover is of aluminum and is painted black. However, each of the 31 sheet-metal-screw positions has been cleaned down to bare metal on the inside for proper shielding contact to the chassis frame. It is also fascinating to track down the construction sequence of the amplifier, as each subassembly contains a tag giving the date and initials of

the technician involved. The only very small detail I didn't like is that the pilot lamps for the meters are held in place by tape. Adhesives today can be extremely good, but I've rarely encountered a tape where the adhesive will not "run" after an extended period in a tropical climate. An "epoxy" fix is obvious and cheap. (I guess I had to include the foregoing comment to balance the rest of my description. I have built literally dozens of linear amplifiers over the years and have taken pride in their quality—after the first few, that is. I would be quite proud indeed if I had been able to put together a linear with the constructional qualities of the AL-1200.)

Operating Results

I guess the bottom line here is that the AL-1200 will deliver a rock-solid 1500 watts output on any band when used with a transceiver having 90-100 watts output and when the antenna load presents less than a 2:1 SWR. Initial tune-up on any band does require adjustment of the drive and then the plate and load controls for the proper combination of grid cur-

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List price \$549.95/CE price \$239.95/SPECIAL 12-Band, 40 Channel • No-crystal scanner Priority control • Search/Scan • AC/DC Bands: 29-54, 118-174, 406-512, 806-912 MHz. Now...nothing excluded in the 806-912 MHz band. The Uniden 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9 1/4" x 4 1/2" x 1 1/2". With nothing excluded in the 806-912 MHz band, this scanner is an excellent choice for law enforcement agencies. If you do not need the 800 MHz band, a similar model called the BC 210XLT-A is available for \$178.95.

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List price \$189.95/CE price \$94.95/SPECIAL 10-Band, 16 Channel • No-crystal scanner Priority control • Weather search • AC/DC Bands: 29-54, 136-174, 406-512 MHz. The Bearcat 147XL is a 16 channel, programmable scanner covering ten frequency bands. The unit features a built-in delay function that adds a three second delay on all channels to prevent missed transmissions. A mobile version called the BC560XLT-A featuring priority, weather search, channel lockout and more is available for \$94.95. CEI's package price includes mobile mounting bracket and mobile power cord.

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 BC172XL-A Bearcat 20 channel scanner \$134.95
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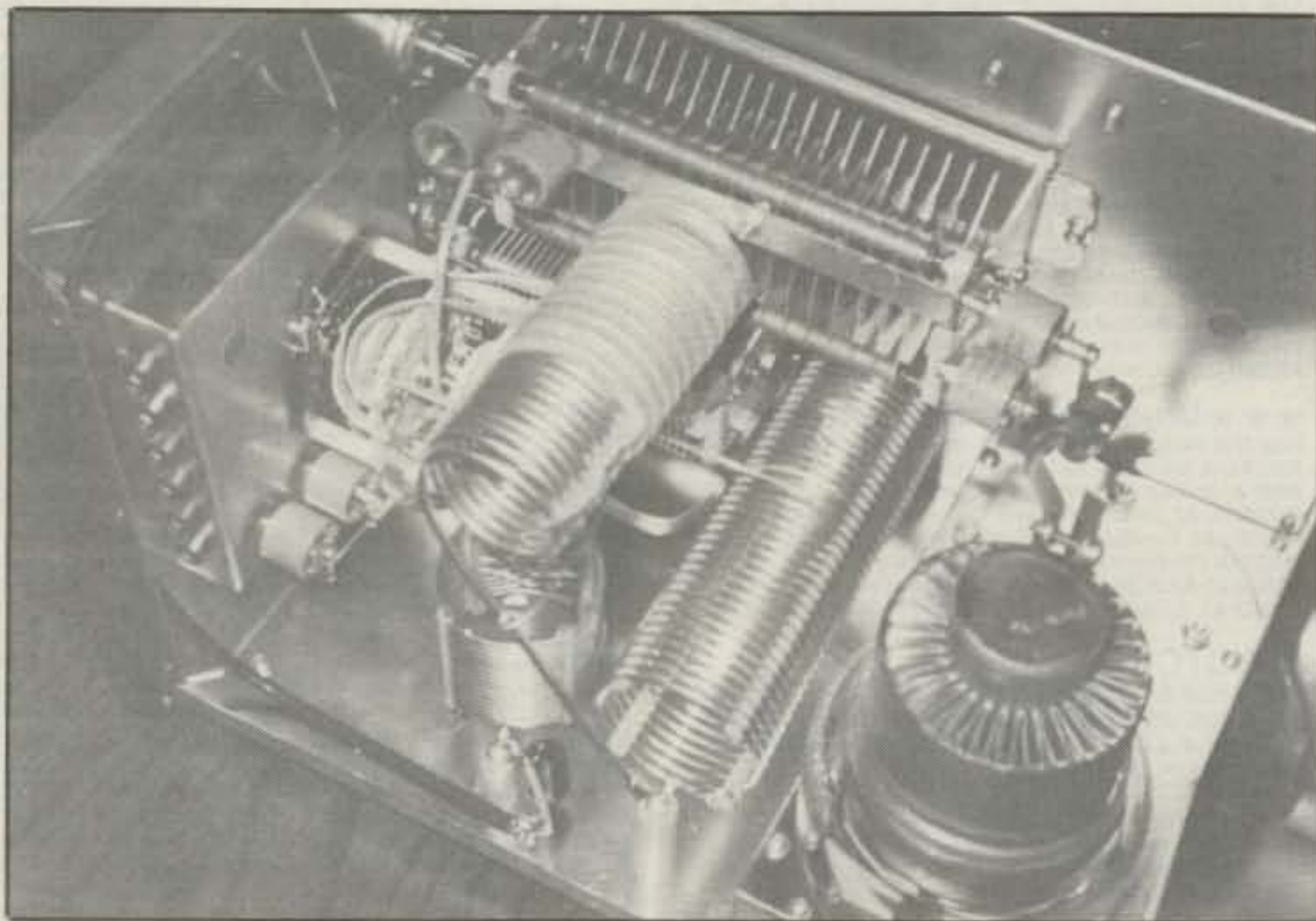
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This view shows the RF heart of the AL-1200. The 3CX1200A7 is mounted on a separate, pressurized sub-chassis. The plate output coils are all heavy-gauge silver-plated wire, or in the case of the 10/15/20 meter coil, solid $\frac{3}{16}$ inch square copper bar stock. No toroids are used. The separate chassis towards the front panel contains the input networks. They can be adjusted, if ever necessary, by removing the top cover. You don't have to go near any high voltage to make the adjustments. Be very, very aware, however, that once the top cover is removed and its safety interlock defeated, lethal voltage points are exposed in other sections of the amplifier.

rent, plate current, and power output. But after this is done and the plate and load control settings logged, which is easily done because of the vernier drive on each control, you have only to return to the logged settings for a given band and peak the controls for maximum output power. Since there is the dedicated meter for grid current, you have only to glance at the meter to see that the current does not exceed 250 ma. If it doesn't, you are tuned up and ready for operation.

The front-panel meters are large and easy to read. However, I did put a small red arrow indicator at the 250 ma reading on the grid current meter just to remind myself that after tuning that value should not be exceeded. Actually, the marker blends exactly with the front-panel arrangement, since the vernier-drive indicators utilize red-tipped position indicators.

The driving power required spanned a narrow range of 90 to 103 watts. The efficiency (overall) ranged from about 65% to slightly less than 70%, of all of which is almost exactly in accordance with the specifications for the 3CX1200A7. The blower speed was set at medium-high (the third highest setting out of four possible choices). The blower does produce an audible air flow, but I did not find it objectionable nor out of line with air-flow audibility I have experienced with other linears in the same power class. The output air flow is very warm simply because

about 1 KW of heat is being exhausted, again as with any linear running roughly at 2.4 KW input and 1.5 KW output. Under key-down periods of 15 to 20 minutes I could not notice an increase in the exhaust air temperature once it had reached an ambient level.

The signal reports received were excellent. Of course, there has to be quite a difference when you go from 100 to 1500 watts output. However, the point is that the 1500 watts should be clean power. All the reports I received indicated that is the case with the AL-1200.

I had intended to test the amplifier on a 120 volt primary as well as the 230 primary which was used. Unfortunately, time ran out on the former project, but I did receive the 120 wiring data from Ameritron and studied it. The conversion would appear to be straightforward enough with just a few wires having to be rerouted. The conversion is not recommended, but I see no reason why it would not work if the 120 VAC line had ample capacity (20 to 25 amperes).

Manual/Customer Service

The AL-1200 manual is complete, and the setup and operating information is clearly presented, although some insert sheets are used. There are a few minor differences in the schematic diagrams and the actual wiring in late-model production units (e.g., the neutralizing tab).

The information presented, however, is certainly complete and clear enough for all practical purposes.

Ameritron is revising the AL-1200 manual and various other manuals to bring them into a standardized format. I did get to look at the AL-82 manual as an example of the new format. The manual is indeed very nicely done with complete installation, interconnection, and operating information complemented by various schematics and a complete parts list. Sending in the warranty registration card for the AL-1200 should suffice to receive any updated manual information. The basic warranty runs for one year and covers parts (except the tube) and labor with, of course, the usual disclaimers in case the unit was really abused.

I didn't really have any problem with the AL-1200, but I did need some technical information. I called Ameritron late in the afternoon. A pleasant YL answered and said she could answer some technical questions, but she would have a design engineer call me back if I had involved questions. The engineer called me back the following morning, and we had a pleasant, long technical discussion. The YL then called me back later to check if I had received the information I required. I did not mention until the very end of the conversation with the engineer that I was working on a review article. I hesitate to draw any conclusions, but the people at Ameritron were certainly responsive and most helpful, and I definitely had the impression they wanted the buyers of their products to be satisfied. This is quite a contrast to some manufacturers I've called over the years who immediately took the offensive when I questioned why they were using #20 AWG wire in places where I felt #12 AWG wire would be more appropriate!

Summary

The AL-1200 is an excellent linear. Considering that you are getting a design using one of Eimac's best tubes and that the linear incorporates very good-quality components at an overall very competitive price, it's a very, very good buy. It is a big, powerful amplifier. You do have to respect its output power, and your station's antenna system in particular should be compatible with the power-output capability of the AL-1200. Enjoy the DX!

The Ameritron AL-1200 amplifier has an amateur net price of \$2045.00. The optional PIN-5 QSK switch is priced at \$189.50. It is user installable. Ameritron estimates time of installation to be about ½ hour for a trained technician, up to about 2 hours, depending on level of ability and experience. The unit is manufactured by Ameritron, 2375 Dorr St., Suite F, Toledo, OH 43607.

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The MM-3 also features automatic serial number insertion and incrementing in any memory message. Use the front panel knob to adjust your sending speed or enter a precise speed with the keypad, toggling between the two at any time. Exchanges can be expedited by having parts of your message sent at a higher speed. You can even add remote switches for four of the memories to send your response or call CQ. The MM-3 can also be programmed for automatic beacon use. The RS-232 compatible serial I/O port provides computer control of the MM-3 and monitoring of the Morse training features.

Packet

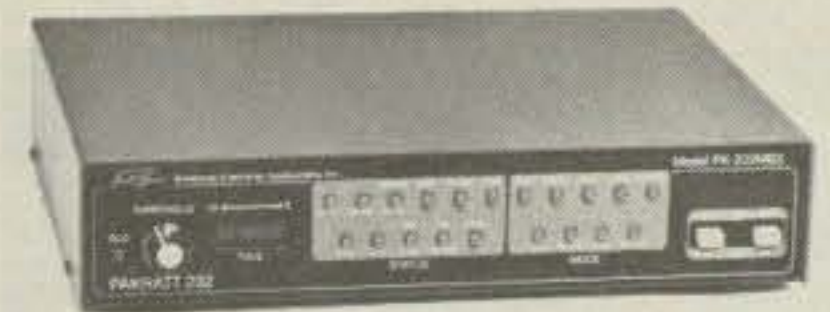


PK-88 Packet Radio TNC

Unique operating features with a proven hardware and software design make AEA's PK-88 your best choice in packet radio--now with MailDrop, an 8KByte efficient personal Mailbox. The PK-88 also allows multiple single frequency QSO's, digipeating and networking. It's a superb value, packed with all the most needed packet radio features such as direct interface capability with NET/ROM and TCP/IP. In addition to all the features of a "standard" TNC, the PK-88 offers features not found in any other TNC:

- WHYNOT command - Shows reasons why some received packets are not displayed.
- "Packet Dump Suppression" - Prevents dumping unsent packets on the radio channel when the link fails.
- CUSTOM Command - Allows limited PK-88 customization for non-standard applications.
- Enhanced MBX command- Permits display of the data in I- and UI-frames, without packet headers and without packet headers or retried frames.
- Enhanced MPROTO command - Suppresses display of non- ASCII packets from Level Three switches and network nodes.

Multi-Mode



PK-232MBX Multi-Mode Data Controller

With over 40,000 units sold worldwide, the PK-232MBX is the world's leading multi-mode data controller. Combining all amateur data communication modes in one comprehensive unit, the PK-232MBX offers Morse Code, Baudot, ASCII, AMTOR/SITOR 476 and 625, HF and VHF Packet, WEFAX receive and transmit, TDM, as well as commercial standard NAVTEX automated marine information services.

All software is on ROM.

- 20 front panel status and mode LED indicators
- RS-232 compatible
- Exclusive SIAM™ Signal Identification and Acquisition Mode
- TDM Time Division Multiplex decoding
- PakMail™ mailbox with selective control of third-party traffic
- FAX printing - supports most printers
- Two radio ports
- Host mode for efficient program control of the PK-232MBX
- KISS mode for TCP/IP networking protocol compatibility
- 32K RAM lithium battery-backed
- Many features for the digital SWL

Antenna Tuners



AT-300 and AT-3000 Antenna Tuners

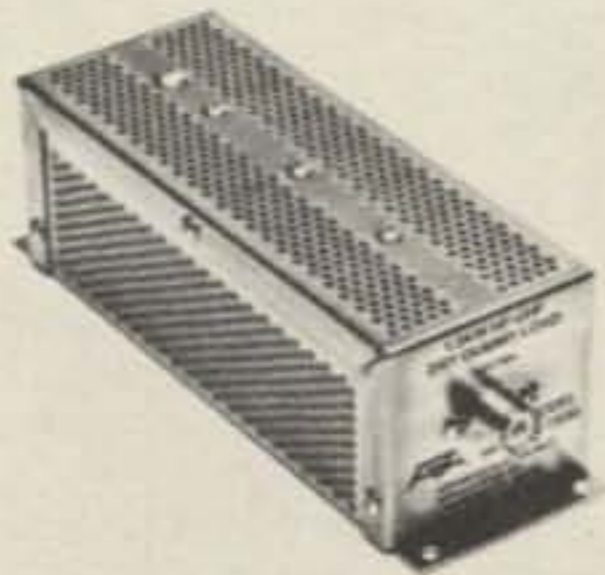
For tuning perfection, choose AEA's AT-300 (300 watt) or AT-3000 (3 kW) antenna tuners. Quality and exceptional engineering are built-in for maximum performance and long operating life.

The low-pass design provides more harmonic attenuation for lower TVI and allows matching to a much wider range of antenna impedances than common high-pass designs.

The AEA tuners feature a frequency compensated dual-movement SWR meter for ease of tuning with a front panel power range switch. Minimal SWR is achieved by inductors with 18 (AT-300) and 20 (AT-3000) taps. AEA's exclusive patent pending CAM switch design on the AT-3000 provides accurate tuning. The built-in front panel antenna switch allows you to easily select two unbalanced (coax-fed) antennas, a dummy load or a balanced antenna.

Better Experience

Dummy Load

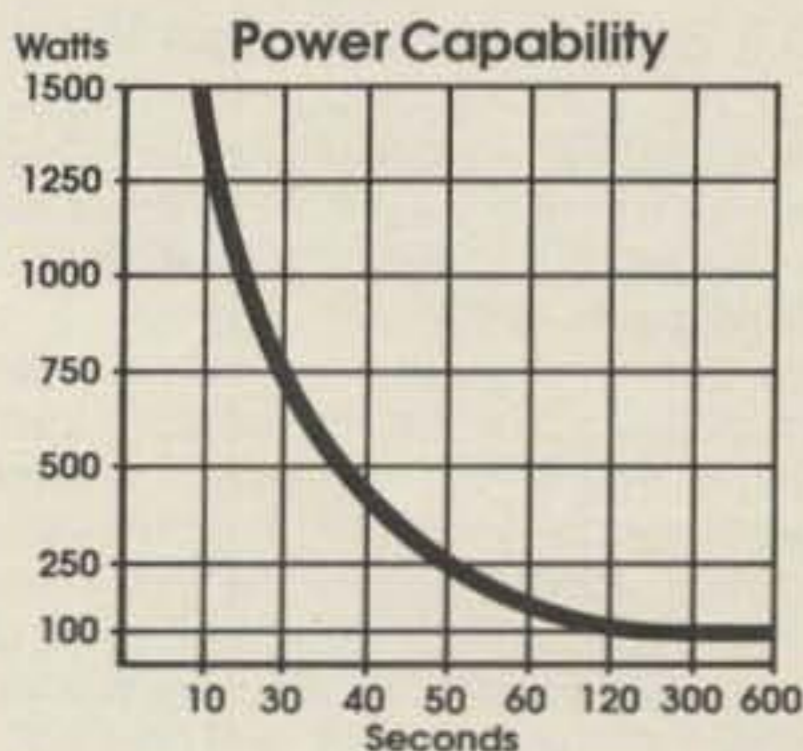


DL-1500

DC-650 MHz Up to 1500 Watts

AEA's dry dummy load simulates a perfect 50 ohm antenna up to 650 MHz so you can test your transmitter without radiating a signal on the air.

- DC-650 MHz
- Simulates matched 50 ohm transmission line to test your transmitter
- Handles short-term RF power up to 1500 watts
- VSWR of less than 1.3:1 at 650 MHz
- Compact and lightweight
- Air cooled dry load



EconoTuner



ET-1 Antenna Tuner 300 Watts of All-Band Tuning

Meet your match with AEA's new ET-1 Econo-Tuner™. A quality, economical antenna tuner for under \$150, the ET-1 Econo-Tuner is designed to match virtually any receiver, transmitter or transceiver from 1.8 to 30 MHz with up to 300 watts of RF power.

Compatible with almost ANY antenna including verticals, dipoles, inverted vees, beams and mobile whips that are fed by coax cable, balanced lines or a single wire. For easy connection to balanced lines, a 4:1 balun is built-in.

A front panel switch control allows you to switch between two coax-fed antennas (direct or through the tuner). You can also switch to a balanced line or wire antenna. The BYPASS position allows you to switch to a dummy load (such as AEA's DL-1500 dry dummy load) or a direct connected coax antenna. In the BYPASS position, COAX 1 OUT or COAX 2 OUT can be selected so that the tuner is bypassed, but not the meter circuit.

The ET-1 features a precision dual-movement meter to simultaneously monitor power and SWR.

Unique engineering designs have made AEA one of the leading innovators in the amateur radio industry. That same quality and superior technical support make the ET-1 your best deal for an antenna tuner.

Antennas

IsoPole™ Omni-Directional VHF and UHF Base Station Antennas

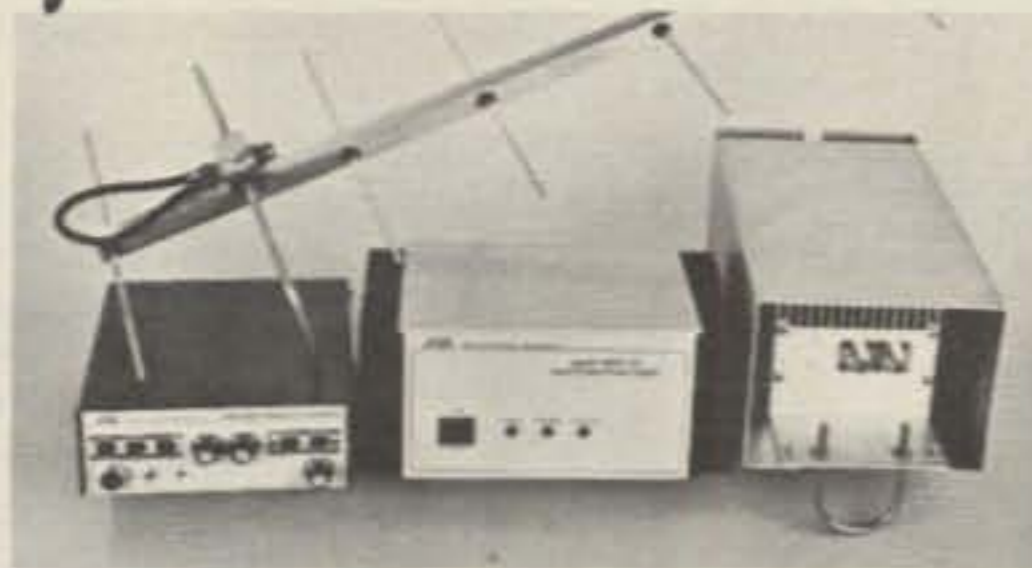


An outstanding mechanical and electrical design make the IsoPole the best choice for an economical omni-directional VHF or UHF base station antenna. All IsoPole antennas yield the maximum gain attainable for their respective lengths and a zero degree angle of radiation which puts the most signal on the horizon. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Decoupling cones offer great efficiency over obsolete radials which radiate in the horizontal plane. The IsoPoles also have a broader frequency coverage than any comparable antennas. Typical SWR is 1.4 to 1 or better across the entire band!

All mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion-resistant aluminum alloys. Aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast, not supplied).

IsoPoles are ideal for packet radio. The decoupling cones stop computer hash picked up by the outer shield of the coaxial cable from being passed to the receiver.

Amateur TV



AEA's New ATV System

Add a new dimension to your amateur radio communications with AEA's Amateur Television (ATV) system. If you hold at least a technician-class license, you can transmit and receive live or taped audio and video Fast-Scan TV (FSTV) information that rivals broadcast quality. Now you can share more than conversation over the air with this new mode of "personal communications."

It's Easy and Inexpensive. If you have a video camera or camcorder and a standard TV set, you may already own the most expensive components of an ATV system. AEA's ATV system includes a transceiver and antenna. Simply connect the camera, TV and the antenna to the transceiver, and you're on the air LIVE with one watt P.E.P.! If you want to broadcast with more power, AEA also offers a 50 watt mast-mounted linear amplifier and GaAsFET preamp with power supply. Your TV set will monitor your transmitted and received pictures.



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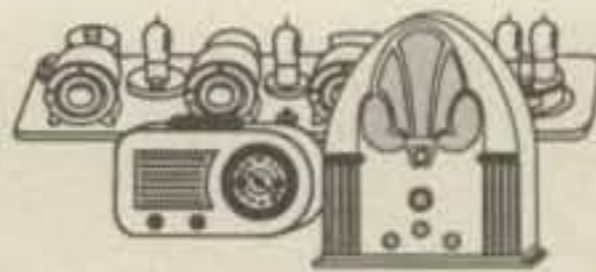
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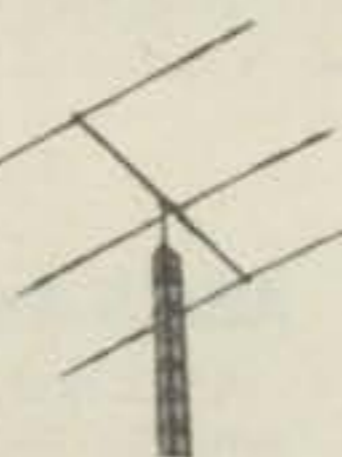
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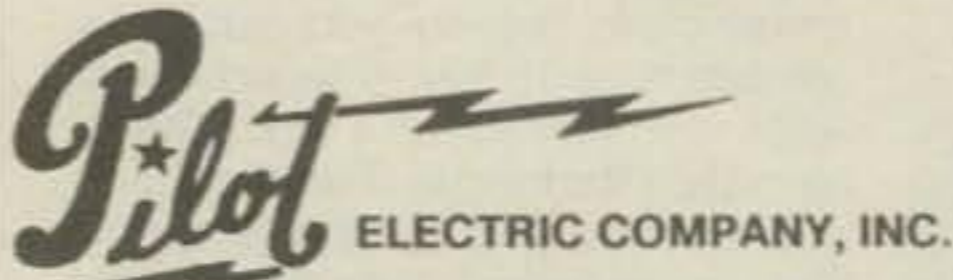
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OUR READERS SAY

QSL Clock Parts Source

Editor, CQ:
Regarding the article "QSL The Time" by Paul Danzer, N11I, in the February 1990 issue of CQ, I would like to note that the company KLOCKIT (P.O. Box 636, Lake Geneva, WI 53147) sells a 24-hour clock mechanism (as well as a 12-hour mechanism) for \$8.25 plus \$3.05 shipping, and they have no minimum order. Get their catalog for ordering miscellaneous parts.

S. Davis
Wadesville, IN

A Bit Less Dramatic

Editor, CQ:
After reading with some amusement about the efforts of both the author and Joe in the article "Coaxial Cable—Cover and Concealment" in the May issue of CQ, I suggest the following as an alternative to welding a 4 foot piece of drill rod to a bit.

Lumber yards and hardware stores carry an item called a bit extension. They come in various lengths, the most common being about 16 inches. They lock onto the bit by means of a couple of Allen screws. By using several of these extensions it is possible to drill holes at various distances without creating a relatively useless single-purpose tool. One also has the advantage of being able to work in tight quarters, perhaps even on an outside wall.

I submit that while the use of a combination of bit extensions, an electric drill, and an extension cord may not be as spectacular a method, it is far more cost effective than using a 45 pistol when drilling holes at a distance.

Jonh Yardley

A Better (And Safer) Way

Editor, CQ:
I enjoyed Larry Hill's May 1990 CQ article about the use of a firearm to provide a hole to conceal coax ("Coaxial Cable—Cover and Concealment," p. 33).

For years I've used what the pros use—a D'versiBit. They come in various sizes and types. All you do is cut a hole for a standard outlet box in the wall. The D'versiBit consists of a drill bit about 3 inches long fixed to a semi-flexible 3/16 inch shaft. I use the 1/2 inch diameter combination bit, which looks like a standard twist drill with a screw tip of the type found on auger bits. It also has a hole near the business ends so you can tie a wire to the bit before withdrawing same after drilling the hole. I find the 36 and 72 inch lengths the most useful. If your electrical supply store doesn't carry this item, or if you want more details, you can call D'versiBit directly at 1-800-334-6870 or 1-800-672-5885 in North Carolina. Ask for their "New Installation Techniques" booklet and price schedule. The prices of the sizes I use run in the \$20 to \$30 range.

I also suggest an electronic stud finder so you will know the best location before cutting the hole in the wall. This will also locate any purlins (2 x 4's in the wall between studs. Don't you just love those "technical words"?)

By drilling from the room side you can often run wires with very little attic height clearance.

William L. Folkerts, W2HDN
North Palm Beach, FL

Here's a handy hint to remember when you think about restoring those vintage radios.

Ye Olde Volt Source

BY GEORGE WILSON*, W10LP

Those of us who run vintage radios would do well to look at the line-voltage ratings for these pieces of gear. In the late 1930s and 40s the most popular line voltage was 115 volts. Before this 110 volts was the standard. On Cape Cod the present line voltage runs at 120 volts minimum, and 125 volts is not unusual. Bear in mind that as the voltage goes up, the current also increases. A 10 volt rise in line voltage means that your vintage radio is dissipating about 20% more power than it was designed for.

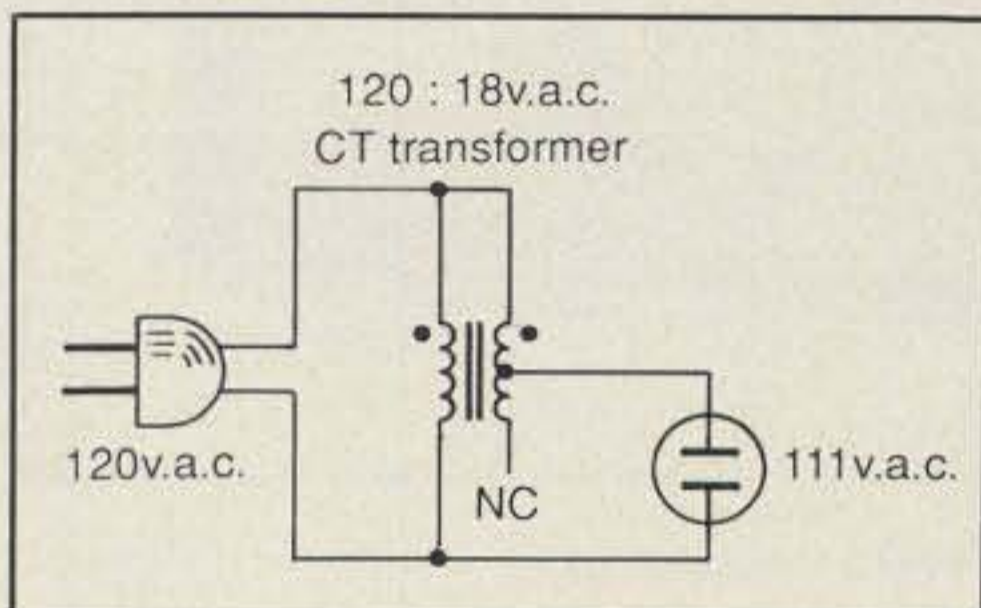

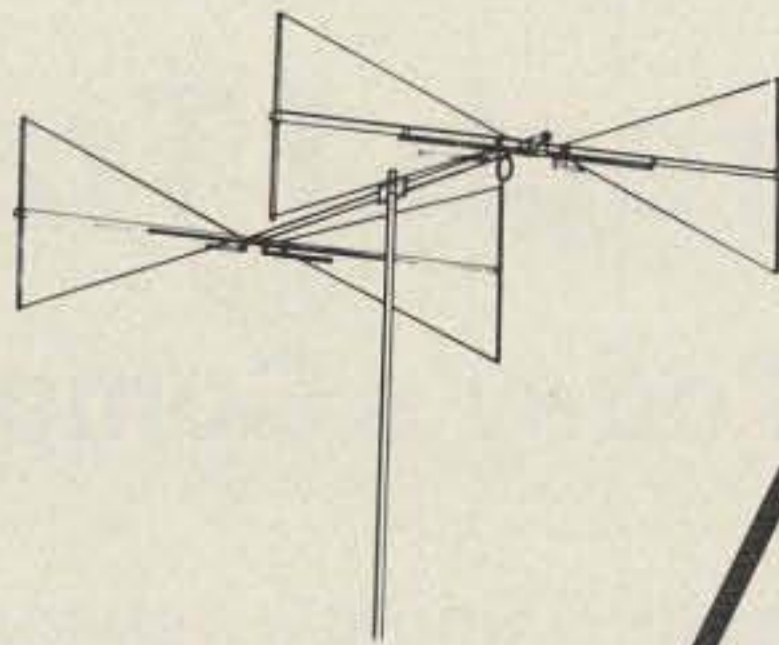


Fig. 1- The line-voltage reducer. Note that the secondary must be phased properly to reduce the line voltage.

A simple line-voltage reducer can be built using the secondary of a low-voltage transformer in series with the line, phased such that it reduces the resulting line voltage. The circuit herewith is typical. The transformer should be selected to suit your local line-voltage conditions. One half of the secondary of a Radio Shack 18 volt CT transformer (273-1515) reduces my line voltage to 111+ volts—quite comfortable for older equipment. 

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Some things at face value can't work and shouldn't work, yet they do. SM5GDQ reviews some German WW II equipment that fits that criteria.

The Fusp rech.f Transceiver

A Forerunner To Today's Compact Transceiver

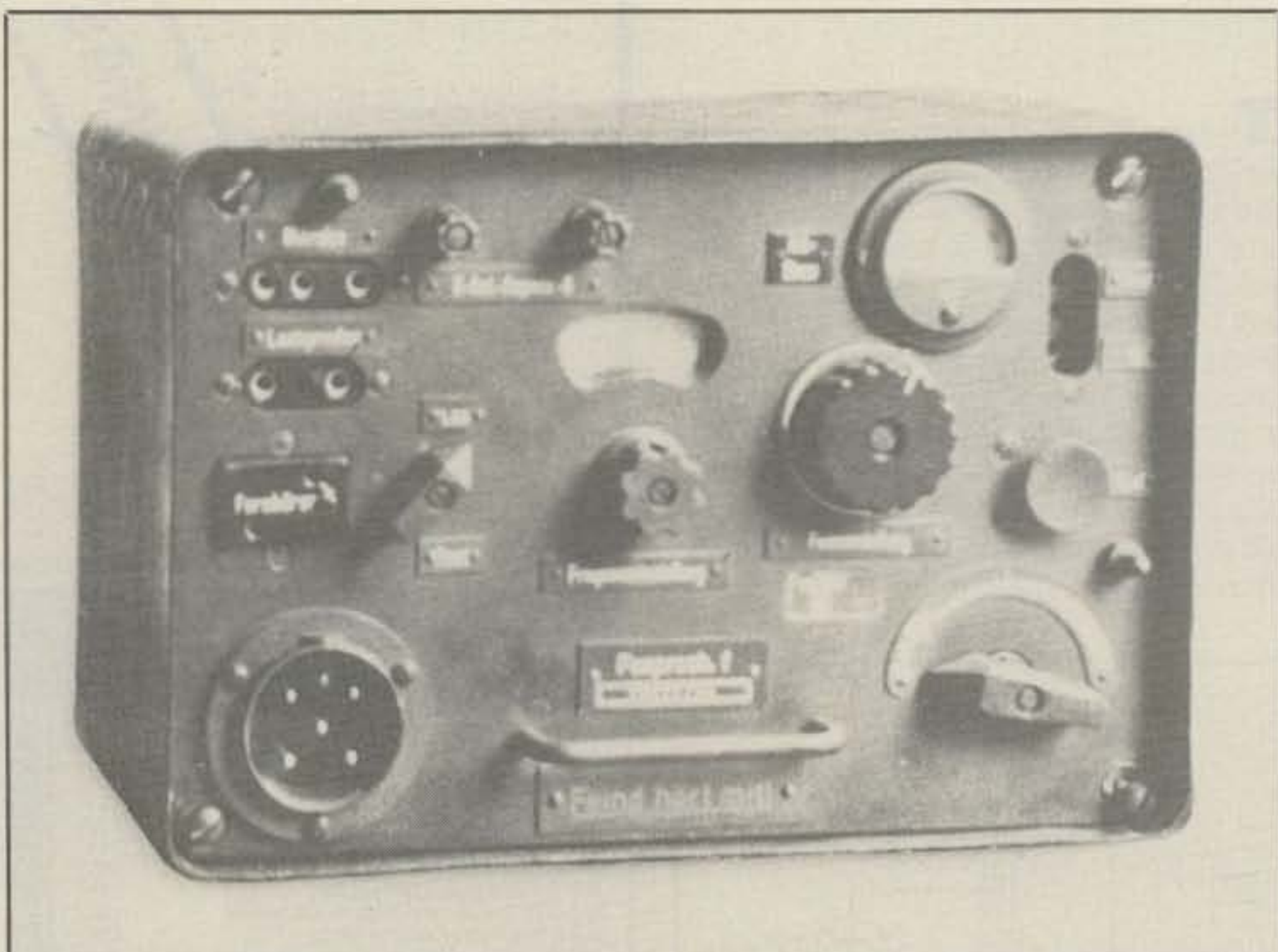
BY BENGT LUNDGREN*, SM5GDQ

The next time you are picking a weak signal out of the mud or working a string of DX with the latest transceiver available, stop and try to think about the amateur of 50 years ago or the type of gear in use during that time. Maybe you can think of it, or perhaps you remember pictures of big, crude-looking boxes or racks with all sorts of knobs and meters across their black, wrinkled steel panels. It was an era of big equipment, not miniaturization.

There were many designers of the time, however, who were working and trying out ideas that have found their way into the very rigs we use today. Prior to WW II, German engineers were working on the concept of a ubiquitous vacuum tube that would perform many functions and still be physically small. Obviously, their thoughts at the time were military, but the equipment they produced is still remarkable, even by today's standards.

Most amateurs throughout the world have probably seen (and used) war surplus equipment made by the U.S. or Britain. It is very rare for the average amateur to have seen let alone used German WW II gear, for very little survived. One interesting development by the Germans, for example, was the RV 12P 2000 tube. It was a multi-purpose tube with outstanding features developed around 1935 for the military. The Allies were to develop close equivalents later on in the Acorn tubes and the RF pentode, 6AK5. The way the Germans used their RV 12P 2000, however, was rather unique. It was used for all types of applications in receivers and in the low-power sections of transmitters. Receivers used to be equipped with that tube straight through from the RF part to the final AF amplifier. You can judge the size of the tube from the photograph.

*P.O. Box 1560, SEEB Airport, Sultanate of Oman



Front view of the Fusp rech.f transceiver.

Design Features Of The Fusp rech.f

Fusp rech.f, or Funksprechgeraet.f, simply means Radiotelephone Set, Model f. As the picture shows, it was a compact, small transceiver. Fifty years ago it must have been one of the smallest and best-developed transceivers in the world. It used seven tubes. The transceiver was normally fitted under the dash of armored vehicles and used for short-haul communications between similar vehicles.

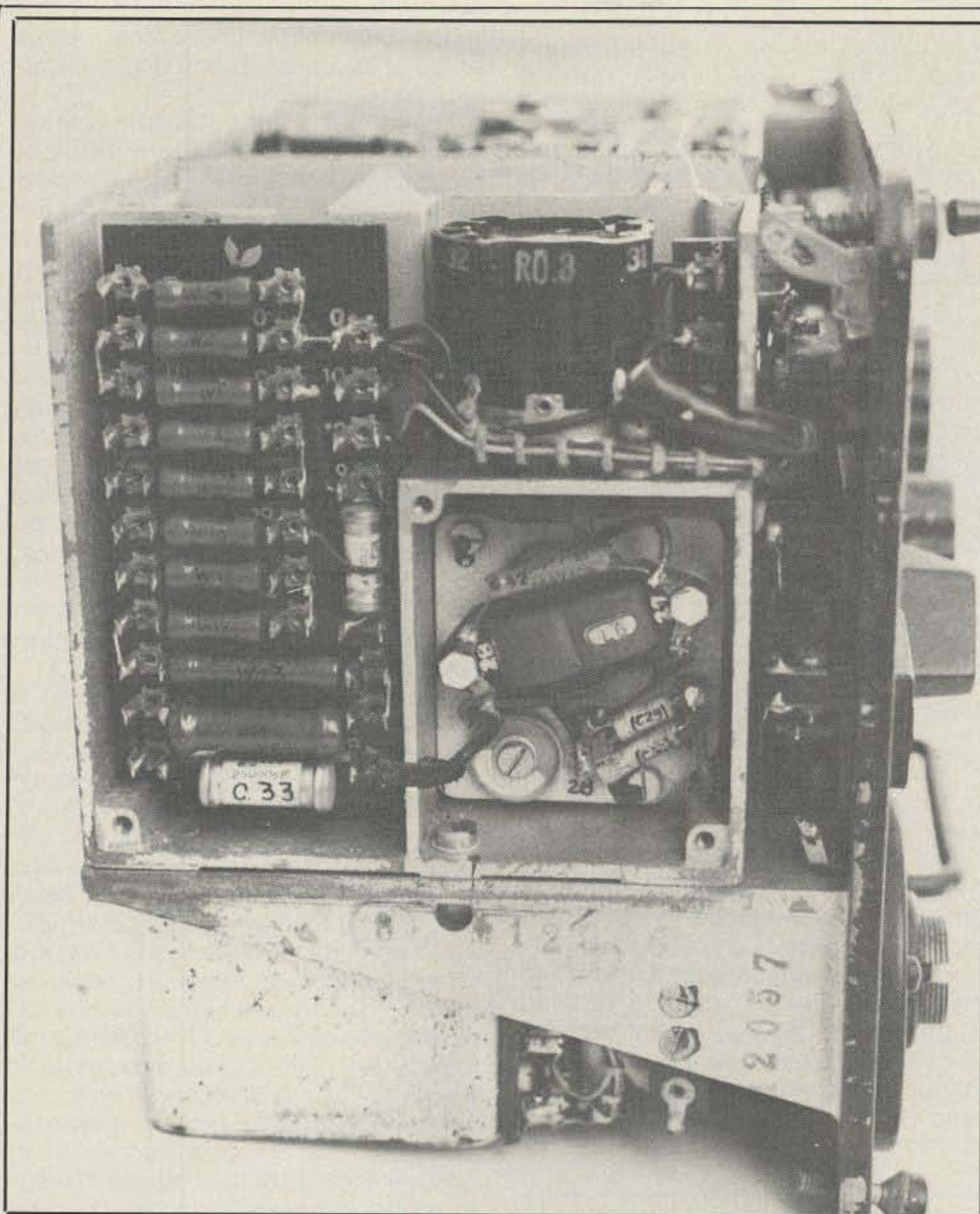
The Fusp rech.f contained 6 of the RV 12P 2000 tubes and an RL 12P 10 power tube. The RL 12P 10 was also developed for the military and is very similar to the better-known 6V6. The transceiver operated on the 15 meter band and certainly would have been popular among post-

war amateurs had many rigs survived the war.

As can be seen in the block diagram, fig. 1, the Fusp rech.f operated as a typical superheterodyne receiver without an RF stage during the receive mode. It could be tuned continuously between 20.0 and 21.5 MHz by means of a stable, free-running oscillator of the famous ECO type with a tuned anode circuit. Tuning was linked directly to the little knob below the dial window.

Operation

When the push-to-talk button on the carbon microphone was activated, a large, centrally-located relay with 10 sets of contacts completely switched the operation of the tubes. The oscillator still ran as



The mixer tube socket, an IF transformer, and a component board.

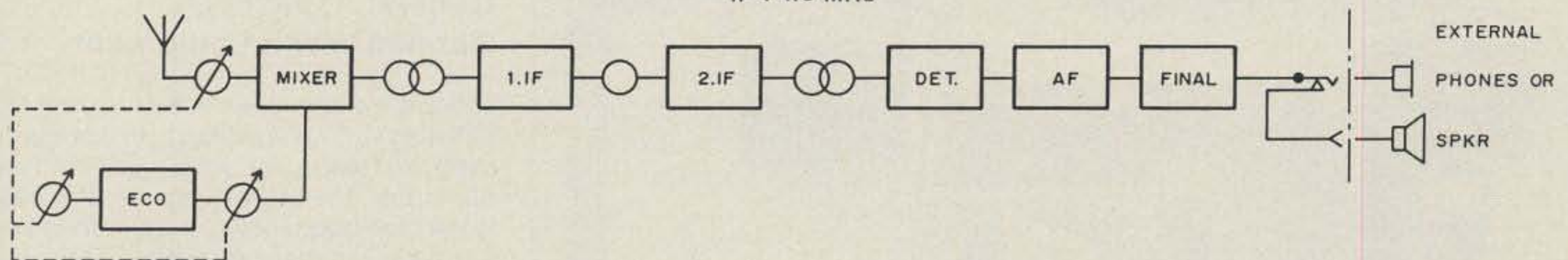
an oscillator, but its frequency jumped up by 1.5 MHz, which was equal to the IF frequency of the receiver. Now the oscillator could feed its signal into the transmitter PA stage instead of into the mixer of the receiver. This is shown in fig. 2, whereby the frequency jump is made by one set of relay contacts which disconnect a capacitor in parallel with a coil of high inductance from the tuned circuit of the oscillator. That loss of a high inductance creates a minor decrease in the inductance of the original little coil used in the oscillator circuit. The purpose of this is to spread the band a bit in the transmit mode in order to make use of the same dial engraving for transmit and receive. That was one of the many clever approaches for the creation of technical features, often simple, that could be found in German equipment.

Your first thought may be that it would be impossible to get back to the right frequency again after such a crude switching arrangement with an oscillator running at that high a frequency. However, you could get back accurately enough so as not to cause any inconvenience in normal speech communication. While normally this wouldn't be the case, it did work in large measure due to the designers' efforts to make everything mechanically stable. As can be seen in the photographs, the mechanical design is excellent. All the chassis parts were cast from a hard metallic alloy instead of being cut from plates of aluminum or steel. Each tube had its own compartment shielded from each other.

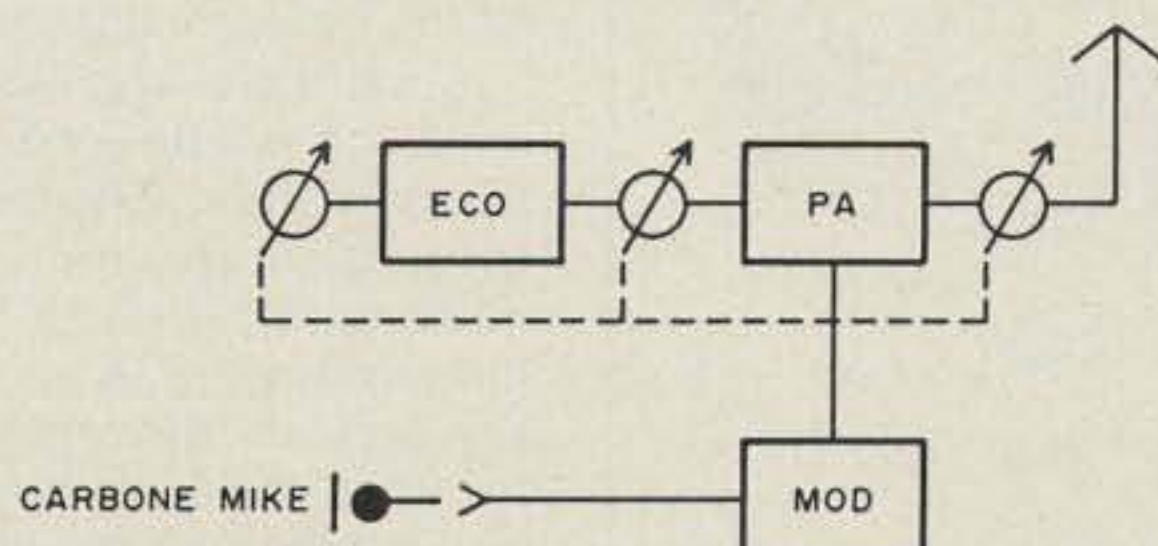
The final receiver audio amplifier tube was switched over to run as a transmitter PA tube by means of the relay. Finally, the receiver AF preamplifier was also used

EQUIPMENT IN RECEIVE MODE. ALL THE 7 TUBES ARE USED

IF : 1.5 MHz



TRANSMIT MODE. 3 TUBES IN USE ONLY. SWITCHED BY A RELAY.



FREQUENCY BAND 20.0 - 21.5 MHz.
DIAL MARKED IN CHANNELS WITH
25 KHz SPACING. (NO. 341 - 400)

Fig. 1- Block diagram of the Fusprech.f transceiver.

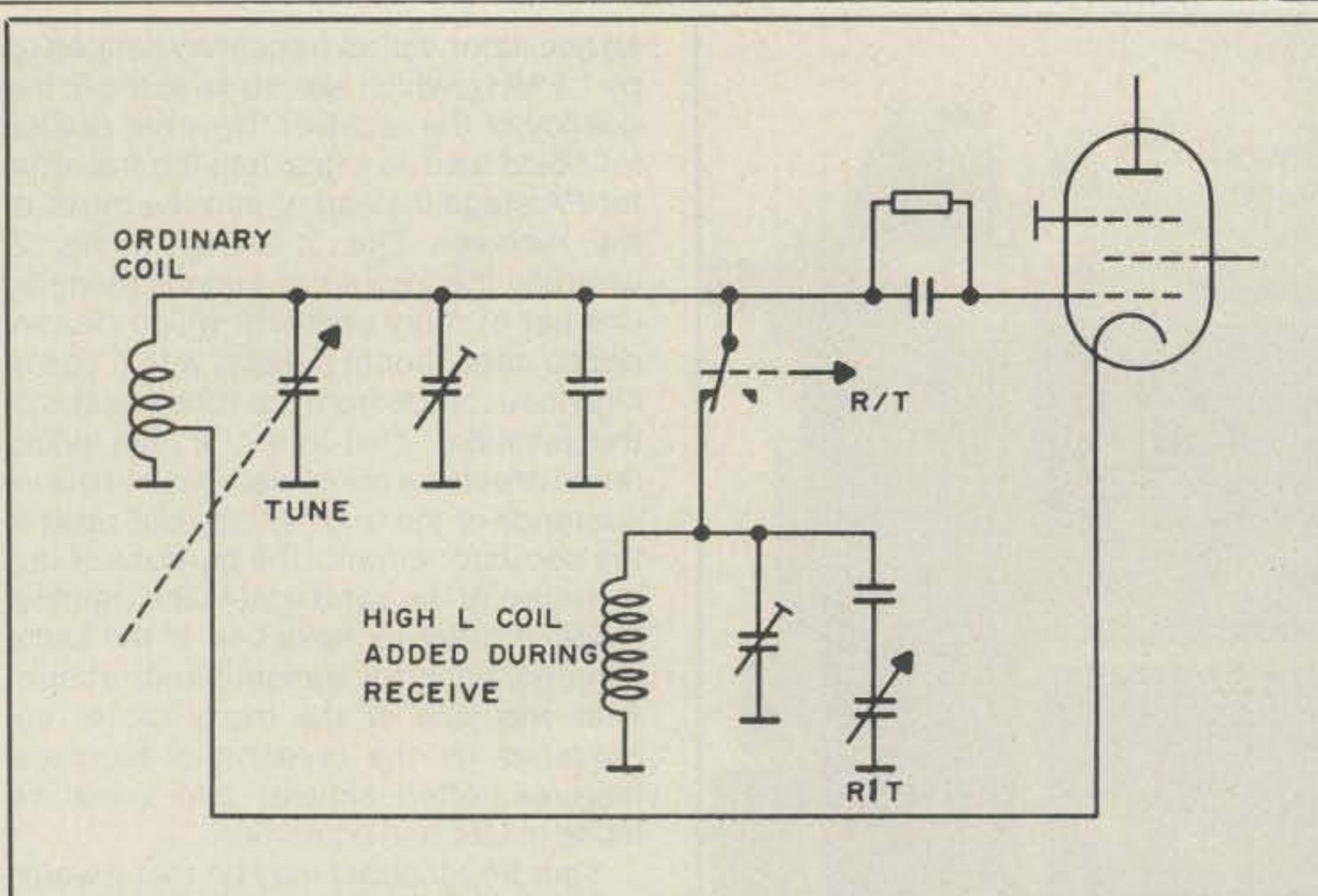


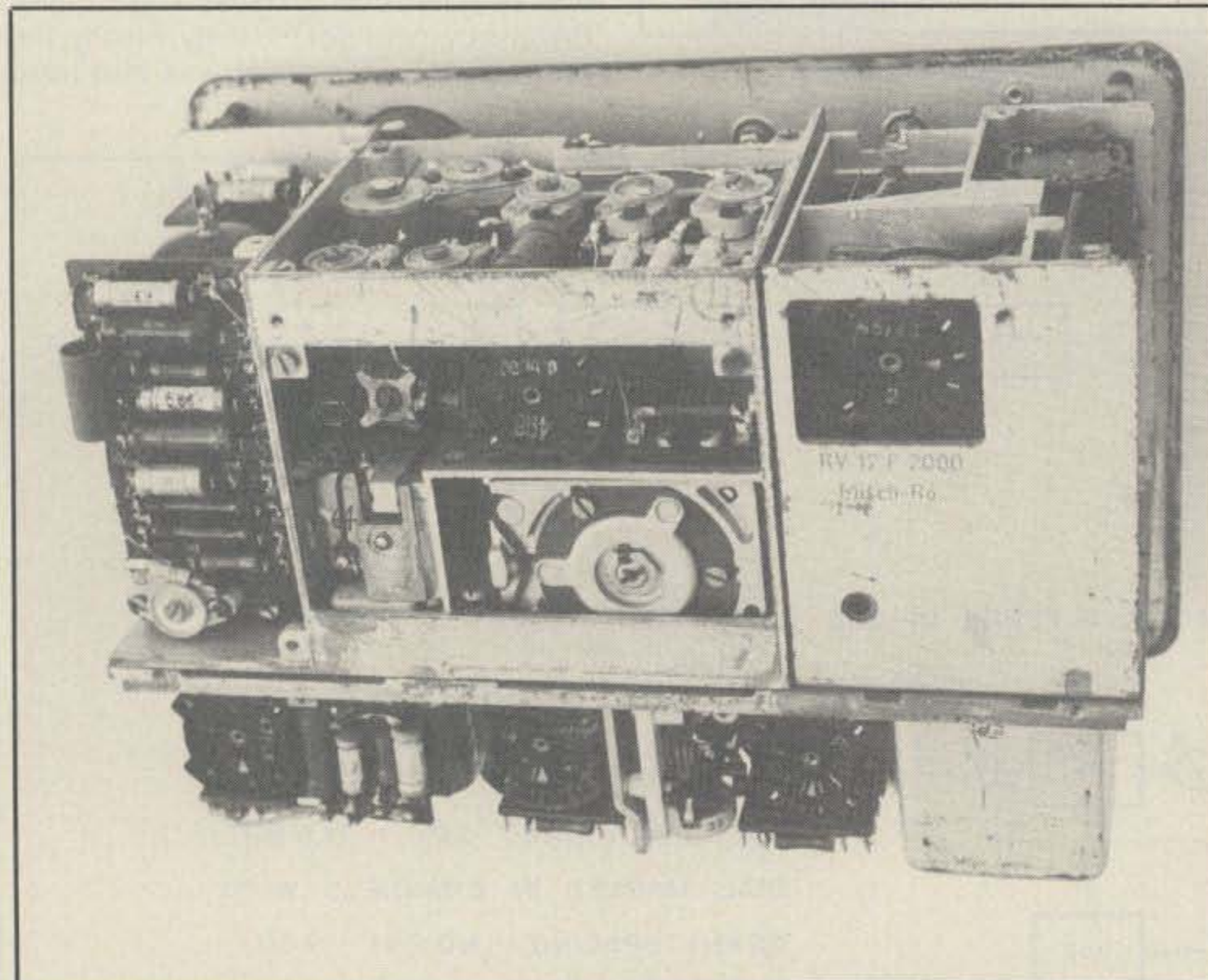
Fig. 2- Oscillator with old-time RIT, and equal band-spread for receive and transmit.

for modulating the control grid of the PA. The remaining four RV 12P 2000 tubes were not used in the transmit mode.

The big knob that can be seen just to the right of the tuning dial is the receiver incremental tuning (RIT) control. The receive frequency could be adjusted about 10 kHz up or down, just as in modern transceivers. This control simply used part of the capacitance switched out of the oscillator circuit during the transmit mode in conjunction with a variable RIT

capacitor in series with a fixed capacitor. It worked very well.

The main dial, which moved behind a window, could be locked mechanically by means of another knob. If the dial was in the locked position, the tuning knob just free-wheeled without engaging the tuning capacitor. The 20.0 to 21.5 MHz bandwidth was divided into channels on the dial. The channels were spaced about 25 kHz apart and marked No. 341-400. The reason behind that number series is un-



The inside of the transceiver with screening plates dismantled. A big relay is hidden in the middle to achieve multi-point switching between receive and transmit.

known, but in all likelihood there were a series of "Fusprechs" working on different frequency bands.

The antenna could be tuned in both the receive and transmit modes by means of two small knobs and a meter that was used to read RF power output to the antenna. The output power was about 2 to 3 watts. The original antenna was a 6 foot mobile whip, but this remaining unit as shown in the pictures ran exceptionally well using a standard amateur radio 15 meter dipole.

There was also a tone-call push-button provided. The button switched to modulator to act as a 500 Hz tone oscillator when depressed. Finally, there was a receiver volume control with a main on/off switch. Connectors were provided for antenna, speaker, microphone, and power supply. Power requirements were 12 volts (from the vehicle battery) and 300 volts from an associated motor generator.

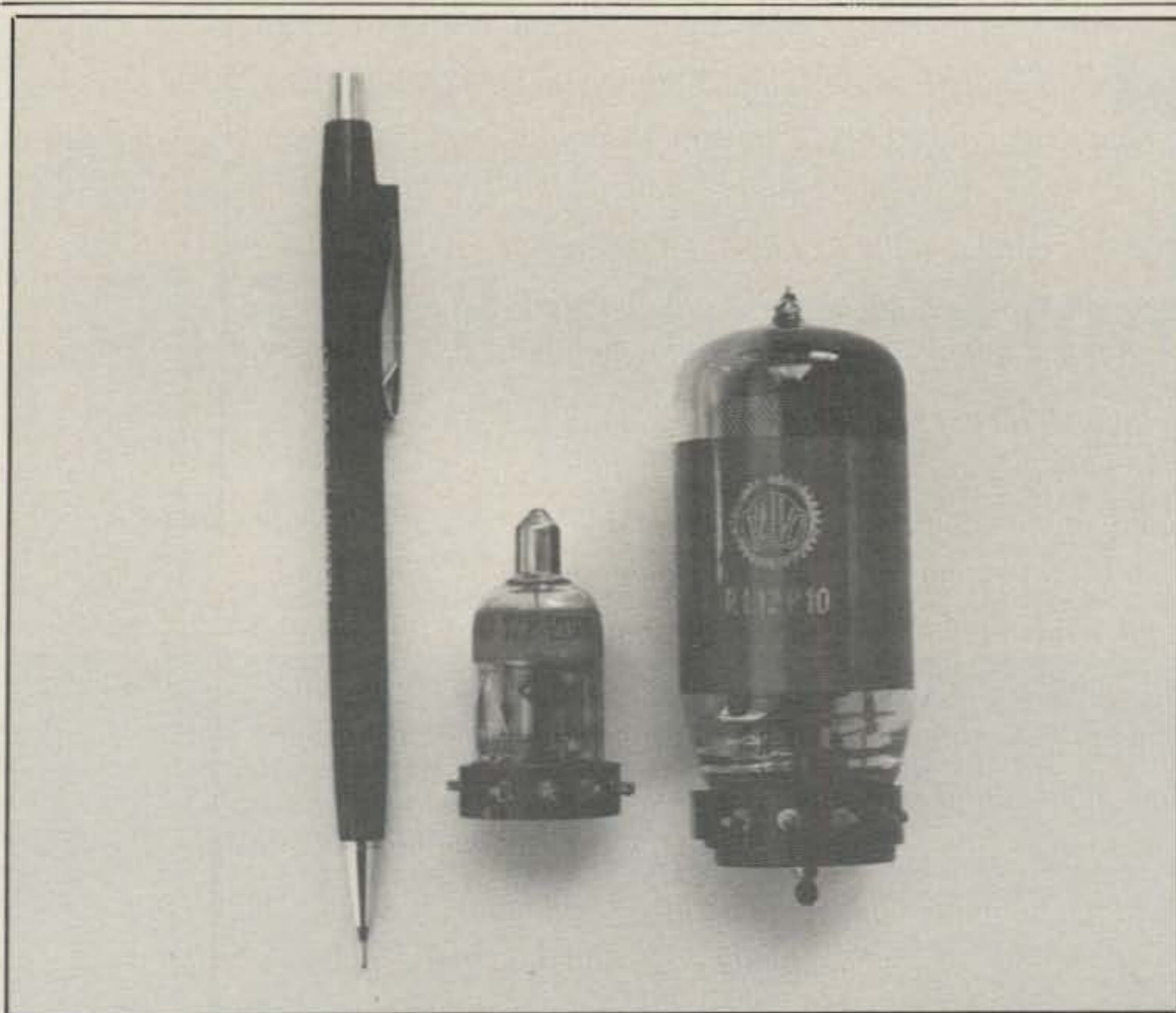
The AF power output was about 3 watts due to the use of the power pentode RL 12P 10 also in the receive mode. That was unusual in military receivers. Almost all German receivers for aircraft, tanks, and so on were equipped with RV 12P 2000s in the final stage and could feed headphones only. But Fusprech.f could feed a large loudspeaker in the vehicle, and that might have been beneficial in a noisy environment. However, we know that the next generation of military radios, those used by NATO and before the introduction of transistors, also delivered the AF power into headphones only.

The detector of the receiver was an RV 12P 2000 with its grids connected to either the anode or the cathode in order to get it working as a diode. That is a good example of how the designers tried to hang onto that tube in all of their applications. This detector provided AGC voltage to the two IF stages in the usual way.

General Aspects Of German WW II Equipment

There have been previous articles in CQ detailing various specific pieces of equipment, so I will cover some significant aspects only. The primary aspect of interest is the high frequency stability through an excellent mechanical design. Many old timers will remember how hard it was to achieve a stable frequency from a homemade, free-running oscillator.

Apparently, crystals were never found in equipment designed for use on an active battlefield. Crystals were used, however, in larger, more exotic pieces of equipment designed for the Navy or fixed installations up to and including calibration crystals. Beyond this use and service facilities, the Germans seemed to rely on and put their efforts into developing simple, straightforward electrical layouts which were well screened and mechani-



The famous multi-purpose pentode RV 12P 2000—which was pushed into its socket with its bottom side up—and the power amplifier tube RL 12P 10. Note the sizes of these old tubes as compared to the pen.

cally stable. They were reasonably assured that their tuning dials were correct, and that they didn't have to continually check readings against a calibrator. Those of us with experience with post-war, continuously tunable military radio sets, before the age of synthesizers, know what that means.

It is equally amazing that the German VHF radios such as airborne sets FuG 16 and FuG 17 from Lorenz did not need any calibration crystals either. The first of this series was introduced in early 1941 as a replacement for earlier airborne radios operating in the lower part of the HF band, 3–5 MHz. The VHF radios operated from 38–42 MHz and 42–48 MHz, respectively, and the basic design guidelines were the same as those used for the Fusprech.f.

The basic difference in design philosophy for the airborne equipment was that there were two units, a receiver and a transmitter, which meant there was no switching in RF circuits. In spite of this, it is amazing that no calibration facility was required after hours of being in and on the air, because the RF part of the transmitter utilized only two tubes, one in an ECO oscillator and one in the PA, both of which were powerful transmitter pentodes, RL 12P 35. The specifications for this tube are very similar to the more familiar 807. Frequency stability was achieved by running the oscillator tube at very low power.

The basic design, however, was unusual and odd. Variations in antenna loading also did not affect the frequency stability. Output was held to 8 watts, far below the capability of the tube, but that was due in part to controlled grid modulation.

The best evidence for transmitter stability in both the FuG 16 and FuG 17 was in their use in some types of aircraft. In some aircraft the VHF radio was installed

in the rear part of the fuselage, out of direct accessibility to the crew. Instead, a form of remote control was achieved by means of geared electrical motors which were able to turn the dial knobs between two defined end-points. The motors were simply affixed to the front panels of the transmitters and receivers, whereby two radio channels could be selected by a switch in the cockpit. The crew couldn't make any adjustments even if they wanted to, but that may not have been necessary. The Germans relied strictly on AM and did not see fit to utilize FM.

One interesting report issued by the Allies on German equipment was prepared by the British Royal Airforce in February 1945. It concerns the FuG 16 ZY and says the following in its preface:

"4. Performance of the FuG 16 ZY/... In actual use the standard is for adjacent frequency channels to be separated by 50 kcs and, in view of the fact that neither the transmitter nor the receiver is crystal controlled, this, in itself, testifies to both receiver selectivity and absence of frequency drift of the transmitter. Similarly, the accuracy with which the equipment retains its calibration is excellent, the general performance being superior to that of special British listening receivers, and at present the only satisfactory interception receiver for FuG 16 ZY traffic is the FuG 16 receiver itself."

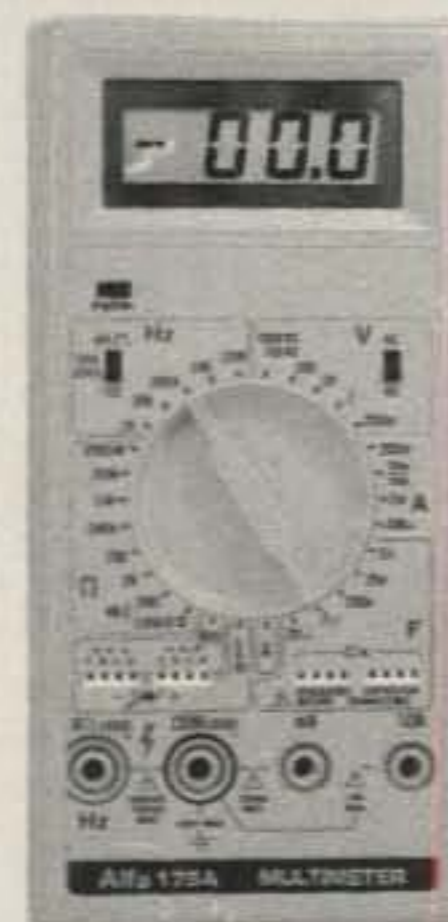
The report was stamped secret and signed (Sd) G.V. Calvert S/Ldr for W/Cdr.

Perhaps now when you look at your compact transceiver you can see some of the evolutionary thought that went into its design. Some things that appear to be remarkably new and innovative have been around for years in different forms. Modern technology has made it much easier just to purchase equipment rather than try and build it, and far simpler and safer than waiting around for war surplus.

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CQ REVIEWS:

The PacComm HandiPacket TNC

BY BUCK ROGERS*, K4ABT

Several years ago, in another space and another time, I wrote an article built around a portable packet station in a briefcase. That system served its purpose for that time period, but time marches on, and several innovations make it necessary to upgrade to the state of the art. The packaging of that system was built around compactness rather than duration and dependability. With today's technology and the availability of power sources and numerous solar recharging methods, we are now able to build a system that is more powerful and has a longer duty cycle (and period) with regard to the power source.

The gel-sel (see upper left corner of TNC photo) has given us a system that can now be recharged from an automobile 12 volt electrical system in a matter of minutes rather than hours. The rapid charging of any battery is not the recommendation of this author, but nevertheless the capability is there. The gel-sels that I use are 20 ampere, at 12 volts, with a tap at the 6 volt post for operating the computer in the event the internal batteries fail.

Key Word is "Mobility"

This time we are not only going to operate packet in a portable environment, but we are also presenting a mobile version of packeting. Packet radio has assumed a serious role in the minds of many of us who have a concern for the emergency applications of the digital modes. Most recent concerns are centered around the devastation from Hurricane Hugo, which crippled a large part of the east coast, and the tragic earthquake that also destroyed life and property on the west coast.

The role performed by the digital amateur during these recent disasters convinced the Health & Welfare organizations to further enlist the use of packet ra-



All set in the shade, ready for some real packet fun. The tea is in the cooler, and the sandwiches are in the . . . Jean Ann (WB4EDZ) where are the sandwiches?



Yes, trust me! The HandiPacket TNC is there. Look for the tiny square box of "digital-dynamite" in the center of the picture.

*506 Pheasant Ridge Drive, Warner Robins, GA 31088

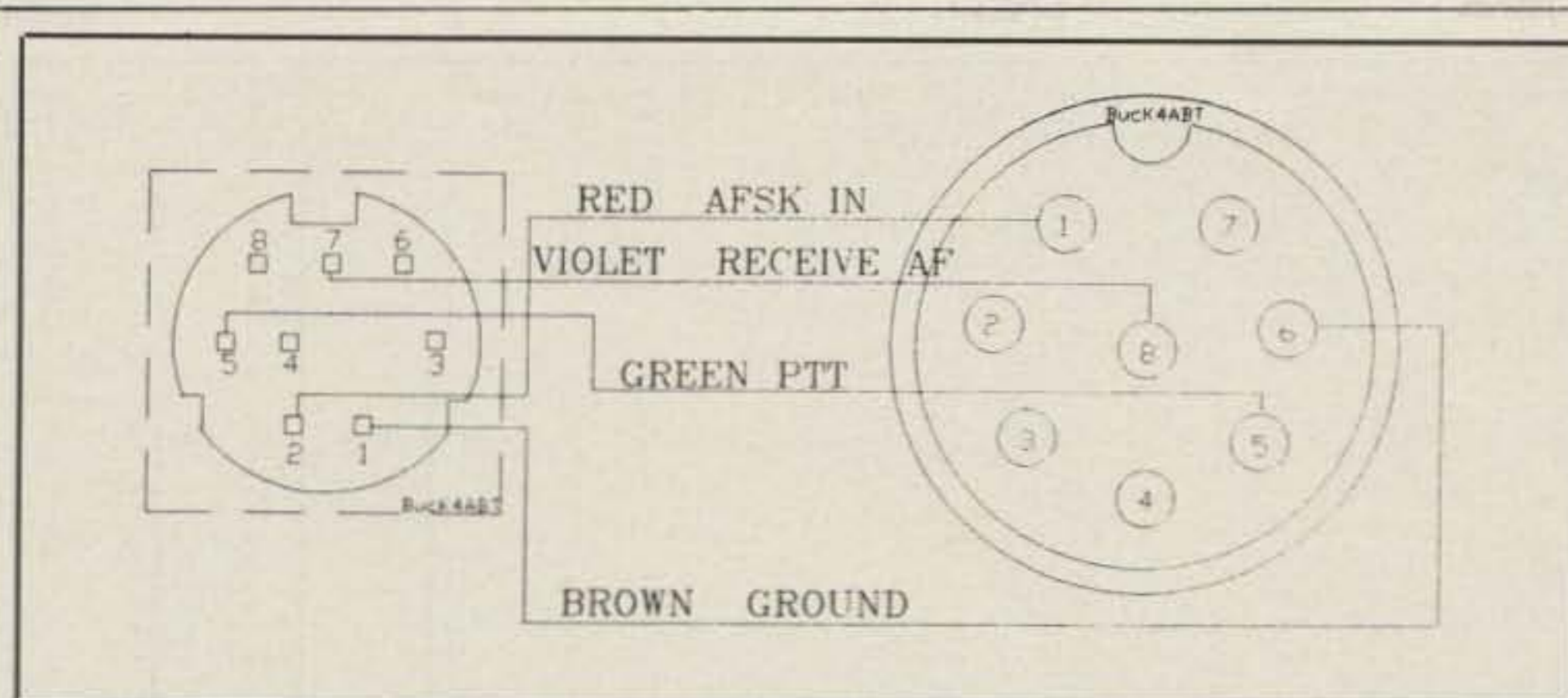


Fig. 1—PacComm HandiPacket to ICOM IC-28A.

radio communications during emergencies and disaster operations. For the medical teams, packet communications can be used as a reliable means to appeal for emergency medical and food supplies.

With reference to voice communications, the spoken word can sometimes be misunderstood or distorted. Even with the use of time-exhaustive "phonetics," the spoken word could convey the wrong message and ultimately bring the wrong kind of medical supplies. In the case of packet radio and its AX.25 error-checking protocol, along with the frame-check-sequence (FCS) and forward-error-correction (FEC) methods, there comes a measure of insurance that every word is received and reproduced exactly as it was sent. The workload associated with the message and traffic handling to and from relatives and friends who may be in the devastated areas can demand a large

part of the "on-location" traffic-handling operations.

"Semper Fidelis"

With the opening to this month's column, this subtopic was the only phrase that could adequately describe preparedness and readiness. The ability to act on a moment's notice.

Being an ex-Marine, I recall with vivid memory how we could come to full readiness with an uncanny machine-like performance within not weeks, days, or hours, but within minutes. The reason behind this kind of immediate response was because the equipment was built for mobility. It could easily be deployed to another location, and once there it could be set up in a matter of minutes. In the case of emergency and disaster communications, this same rule should apply.

There is another utilization for this kind of mobile, portable packet setup. That is the field-day, contesting, or just plain fun "mountain-top" recreational packeting. In addition to the many features relating to recreational packeting, there are the advantages of having a terminal program with the "buffer always open, and SAVE" features built in. The ability to save to disk every word typed in by the operator and the text received in every contact (connect) brings on a whole new viewpoint with this kind of "mobility." Just imagine how much time is saved in a contest if the contact text, complete with QTH, is time and date stamped and saved to disk. Now I have the attention of the DXers and contesters! This same text preservation can also be applied to the earlier mentioned disaster operations and traffic handling.

Bringing It Together

I chose the components for my system with the following reasons in mind:

- Low power requirements
- Dependability
- Weight
- Compactness
- Each component having its own built-in power source

The last item in this list may be difficult to accomplish when additional power at the antenna is needed to get beyond the boundaries or obstacles that might impede access to another node or digipeater.

For obvious reasons, and the one I just mentioned, I used the 25 watt mobile transceiver in this application. For no special reason other than it being handy, I'm using the ICOM IC-28A mobile transceiver for this performance review of the PacComm HandiPacket TNC. Almost all VHF transceivers in the power range mentioned will work well in this application. I also used the IC-02AT with pleasing results, and for that reason I'm including the interface connections for it as well. However, I gain several dB with the 25 watt mobile transceiver over the 3 to 5 watt HTs. I spend a lot of time in my Chevrolet Blazer "Tahoe," and I operate a lot of mobile packet.

In addition, I use the Toshiba 1000 PC compatible LapTop to write my articles while I'm away from my main "work-horse," the Sierra Technologies 80386/80387 PC. While the computer is being used with the "Professional Write" word-crunching software off-line, the PacComm HandiPacket is still catching calls (mail) for me (more on the mail feature later in this article).

An accompanying photo shows the PacComm HandiPacket interfaced to the IC-28A mobile transceiver. (Yes, trust me! It is the tiny square box in the middle of the picture.) I use this illustration in this manner because I use the system in a



For field-day purposes I ran a special line (fused) to the rear of the Blazer from the vehicle's heavy-duty electrical system (the cable visible beneath the spare tire). For added protection a separate switch at the battery controls the power to the line.

mobile position most of the time. I've included the interface connections for both the IC-28A 25 watt mobile transceiver and the IC-02AT HT (figs. 1 and 2) to give you an alternative to the radio that I use. Other hand-held radios may be connected in accordance with the instructions contained in the PacComm HandiPacket manual.

Here is a pleasing note to the purchaser of the PacComm HandiPacket TNC. It comes with all the cable assemblies to mate to the TNC and the computer. The TNC-to-transceiver cable is already equipped with the connector for the TNC end of the cable. If your computer is equipped with a male DB-25 connector, then it will be wise to pick up a "gender-changer" (female to female) while you're shopping for the mic connector to your transceiver.

Here is the only "short" coming that I found in my PacComm HandiPacket, and that was the length of the TNC-to-radio cable, and there may be a reason for that, too. The length of this TNC-to-radio interface cable somehow caught my attention. I picked up the ruler and measured it. It may or may not be a coincidence, but it is exactly one-quarter wavelength at the low end (packet region) of the 2 meter band.

The PacComm Formula

As I recall, the small portable computer that I used in the "Porta-Packet" article written about six years ago would reset itself to la-la land every time it got too close to the radio. I also recall that the radio-to-TNC cable was extremely long. Therefore, it may be that PacComm has the right formula to take care of that problem by keeping the TNC-to-transceiver cable short, thus reducing the stray RF pickup. It is apparent that PacComm has made an extra effort to design the HandiPacket so that stray RF and "birdies" are kept to a minimum. Whatever the reason for the 20 inch TNC-to-radio cable, it must work, for there is no sign of stray RF to cause any resets to la-la land for my system.

Mounting brackets and "Velcro" are included with the HandiPacket so that you can apply the mounting technique that most suits your application.

Start-Up Begins at 1200 Baud

The HandiPacket is very well documented and presented in a two-section manual. The first section is the "Operating" section, and the second section is devoted to "Technical and Maintenance" information.

Once the hookup is made and you are ready to set the parameters of the TNC, please make this mental note. Terminal-to-TNC start-up begins at 1200 baud. With the terminal set to 1200 baud, press

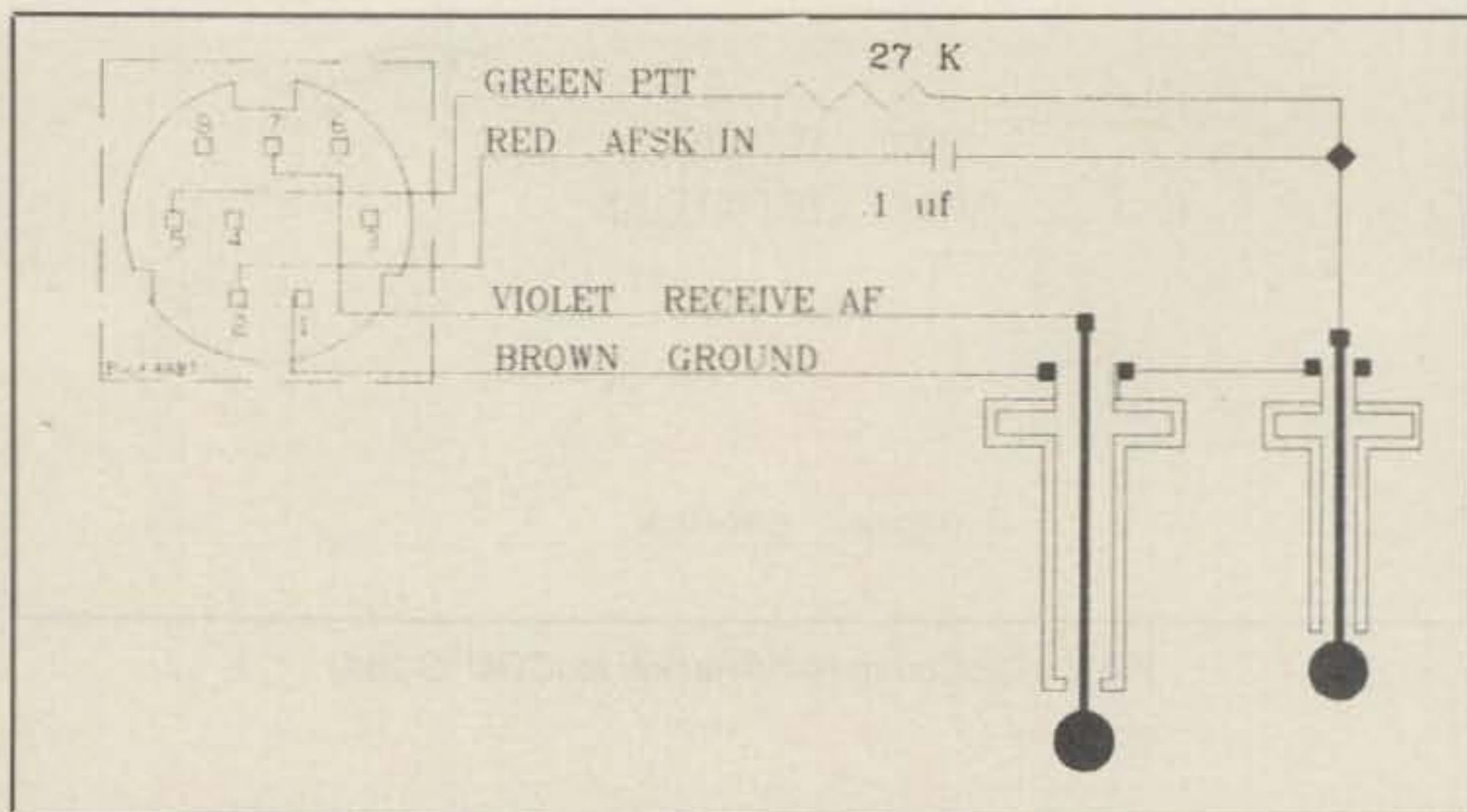


Fig. 2- PacComm HandiPacket TNC to ICOM IC-02AT.

the enter key and be sure you have the familiar **CMD:** displayed on the screen. Then if you wish to change to another baud rate for the terminal-to-TNC, or radio (on the air) speed, simply type **BAUD**. You may then choose whatever TNC or on-air baud rate you wish. Follow the on-screen instructions and you are *in*. Don't forget to set the terminal speed and parameters to those you chose at the menu. You must match the speed that you chose from the HandiPacket **BAUD** menu.

The battery pack is already installed, so the only thing you have to do is "aim and shoot," so to speak. Pick up a matching connector for the transceiver end of the cable, and wire the radio input according to the AF in, AF out, PTT, and ground connections as required, and you'll soon be on your way to real mobile and portable packet fun.

The Fun Continues

Another ideal feature built into the PacComm HandiPacket that is great for the mobile and portable packet station is the PacComm HandiPacket mailbox and message-capture feature. I often take the Toshiba 1000 off-line to do as I'm doing at this moment—writing this article. While the computer is away from packet, performing other functions, the HandiPacket is still at work. While I'm writing this article, the HandiPacket continues to catch any calls or messages that I might receive while the lap-top is off-line. It will continue to receive messages and mail, hold them, supported by the HandiPacket's internal battery backup, until I put the lap-top back on-line and retrieve my mail.

While I'm on the mail and message subject, there's another nice new feature in the PacComm HandiPacket TNC. This feature allows message handling to and from the MBL, MNT, MSYS, and RLI full-

featured BBSes. This is one feature you must experience to enjoy, and all this is contained in a very tiny, but durable, TNC that can disappear if you were to place your HT over it.

Well, it's about time for me to head home. The PacComm HandiPacket has been operating for more than 11 hours without charging, and it is still going great. Well... maybe I'll make a few more contacts (connects), and if it blinks, I'll charge it from the Chevrolet Blazer's 12 volt system. CQ



The antenna system can be erected in less than 5 minutes. Yes, that is an Alabama Amateur Electronics BandMaster Quad, and the support system (not fully extended) is the AAE BandMASTER mast. The complete AAE system shown here is of light, durable fiberglass construction.

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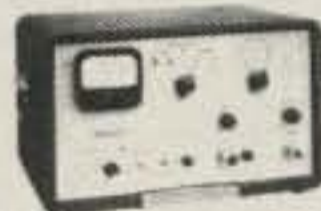
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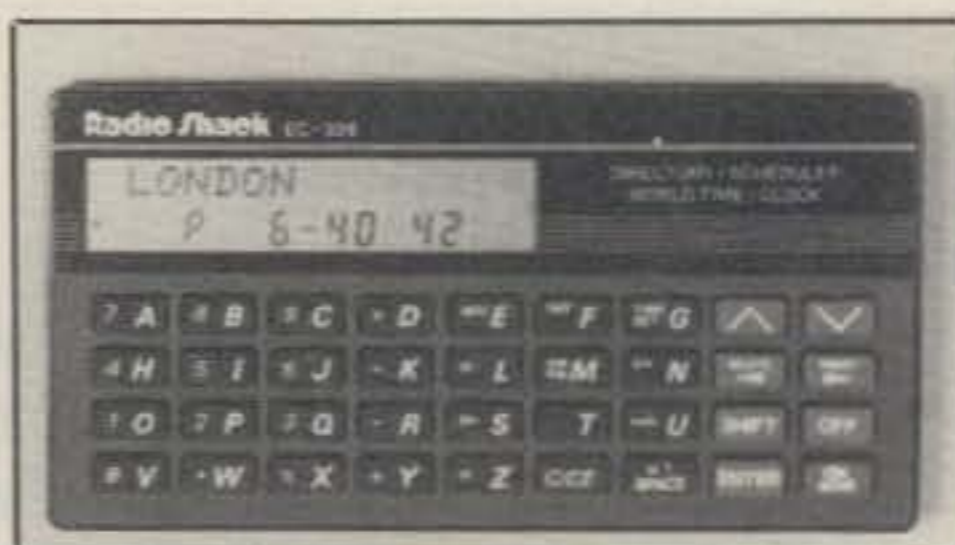
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Optoelectronics Hand-Held Universal Counter/Timer

The Optoelectronics Handi-Counter Model UTC 3000 is a universal counter/timer for frequency test and measurement. It is battery powered and operates from sub-audio to microwave. The unit weighs 15 ounces and is 5.3" x 3.9" x 1.4". It offers an ultra-wide dynamic range from 10 Hz to 2400 MHz, and is useful up to 3200 MHz. Three signal-frequency ranges include a direct counting range that goes from 10 Hz to 200 MHz, an internally-prescaled range to 600 MHz (useful to 900 MHz), and a second prescaled range specified to 2400 MHz (useful to 3200 MHz).

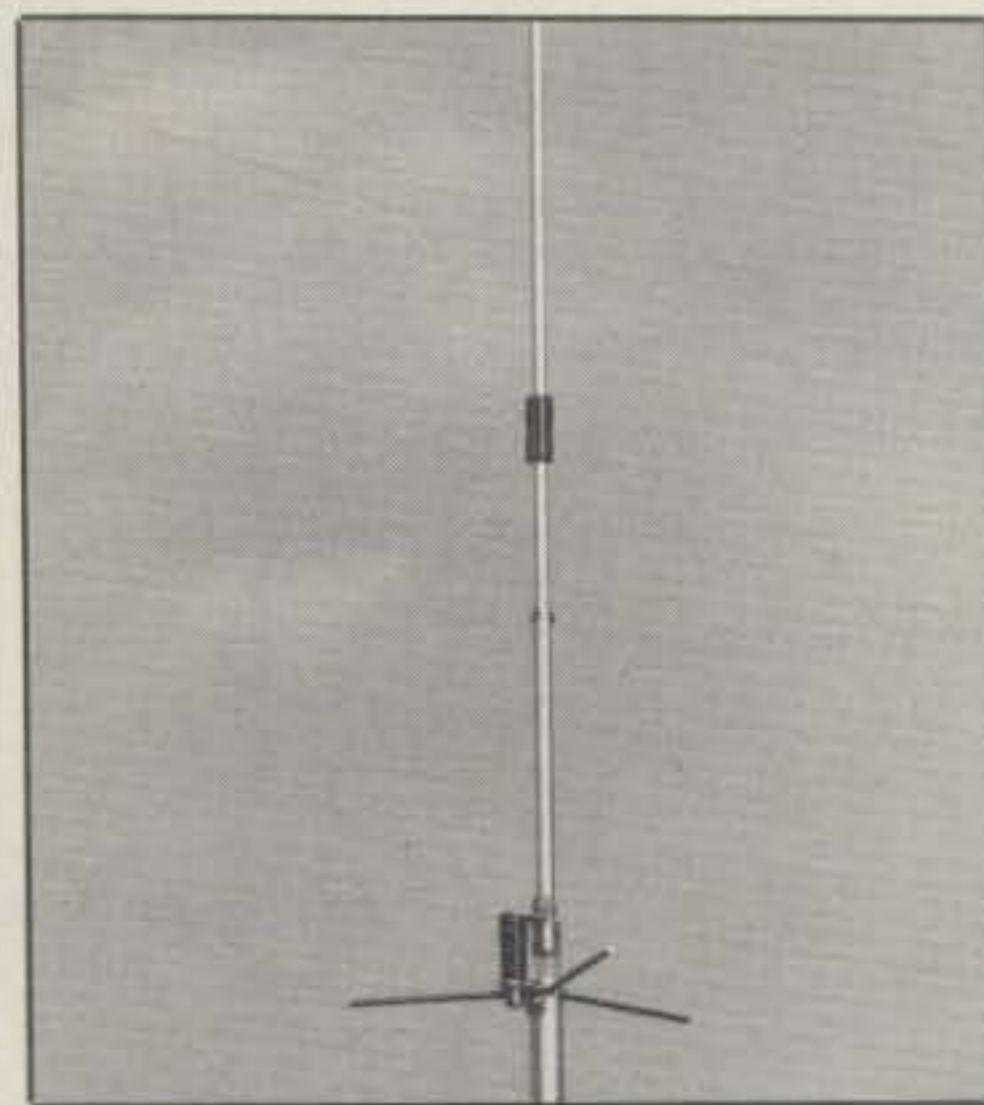
The UTC 3000 is priced at \$375. For more information, contact Optoelectronics Inc., 5821 NE 14th Ave., Fort Lauderdale, FL 33334, or circle number 105 on the reader service card.



Yaesu Antenna Rotator

Yaesu's G-250 Antenna Rotator has been designed for light to medium UHF, VHF, FM radio, and television antenna arrays for remote-control operation. The controller is a desktop unit which provides 360-degree indication of actual antenna compass direction. It is housed in weatherproof, melamine-coated, die-cast aluminum, and is permanently lubricated for maintenance-free operation. Power consumption is 37 VA; 360-degree rotation time is 45 seconds at 60 Hz; rotation torque is 14 ft.-lbs. Weight of the controller is 2.5 lbs., and the rotator is 4 lbs.

The G-250 is priced at \$111. For more information, contact Yaesu USA, 17210 Edwards Rd., Cerritos, CA 90701.



Cushcraft Dual-Band Ringo Antenna

The Cushcraft AR-270 Dual-Band Ringo antenna is suited for any dual-band 2 meter/70 cm transceiver. The lightweight design is aluminum in construction and utilizes stainless-steel hardware. The AR-270 measures 3 3/4 feet high and has 3.7 dB gain on 2 meters and 5.5 dB on 70 cm. There is full bandwidth on 2 meters and over 15 MHz on 435-450 MHz to work an FM repeater. It has a two-section vertical element, three short radials, weather-sealed phasing coil, and weighs 2 lbs.

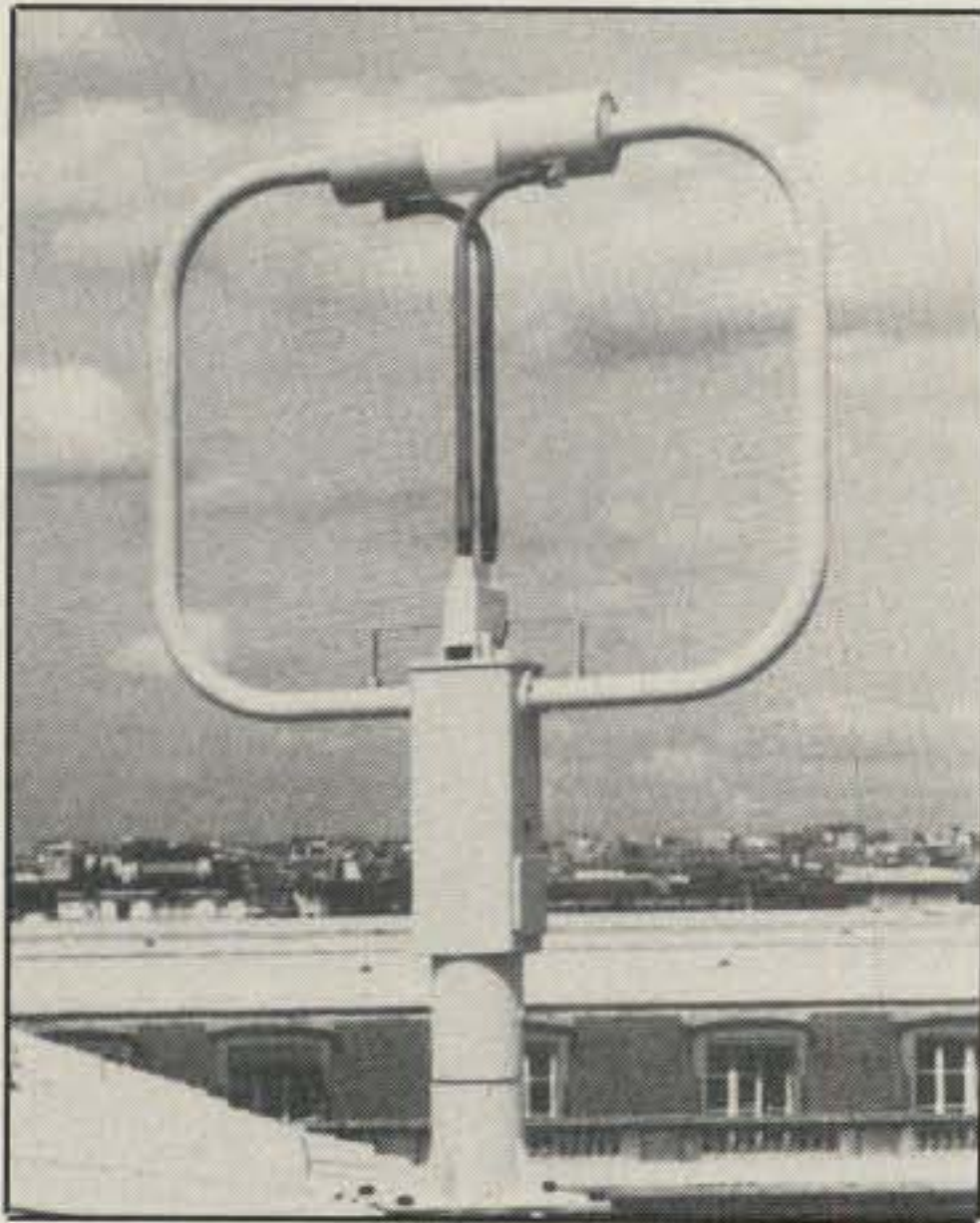
For more information, contact Cushcraft Corp., P.O. Box 4680, 48 Perimeter Rd., Manchester, NH 03108, or circle number 103 on the reader service card.



ICOM IC-449 440 MHz FM Transceiver

The IC-449 440 MHz mobile transceiver has one-touch-access design allowing each function to be activated with one switch. It measures 5.5" x 1.6" x 6.1" and has 35 watts output power. Twenty memory channels and a programmable call channel are included. The supplied HM-56 hand microphone has 14 DTMF memory channels capable of storing up to 22-digit telephone numbers. The IC-449 also provides a variety of scan functions, tuning steps, and optional accessories such as the UT-55 DTMF encoder/decoder and UT-50 tone squelch unit.

For more information, contact ICOM America, Inc., 2380 116th Ave. NE, Bellevue, WA 98009-9029, or circle number 110 on the reader service card.



Sabre-Starec Loop Antennas

Sabre-Starec loop antennas are highly selective, and are unaffected by environmental conditions, installation height, surface obstacles, or nearby electromagnetic fields, maker says. They offer performance without blind spots for medium-range communications. They are rugged and corrosion resistant, and are compact (5 to 7 feet on a side depending on model) and portable, requiring no towers. Vehicle-mounted half-loop models provide communications with fixed or mobile bases.

For more information, contact Sabre Communications Corp., 3400 Highway 75 North, P.O. Box 536, Sioux City, IA 51102, or circle number 109 on the reader service card.



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CIRCLE 92 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	UG7GWO('87)	255,852	1,327	12	57
3.5	P40R('87)	552,786	1,628	23	91
	(Opr. K4UEE)				
7.0	EA8RCT('87)	859,362	1,959	32	115
	(Opr. OH2MM)				
14	VP2KAA('81)	2,011,185	4,186	37	150
21	ZP5Y('88)	2,525,791	4,442	38	155
	(Opr. ZP5JCY)				
28	P40R('89)	2,669,580	4,951	35	145
	(Opr. K4UEE)				

AFRICA

1.8	IH9/IV3PRK('89)	81,344	447	9	53
3.5	CT3BZ('79)	235,113	772	22	87
7.0	EA8RCT('87)	859,362	1,959	32	115
	(Opr. OH2MM)				
14	EA9LZ('89)	1,213,215	2,798	29	116
21	EL2CX('89)	2,242,968	4,445	34	135
28	5H3TW('89)	2,052,900	3,855	38	142

ASIA

1.8	UG7GWO('87)	255,852	1,327	12	57
3.5	UW9AF('83)	222,192	554	19	53
7.0	JA8IXM('86)	316,382	794	37	109
14	RF0FWW('87)	1,447,128	2,894	40	147
	(Opr. UF6FFF)				
21	4S7AAG('81)	918,925	2,897	38	137
	(Opr. OH2BCP)				
28	JH1AJT('88)	1,421,070	2,409	38	163

EUROPE

1.8	LZ2CJ('84)	107,818	1,319	13	61
3.5	IK5BAF('88)	270,704	1,238	27	85
7.0	SP3RBR('88)	505,440	1,529	35	118
14	TF3CW('88)	1,791,840	4,107	34	126
21	YT3AA('88)	1,423,275	3,020	39	136
28	YU3ZV('88)	1,541,603	3,219	39	134

NORTH AMERICA

1.8	VE3BMV('86)	52,240	662	14	26
3.5	VE3BMV('85)	383,040	1,629	25	89
7.0	VP2ET('85)	850,795	2,295	31	124
	(Opr. K5RX)				
14	VP2KAA('81)	2,011,185	4,186	37	150
21	V22A('86)	1,789,470	4,075	37	140
	(Opr. WB7RFA)				
28	VP2ET('88)	2,423,880	5,137	37	143
	(Opr. K5RX)				

OCEANIA

1.8	KH6CC('85)	45,984	484	13	19
3.5	T32AF('85)	222,768	1,064	23	49
7.0	T32AF('84)	677,844	2,045	34	80
	(Opr. KH6UR)				
14	ZM1BIL('83)	1,334,232	2,635	38	136
21	AH0AB('82)	1,923,840	4,509	36	108
	(Opr. JA3DOC)				
28	KD7P/NH2('88)	2,309,304	4,885	38	123

SOUTH AMERICA

1.8	YV2IF('84)	18,291	172	14	25
3.5	P40R('87)	552,786	1,628	23	91
	(Opr. K4UEE)				
7.0	9Y4VU('84)	700,488	1,718	28	110
14	P40SS('87)	1,792,056	3,570	35	133
	(Opr. K2SS)				
21	ZP5Y('88)	2,525,791	4,442	38	155
	(Opr. ZP5JCY)				
28	P40R('89)	2,669,580	4,951	35	145
	(Opr. K4UEE)				

Single Operator/All Band

AF	CT9BZ('88)	12,743,190	6,886	157	497
	(Opr. OH2BH)				
AS	EX6F('84)	6,362,000	4,648	113	387
EU	ZB2X('89)	6,864,906	5,471	140	438
	(Opr. OH2KI)				
NA	HI8PGG('81)	9,009,721	7,190	131	392
	(Opr. N1GL)				
O	YJ0RY('88)	8,970,328	6,429	144	370
	(Opr. OH1RY)				
SA	9Y4TT('88)	12,340,132	7,150	151	436
	(Opr. NQ4I)				
QRP	PJ2FR('87)	3,171,166	3,212	100	234
	(Opr. K7SS)				
Asst.	YT3AA('89)	5,756,932	3,580	154	482

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	124	10	37
CT9BZ	3.5	175	22	64
(1988)	7.0	608	24	83
12,743,190	14.0	2,358	37	107
	21.0	926	30	97
	28.0	2,695	34	109
	Total	6,886	157	497

Multi-Operator/Single Xmtr.

AF	EA8AGD('88)	17,172,672	8,203	157	547
AS	RG6G('82)	12,276,352	6,012	156	558
EU	IR4LCK('88)	13,157,568	6,182	184	678
NA	NP4A('82)	14,953,818	8,772	174	585
O	AH0B('88)	8,608,600	6,163	143	330
SA	P40V('89)	18,520,488	9,128	143	542

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	39	9	21
P40V	3.5	227	13	48
(1989)	7.0	668	23	83
18,520,488	14.0	2,738	35	138
	21.0	1,996	32	129
	28.0	3,460	31	123
	Total	9,128	143	542

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	LX7A('89)	26,578,978	14,947	175	751
NA	VP2KC('79)	37,770,012	17,767	175	677
O	KH6XX('79)	21,990,252	10,989	184	494
SA	P40V('88)	49,347,430	18,065	189	746

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	338	17	43
P40V	3.5	1,504	26	97
(1988)	7.0	2,063	32	125
49,347,430	14.0	4,884	38	164
	21.0	4,867	38	159
	28.0	4,409	38	158
	Total	18,065	189	746

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

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	TA2BK('88)	163,605	880	11	55
3.5	NP4A('88) (Opr. K1ZM)	808,640	2,243	31	102
7.0	YX5A('88) (Opr. YV5ANT)	1,000,578	2,506	33	101
14	P40N('86) (Opr. N4PN)	1,477,905	3,138	37	122
21	CW8B('88) (Opr. CX8BBH)	1,496,556	3,112	40	122
28	ZP0Y('89) (Opr. LU8DQ)	1,692,429	3,491	37	126

AFRICA

1.8	EA8AK('82)	75,768	385	15	51
3.5	EA8XS('88) (Opr. OH5XT)	516,390	1,649	24	81
7.0	OH7JT/CT9('88)	904,038	2,195	35	103
14	EA8ID('87) (Opr. DK3GI)	1,212,384	2,336	39	134
21	5H3TW('89)	1,152,528	2,480	38	118
28	FR0MM('79)	978,012	2,590	36	90

ASIA

1.8	TA2BK('88)	163,605	880	11	55
3.5	ZC4DX('87) (Opr. 4Z4DX)	430,560	1,318	29	88
7.0	4Z4DX('88)	859,392	2,129	36	108
14	4Z8DX('89) (Opr. 4Z4DX)	1,156,148	2,621	38	119
21	JA5DQH('88)	624,470	1,413	40	114
28	VS6UP('88) (Opr. KB7G)	712,597	2,322	36	91

EUROPE

1.8	HB9AMO('88)	111,245	751	20	75
3.5	UA2FGA('87)	403,686	1,918	30	93
7.0	YU3ZV('87)	709,104	2,012	38	120
14	DK3GI('86)	822,024	2,006	39	129
21	OH6MCW('89)	775,620	2,208	37	102
28	YZ6A('89) (Opr. YT6AA)	766,746	1,963	39	123

NORTH AMERICA

1.8	K5UR('85)	47,005	219	25	60
3.5	NP4A('88) (Opr. K1ZM)	808,640	2,243	31	102
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	J79DX('89) (Opr. AA5DX)	859,360	2,661	33	98

OCEANIA

1.8	KX6DC('88) (Opr. NZ8B)	42,723	297	22	25
3.5	VR3AH('76)	178,560	956	24	40
7.0	KH6XX('84)	427,230	1,424	33	68
14	NY6M/KH2('88)	765,872	1,717	38	113
21	N7DF/NH2('89)	1,205,776	2,977	37	99
28	KD7P/NH2('88)	1,037,608	2,456	38	105

SOUTH AMERICA

1.8	YV3AGT('85)	147,588	591	21	63
3.5	P40R('86) (Opr. K4UEE)	576,725	1,682	25	90
7.0	YX5A('88) (Opr. YV5ANT)	1,000,578	2,506	33	101
14	P40N('86) (Opr. N4PN)	1,477,905	3,138	37	122
21	CW8B('88) (Opr. CX8BBH)	1,496,556	3,112	40	122
28	ZP0Y('89) (Opr. LU8DQ)	1,692,429	3,491	37	126

Single Operator/All Band

AF	9Q5NW('87)	7,586,300	4,768	150	385
	(Opr. N6AA)				
AS	5B4TI('87)	5,816,907	3,949	126	387
	(Opr. N6ZZ)				
EU	ZB2X('89)	5,450,761	4,402	146	529
	(Opr. OH2KI)				
NA	8P9HT('88)	7,323,030	5,590	139	356
	(Opr. K4BAI)				
O	KC6CS('88)	4,906,470	4,053	137	273
	(Opr. JE1JKL)				
SA	FY5YE('88)	9,574,096	5,548	142	442
	(Opr. OH2MM)				
QRP	YU3BC('88)	1,241,286	1,295	114	329
Asst.	K1DG('89)	5,048,802	2,904	155	438

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	149	12	37
FY5YE	3.5	382	17	60
(1988)	7.0	554	21	68
9,574,096	14.0	1,403	30	88
	21.0	1,067	31	98
	28.0	1,993	31	91
	Total	5,548	142	442

Multi-Operator/Single Xmtr.

AF	EA9EA('89)	11,755,566	5,923	167	499
AS	RG6G('82)	10,394,658	5,355	166	511
EU	LZ9A('89)	9,962,386	5,342	200	626
NA	NP4A('82)	11,648,565	6,881	168	515
O	KC6AA('89)	5,002,664	3,917	136	300
SA	PJ2X('88)	8,948,660	5,257	152	422

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	41	9	35
EA9EA	3.5	261	19	64
(1989)	7.0	1,034	32	89
11,755,566	14.0	1,580	36	110
	21.0	1,304	35	99
	28.0	1,703	36	102
	Total	5,923	167	499

Multi-Operator/Multi-Xmtr.

AF	CT3M('89)	32,031,744	14,473	172	596
AS	EW6V('82)	14,702,688	8,001	159	504
EU	LX7A('89)	20,497,632	12,735	189	705
NA	KP2A('88)	32,325,150	15,198	191	631
O	AH0C('83)	6,877,750	5,164	149	302
SA	PJ1B('88)	38,415,760	14,921	194	672

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	717	17	65
PJ1B	3.5	1,447	24	83
(1988)	7.0	3,119	37	133
38,415,760	14.0	3,791	40	140
	21.0	2,997	39	134
	28.0	2,850	37	117
	Total	14,921	194	672

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	WB9HAD('87)	27,181	157	23	54
3.5	K7SS('86)	217,038	828	31	91
7.0	W7RM('85) (Opr. W7WA)	243,270	813	31	71
14	K1OX('85) (Opr. KC1F)	1,131,328	2,176	36	140
21	K3RV/4('88)	1,270,478	2,298	39	148
28	W0ZV('88)	1,145,368	2,158	39	142

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	16	7	10
KC1F	3.5	225	18	58
(1983)	7.0	102	18	58
6,429,808	14.0	968	36	125
	21.0	723	33	102
	28.0	1,527	34	117
Total		3,561	146	470

Assisted

K1ZM('89)	4,043,592	2,074	153	525
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Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	27	11	24
N2RM	3.5	242	17	63
(1988)	7.0	82	23	73
6,923,136	14.0	614	37	126
	21.0	1,120	37	126
	28.0	1,293	36	131
Total		3,378	161	543

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	141	16	52
W3LPL	3.5	415	22	75
(1988)	7.0	330	28	93
16,092,951	14.0	1,571	39	159
	21.0	1,710	38	146
	28.0	2,310	37	156
Total		6,477	180	681

CW

Single Operator/Single Band

1.8	K5UR('85)	47,005	219	25	60
3.5	W1FV('87)	270,692	790	28	90
7.0	K2EK('88)	520,086	1,244	37	110
14	K2EK('89)	903,200	1,902	38	112
21	W7WA('89)	772,146	1,647	39	119
28	K1ZM('89)	732,564	1,447	37	134

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	14	5	9
K3TUP	3.5	61	15	46
(Op.K5ZD)	7.0	622	31	85
(1989)	14.0	759	36	98
5,575,913	21.0	864	35	99
	28.0	894	33	95
Total		3,214	155	432

Assisted

K1DG('89)	5,048,802	2,904	155	438
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Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	36	16	33
K1AR	3.5	313	26	75
(1989)	7.0	920	35	100
9,383,459	14.0	1,139	37	128
	21.0	773	39	123
	28.0	920	37	129
Total		4,101	150	588

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	72	15	34
W3LPL	3.5	401	28	86
(1989)	7.0	1,508	34	106
16,221,259	14.0	1,965	39	135
	21.0	1,658	39	126
	28.0	1,546	38	140
Total		6,866	190	619

Club record: Frankford Radio Club ('89) 307,534,371

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- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD except for RS-3A
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)

SL SERIES

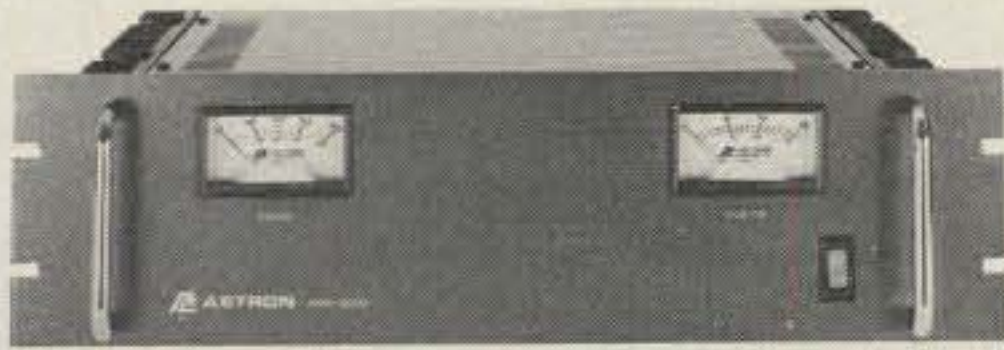


MODEL	Colors Gray Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
SL-11A	• •	7	11	2 3/4 x 7 5/8 x 9 3/4	11

RS-L SERIES



MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RS-4L	3	4	3 1/2 x 6 1/8 x 7 1/4	6
RS-5L	4	5	3 1/2 x 6 1/8 x 7 1/4	7



RM SERIES MODEL RM-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RM-12A	9	12	5 1/4 x 19 x 8 1/4	16
RM-35A	25	35	5 1/4 x 19 x 12 1/2	38
RM-50A	37	50	5 1/4 x 19 x 12 1/2	50
RM-60A	50	55	7 x 19 x 12 1/2	60
RM-12M	9	12	5 1/4 x 19 x 8 1/4	16
RM-35M	25	35	5 1/4 x 19 x 12 1/2	38
RM-50M	37	50	5 1/4 x 19 x 12 1/2	50
RM-60M	50	55	7 x 19 x 12 1/2	60

RS-A SERIES



MODEL RS-7A

MODEL	Colors Gray Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RS-3A	• •	2.5	3	3 x 4 3/4 x 5 3/4	4
RS-4A	• •	3	4	3 3/4 x 6 1/2 x 9	5
RS-5A	• •	4	5	3 1/2 x 6 1/8 x 7 1/4	7
RS-7A	• •	5	7	3 3/4 x 6 1/2 x 9	9
RS-7B	• •	5	7	4 x 7 1/2 x 10 3/4	10
RS-10A	• •	7.5	10	4 x 7 1/2 x 10 3/4	11
RS-12A	• •	9	12	4 1/2 x 8 x 9	13
RS-12B	• •	9	12	4 x 7 1/2 x 10 3/4	13
RS-20A	• •	16	20	5 x 9 x 10 1/2	18
RS-35A	• •	25	35	5 x 11 x 11	27
RS-50A	• •	37	50	6 x 13 3/4 x 11	46

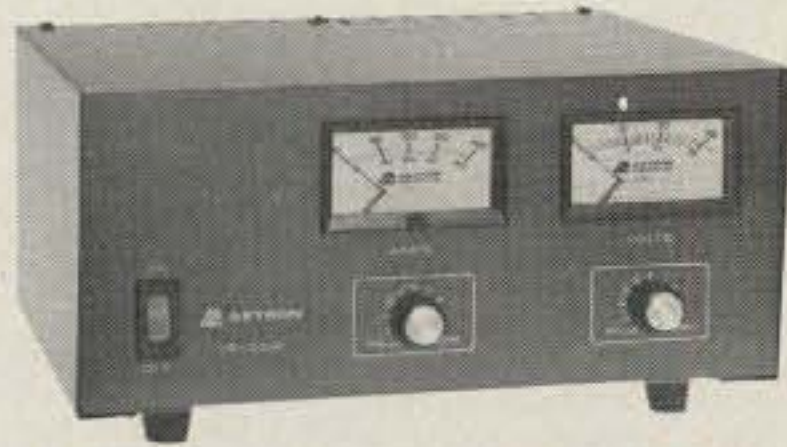
RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RS-12M	9	12	4 1/2 x 8 x 9	13
RS-20M	16	20	5 x 9 x 10 1/2	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 3/4 x 11	46

VS-M AND VRM-M SERIES



MODEL VS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
VS-12M	9 @13.8VDC, 5 @10VDC, 2 @5VDC	12 @13.8V	4 1/2 x 8 x 9	13
VS-20M	16 @13.8VDC, 9 @10VDC, 4 @5VDC	20 @13.8V	5 x 9 x 10 1/2	20
VS-35M	25 @13.8VDC, 15 @10VDC, 7 @5VDC	35 @13.8V	5 x 11 x 11	29
VS-50M	37 @13.8VDC, 22 @10VDC, 10 @5VDC	50 @13.8V	6 x 13 3/4 x 11	46
VRM-35M	25	35	5 1/4 x 19 x 12 1/2	38
VRM-50M	37	50	5 1/4 x 19 x 12 1/2	50

RS-S SERIES



MODEL RS-12S

MODEL	Colors Gray Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt. (lbs.)
RS-7S	• •	5	7	4 x 7 1/2 x 10 3/4	10
RS-10S	• •	7.5	10	4 x 7 1/2 x 10 3/4	12
RS-12S	• •	9	12	4 1/2 x 8 x 9	13
RS-20S	• •	16	20	5 x 9 x 10 1/2	18

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Thoughts on Multiband Antennas and More

Several months ago Harry K. Wolf, W6NKT, dropped us a line. He suggested that, from reading our column, he and I were essentially on the same wavelength when it comes to transmission lines and wire antennas. Harry contributed some short essays on these subjects, and we're pleased to offer this forum where we've adapted his beginner-oriented views on multiband wire antennas.

The Challenge de W6NKT. In Harry's view, wire antennas lend themselves to fruitful experimentation at relatively low cost. Besides the fun of experimentation, one simple reason we construct multiband antennas is that our multiband transceivers far outnumber the single-band type. But there aren't very many antennas that can match the frequency diversity of the transceiver. The challenge is to design a simple but effective wire antenna that lets the typical 100 watt output transceiver face a nominal 50 ohm impedance with an SWR of 1.3:1 or less, on several bands and across the phone and CW segments of each band.

First Things First. The first consideration in building a wire antenna, notes Harry, is cutting a flattop of approximately $\frac{1}{2}$ wavelength. The formula $468/f$ (MHz) gives the length of a half-wavelength antenna for the desired operating frequency. However, if anything is attached to the antenna, such as traps, this natural resonant condition is disturbed. Also, most wire antennas are environmentally sensitive. Thus, the antenna's resonance and performance may be affected by its placement; it may work well in one location but not in another.

The next consideration is where to feed the antenna. Should it be fed at one end, in the middle, or somewhere in between? Each of these choices has its advantages and disadvantages. Most multiband wire antennas are fed in the middle, though there are several different ways to feed an antenna at its midpoint. Generally, we open the antenna at this point and conveniently insert an insulator or a balun. We may use either coax or parallel transmission line, so let's look at each.

Coax Feed. When we use coax, we have several options to let us operate on several bands. With coax feed we generally have a good-performing single-band antenna, though the dipole will also offer a good match to coax when operated at three times the design frequency. One way to make a multiband coax-fed antenna is to attach several half-wave antennas "in parallel" to a common center insulator. However, antennas of this type become cumbersome physically when more than two- or three-band operation is required.

Another way to make a coax-fed multiband antenna is to use traps. Two traps are needed for each band. Each set forms a dipole for the

desired band, with the wire beyond the traps being "trapped out." For a few bands trap dipoles make good antennas, but they run into problems when seven, eight, or nine bands are required. A major problem is the heavy weight of numerous traps.

These antennas will work with a balun when it is substituted for the center insulator. The balun's case usually sports a handy set of mounting hooks for the wire sections and for supporting the coaxial feedline. Most baluns for wire antennas are of a 1:1 ratio, since the impedance at the middle of the dipole is typically around 72 ohms. Thus, 72 ohm coax is a good feedline choice, although in practice you can usually substitute 50 ohm coax if you like. All of these antennas should be "pruned" or adjusted to frequency.

Enter the Zepp. If you use an insulator at the midpoint, you can use parallel feeders of 300, 450, or 600 ohms. Several distinct advantages accrue when you use parallel feeders to make what is popularly dubbed the center-fed Zepp. The first is that a simple, nine-band antenna is formed if you make the flattop 65 feet or longer (preferably 132-137 feet). A second advantage is that parallel conductor feedlines are the most efficient ones. A third is that the flattop itself isn't critical as to length, thus eliminating the need to prune the system. On balance, the parallel-feeder, center-fed antenna makes one of the most efficient and simplest multiband wire systems you can erect. Not only will such an antenna operate on all nine HF bands, but it will effectively cover both the CW and phone portions of each band.

The antenna we've just described may be used as a straight flattop, Vee, or sloper—or even with the ends bent or drooped. Very seldom is it necessary to change the length of the flattop. If you encounter some difficulty in matching on one band, try lengthening the transmission line by several feet at a time and rechecking the match on each band you use.

The center-fed Zepp is a balanced system, you don't need a ground (though one should of course be on the equipment), and the feeders are "self-canceling" so that there should be little incidental radiation from them (with reduced risk for TVI). The center-fed Zepp does require an antenna tuner, however.

There are other ways to feed the antenna at the midpoint, some of which involve matching devices and stubs. One of the most popular schemes is that of the G5RV, with its 102 foot flattop and (in one version) its 33-34 foot matching stub and coax feed. However, the G5RV is really a special case of the center-fed Zepp, with its 102 foot length chosen because of its three-half-wavelength harmonic relationship to the 20 meter band.

The Windom. Various types of "off-center-fed" flattops are popular. These are antennas that have the transmission line attached somewhere between the middle and the end of the flattop. In its simplest form the antenna,

known as the Windom, has a single wire feedline attached about 15-16 percent off the middle. Amateurs found that they could use the antenna on multiple bands by attaching a 300 ohm feedline at a point about one-third in from one end, opening the antenna at this point and inserting an insulator. Some users report good results using a 6:1 balun at this point instead of an insulator, to use coax feed. However, you may encounter some problems using the Windom on several different bands, making it necessary to prune the flattop.

End-Fed Zepps and Slopers. An early multiband wire antenna is the end-fed Zepp. It uses parallel feeders, but unlike its center-fed counterpart, these feeders are apt to radiate. Also, you're likely to see more problems getting this antenna to load well on several bands. Slopers are often end-fed. However, they usually are fed with coax, often use traps, and typically need a good ground or counterpoise. Normally bandwidth is fairly narrow.

Randomwires. The last simple multiband wire antenna we'll consider is the random-wire. It's formed by a single wire from the tuner run to any available outside support. By definition, one doesn't have to measure the antenna's length, but a wire that is 65 feet or longer can produce good results even on 75 and 80 meters. With a good ground random-wires can be excellent performers, but you often have to contend with the problem of "RF in the shack" and an increased risk of interference to electronic devices of all kinds. Here antenna and feedline are one.

Achieving a Match. To effectively use a parallel feedline antenna system, or a single-wire antenna, with modern transceivers requires some sort of matching device. Whether they are called transmatches, antenna couplers, or antenna tuners, so convenient and versatile are these devices that some transceiver manufacturers build them into their units. Because the antenna tuner can bring about an efficient "conjugate match," tuning the whole system, there is little reason to worry about the exact length of the wire, especially with the center-fed Zepp. In general, though, the antenna should be as long and as high as possible.

Somewhere in the system there should be a balun to change two-wire, parallel transmission line to match the coaxial output of the transceiver. The balun and tuner introduce some loss, but that loss is usually not significant. If the transceiver has a built-in antenna tuner, all that you need to get on all bands is a 4:1 balun located near the transceiver. Most built-in tuners match about 20 to 150 ohms. With the balun you can match from about 80 to 600 ohms, just right for ladderline or openwire line.

If your transceiver doesn't have a built-in tuner, you should consider investing in a good wide-range tuner that has a built-in balun and power/SWR meter, especially if you expect to

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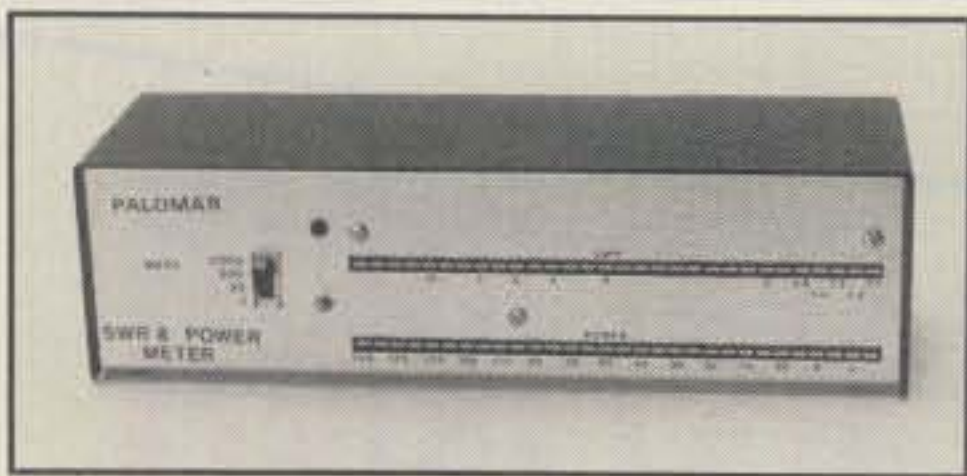
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393S	TH5MK2S Thunderbird, 5 elements	805.00	236S	153BAS 3 element 15 meter	200.00
395S	Explorer 14 Broad Band	637.00	226S	203BAS 3 element 20 meter	325.00
221S-1	TH3JRS Thunderbird, 750W PEP	403.00	375S	105BAS Long John 5 element 10 meter	278.00
390S	TH2MKS Thunderbird, 2 elements	378.00	376S	155BAS Long John 5 element 15 meter	419.00
396S	30/40 Meter Kit for Exp. 14	162.00	377S	205BAS Long John 5 element 20 meter	713.00
			394S	204BAS 4 element 20 meter	539.00
			371S	Discoverer 7-1 Rotary dipole 30/40 meter	294.00
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			373S	Discoverer 7-3 Director Kit for 7-2	416.00

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The Palomar Engineers M-835 is a deluxe version of the M-827 SWR and Power Meter. The M-835, like its predecessor, is an LED-display, instant-reading device that shows PEP output power directly and accurately. The unit features two 30-element, 6 inch LED readouts for a reading resolution of better than 3 percent of full scale. (Photo courtesy Palomar Engineers)

experiment with the antenna system. Most commercially built tuners will match the situations you're likely to encounter using parallel feeders. In fact, many external tuners can handle a wider variety of matching chores than can internal transceiver tuners.

Hopefully, one of the multiband wire antennas we've suggested should fit your situation, allowing your antenna's versatility to equal the multiband features that the modern transceiver usually possesses.

Thanks again to Harry K. Wolf, W6NKT, for his timely contribution to the Antennas & Accessories column.

Antenna Notes: New Products

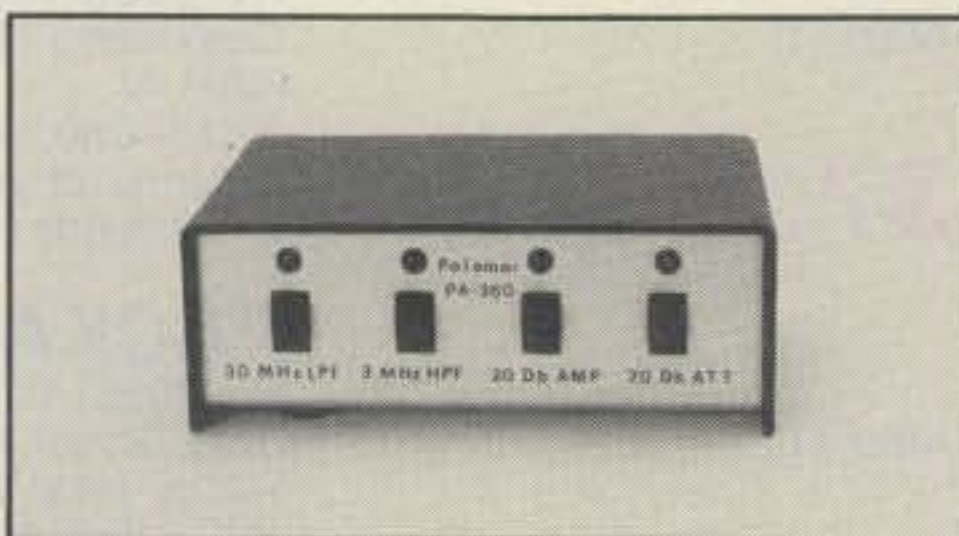
Two From Palomar Engineers. Jack Althouse, K6NY, sent us information on several Palomar Engineers accessories. One is the new "hands off" M-835 SWR and Power Meter. This is a deluxe version of the older M-827. The M-835, like its predecessor, is a LED-display, instant-reading device that shows PEP output power directly and accurately, allowing you to see actual SSB PEP peaks. The unit fea-

tures two 30-element, 6 inch LED readouts to rival a reading resolution of better than 3 percent of full scale.

The M-835 may be used from QRP power levels as low as 100 milliwatts, up to the maximum legal limit. It has four power ranges—2, 20, 200, and 2000 watts—selected by a front-panel switch. Both power and SWR, the latter from 1.0 to 10+, are displayed continuously, and the M-835 may be used over the range 1.8 to 30 MHz. It requires 15 VDC for operation and is priced at about \$190.

A second product of interest, especially to SWLs, is the PA-360 Amplifier™ designed to improve shortwave reception, especially with relatively insensitive receivers and those which are particularly subject to crossmodulation and overload. This is a rather novel four-function device that includes (1) an amplifier with 20 dB gain from 100 kHz to 1000 MHz; (2) a 3 MHz highpass filter; (3) a 30 MHz lowpass filter; and (4) a 20 dB attenuator.

Each of the four functions has its own panel switch and indicator lamp. The functions may



The Palomar Engineers PA-360 Amplifier™ is a novel four-function device that includes (1) an amplifier with 20 dB gain from 100 kHz to 1000 MHz; (2) a 3 MHz highpass filter; (3) a 30 MHz lowpass filter; and (4) a 20 dB attenuator. It's of special interest to SWLs, those with relatively insensitive receivers, and users whose equipment is prone to crossmodulation and signal overload. (Photo courtesy Palomar Engineers)



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But comparing amplifiers is tough, because so many claims range from vague to absurd.

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The term lost its meaning in the 70's, so ETO switched to *locked key, no time limit*. Unequivocal, right? A brochure I saw recently used the phrase "continuously, no time limit..." then defined duty cycle as "full output in amateur service." What does *that* mean?

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73,



Dick Ehrhorn

Dick Ehrhorn
W4ETO

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20 METER		ALL BAND			QRZ ⌘G	QSL ⌘H	Sri wrkd ⌘I
10	8	8	13	36	11	11	792
QSO's	Countries	Zones	QSO's	QSOpts	Countries	Zones	Score
Country Maldive Is. Valid Zone(s) 22 Continent AS - New QSO - - New Zone - - New Country - Worth 144 Points				Speed Vs Function <input type="checkbox"/> Quick Dupe <input type="checkbox"/> Disable Scoring		Pre Contest Functions	
				BAND		MEMORY	
				10 15 20 40 80 160		KH6XX @28.430.8	
				⌘1 ⌘2 ⌘3 ⌘4 ⌘5 ⌘6		VU2TG @14.177.4	
						HL2HN @ 28.370.6	
						H44NZ @ 21.206	
CALL		ZONE		R E P O R T			
8Q7AZ		22		59 59			
Previous Call HS1BF				RECEIVED SENT			
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Fig. 1—Typical display of the CQ WW DX Contest version of The Six Shooter for the Mac. ZCo offers The Six Shooter as a subscription. The sub covers six of the most popular contests.

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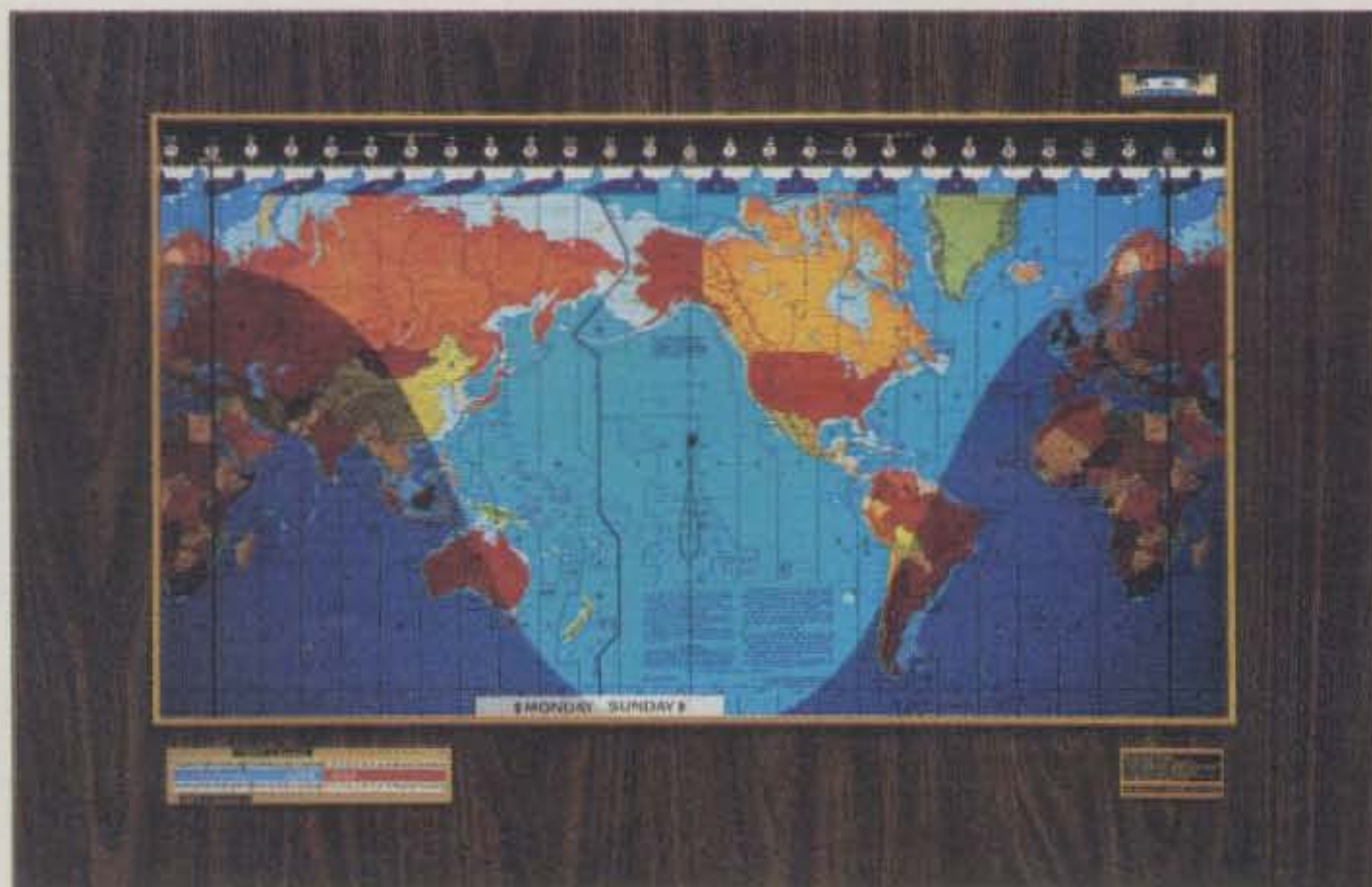
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CIRCLE 74 ON READER SERVICE CARD

be switched in one at a time or in any combination. With all switches in the out position, the antenna is connected directly to the receiver. With any switch in the in position, that function is enabled and the corresponding indicator light illuminates. For example, if local AM broadcast stations overload your receiver and cause "birdies," you can switch in the 3 MHz highpass filter to eliminate them. The 30 MHz lowpass filter does the same thing for offending VHF FM, TV, and utility stations, while the 20 dB attenuator reduces overload from in-band signals. You can use the 20 dB amplifier to help compensate for a relatively insensitive receiver or a less-than-optimal antenna.

The PA-360 is designed for use with coax-fed, parallel line fed, or singlewire antennas. It requires 12 VDC for operation and is priced at about \$80. For details, contact Palomar Engineers, P.O. Box 455, Escondido, CA 92025.

SG-303 HF Antenna. In the July 1989 issue we profiled the SG-230 Smartuner™. This is SGC's microprocessor-controlled "intelligent" HF antenna coupler designed for marine, aviation, paramilitary, and amateur operation. It automatically tunes any length antenna from 8 to 80 feet over the range 1.8 to 30 MHz. To recall, one of the novel features of the SG-230 is its non-volatile memory, which remembers the frequency and tuning values. Thus, on future transmissions on the same frequency, the tuner reselects these values, doing so in less than 10 ms.

SGC recently introduced the SG-303, a 9 foot HF antenna for marine and mobile use. Designed for operation in the range 2-30 MHz, the antenna is intended for use with the SC-230 Smartuner or a similar antenna coupler. The new vertical antenna is modular, coming in two sections. SGC includes a four-way stainless-steel ratchet mount, a heavy-duty base spring, and other installation accessories that facilitate its use with the SG-230 coupler. The ratchet mount allows the antenna to be folded down when the vehicle is in operation. The antenna handles up to 150 watts and weighs 6 pounds.

For pricing, specs, and an application note on the antenna/tuner combination, contact SGC, Inc., SGC Building, 13737 SE 26th St., Box 3526, Bellevue, WA 98009.

Software Topix

Diamond Systems Study Courses. Some time ago CQ received for review one of the Diamond Systems Amateur Radio License Study Courses for the IBM PC and compatibles. These are study courses that include most of what you need to prepare for any of the five classes of amateur radio examinations—theory, code, and regulations.

The courses contain up-to-date, complete FCC/VEC questions for the appropriate examination. They include all examination sub-elements, generate thousands of practice tests, keep score for the student, and contain a CW code practice program on disk. As a bonus, the courseware package comes with discount coupons from leading dealers and manufacturers of amateur radio gear.

The Novice class study course which I test drove is part of this study series. The course includes more than 370 FCC-approved questions on floppy disk, along with 1488 associated answers. The computer randomly selects the questions for self-test purposes. You

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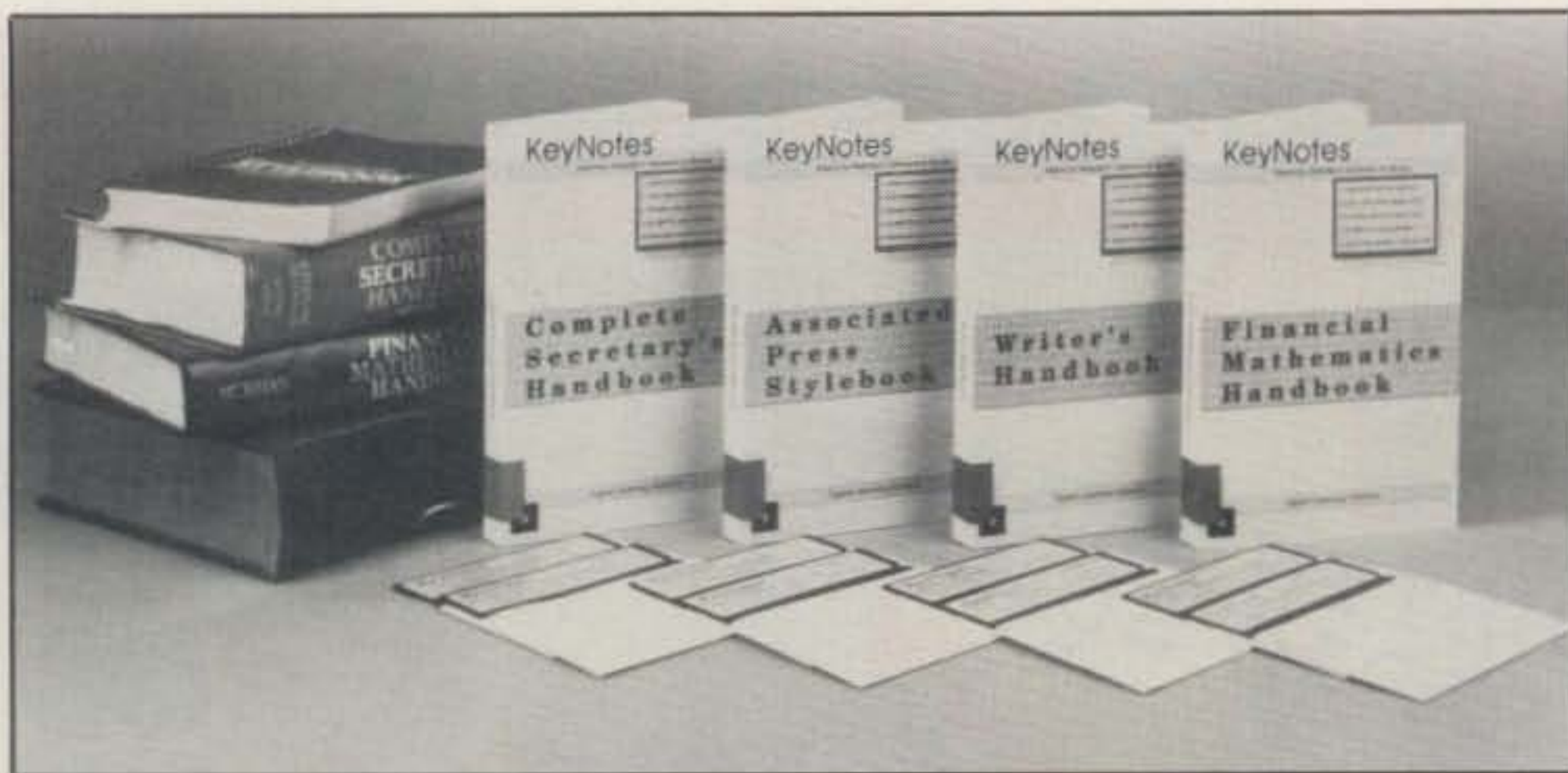
AEA PK-232MBX, PK-88



MFJ 1270B, 1274, 1278



KANTRONICS KAM



The KeyNotes Electronic Reference Library combines the resources of popular print reference books with the fast information retrieval capabilities of the PC. Presently, the manufacturer offers four separately sold "books" for a variety of word-based and mathematical uses. (Photo courtesy Digital Learning Systems)

can study the individual sub-elements, produce a 30-question test from the nine study sub-elements, or study from the entire question-pool database.

The Morse code program is an easy-to-use, menu-driven trainer that lets your PC generate the code. The program can generate code randomly or from a test file, from 2 to 60 WPM. It can create a text file or retrieve a text file from disk.

I found the Novice program to be quite comprehensive. Particularly useful was the real-world description of what to expect when you take your exams with a volunteer examiner and how they score the written and code examinations. A minor drawback is that the program diskette is copy protected; you must customize the program with your own name to discourage passing the program around. However, the copy protection doesn't prevent you from installing the program on a hard disk.

The Diamond Systems Novice course is regularly updated and is priced at \$49.95. The packages for other class licenses vary from \$44.95 to \$59.95. For more information and literature on the series, contact Diamond Systems, Inc., P.O. Box 48301, Niles, IL 60648. The computer courseware, as well as book-and-tape versions for each license class, are also sold through the Heath catalog.

Six Shooter and Qlog for the Mac. John Olapurath, KE1Z, of ZCo Corp., knows that I'm not Macintosh-PC equipped. Nevertheless, he sent me some detailed information on two of his new software products for the Mac.

John is particularly enthusiastic about The Six Shooter, which is a series of six separate Mac amateur radio contest programs. Each one is customized for a specific contest. The programs automatically perform QSO logging, time stamping, duping, scoring, and after-the-event paperwork. Six of the most popular contests are included. These are the ARRL International DX Contest, CQ World-Wide WPX Contest, Field Day, IARU HF Championship, CQ World-Wide DX Contest, and ARRL 10 Meter Contest.

These contest programs include a number of sophisticated features. One is Call Memory, useful when "cruising the band." You can use it to save the call and frequency of a station you want to return to and work later. There's

also a digitized voice feature that lets you use your Mac to call CQ and do most of the exchanges in a phone contest. Among other features, the programs also include a database that manages both the DXCC prefix list and ITU allocations.

The Six Shooter is sold on a subscription basis. The \$49.95 subscription price gives you a one-year sub and license to use the six separate programs. ZCo ships each one a few days before the actual contest.

QLog (which John called "Zlog" while in development) is ZCo's latest program. It's a relational database logger for the Mac that's designed to automate your station's QSLing activities. The program is compatible with The Six Shooter so that you can move its logs into Qlog very easily. It can store and receive vast amounts of data quickly and efficiently, being theoretically capable of handling more than one billion records.

The program sports a number of advanced features that allow you to precisely track which QSLs you sent and received. It has a powerful report writing facility, and it allows you to design your own QSL card format. You also can import graphics from a variety of paint programs, print out hundreds of QSLs at a session, and prepare address labels. The program is priced at \$49.95. (John offers a package deal containing both Qlog and The Six Shooter for \$79.95.)

For more information, contact ZCo Corp., P.O. Box 3720, Nashua, NH 03061-3720. Or, check out the March/April issue of *Digital Digest*, which features a detailed review of The Six Shooter on page 24 of that issue.

Fig. 1 shows a typical visual display of The Six Shooter for CQ magazine's own popular World-Wide DX Contest.

KeyNotes® Electronic Reference Library. The KeyNotes Library is a series of IBM PC reference programs that we might describe as "electronic reference tools." Recently, Digital Learning Systems updated the existing three wordprocessor-related "reference books" in the series and introduced a fourth—a financial, math-oriented book. The books can be quite useful for those who do a good deal of writing and need various types of reference material on-screen and at their fingertips. We described the evolving KeyNotes Li-

brary twice previously, in the January 1988 column and again in February 1989. (You do save your old copies of CQ, don't you?)

The KeyNotes Library is an interesting approach to information retrieval that combines the resources of popular print reference books with the fast retrieval capabilities of the PC to provide instant access to needed reference information.

Presently, four online books make up the series. These include the *Associated Press Stylebook*, a standard reference for consistency widely used by journalists worldwide; the *Financial Mathematics Handbook*, the latest book, with its dozens of financial formulas; the *Complete Secretary's Handbook* for business correspondence; and the *KeyNotes Writer's Handbook*, a rule and reference guide for writers.

You can run the electronic books in a memory resident mode. This gives you instant "hot key" access via pull-down menus to important and often-used reference books without leaving your application program and interrupting work flow. The online books use familiar concepts of paper-and-ink books such as bookmarks, cross-references, tables of contents, indexes, and glossaries. Most of the electronic books are designed to be run in conjunction with a wordprocessor, but you can also use the *Financial Mathematics Handbook* with your spreadsheet program.

As I reported in earlier columns, if you're "into" the kinds of writing and calculating covered by the KeyNotes Library, you'll find the series both comprehensive and invaluable. Also, the library is designed to be expanded. I have three minor criticisms about the series, however. One is that early versions allowed you to design your own reference notes and help screens, but the handy, built-editor appears to have been dropped in the later versions. Another shortcoming is that the instruction manuals for each separately-sold reference are too generic; they deal more with installation and mechanics than with the inner workings and content of each reference. A third shortcoming is one of omission. In the latest offering, the *Financial Mathematics Handbook*, it would be a nice bonus to be able to work problems directly in the program, without having to transfer the formulas to a spreadsheet or calculator to actually crunch the numbers.

Each electronic reference book is sold separately and is priced from about \$80-\$100. For more information, contact Digital Learning Systems, 4 Century Drive, Parsippany, NJ 07054.

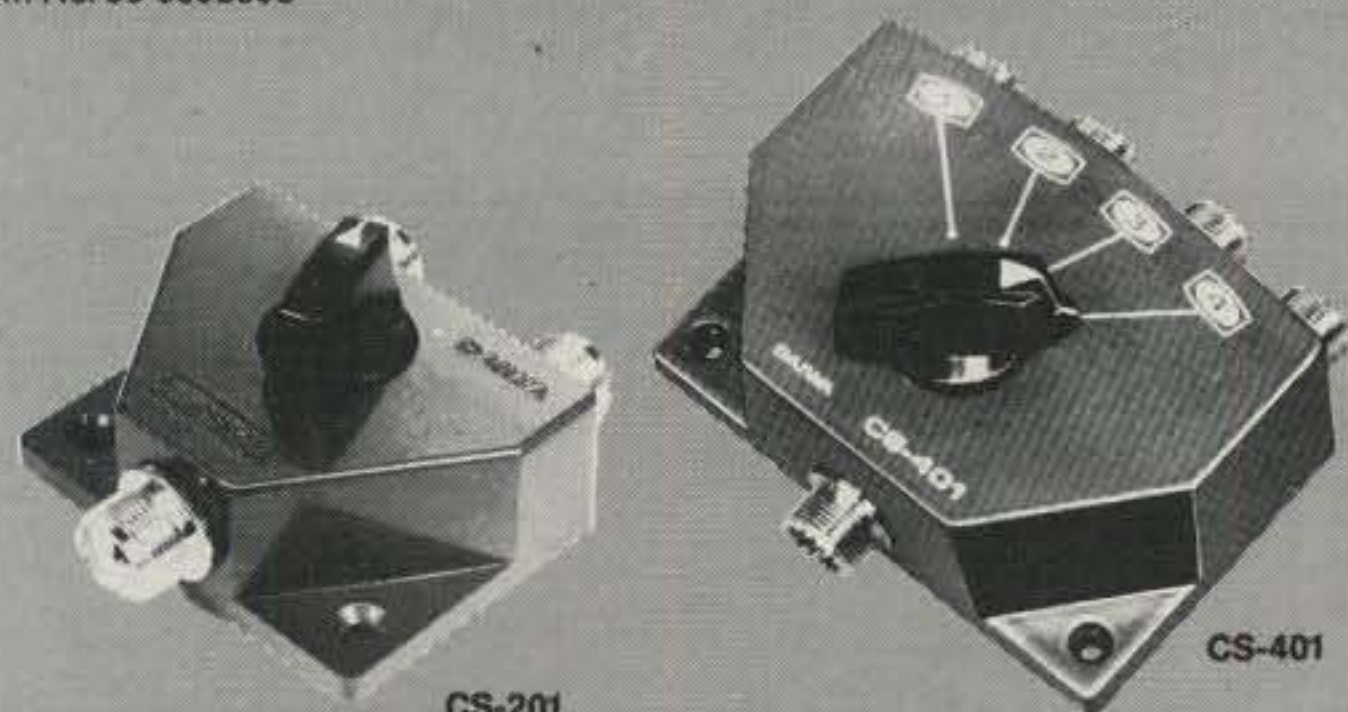
Grammatik IV. If you'll excuse me for again straying from strictly amateur-radio-oriented programs, I'll share with you another general-purpose program about which I'm quite enthusiastic. It's Grammatik IV for the IBM PC, a comprehensive grammar and style checker that finds and fixes writing problems to help improve your writing. The program lets you thoroughly proofread anything you write for errors in grammar, style, usage, punctuation, and spelling with the touch of a hot key. Although the program supports more than 33 wordprocessors, you don't have to leave your favorite word-cruncher to convert files if it's one of the "biggies" with which Grammatik IV works hand-in-glove.

The program uses artificial intelligence (AI) techniques and a built-in rules dictionary to locate incomplete sentences, split infinitives,



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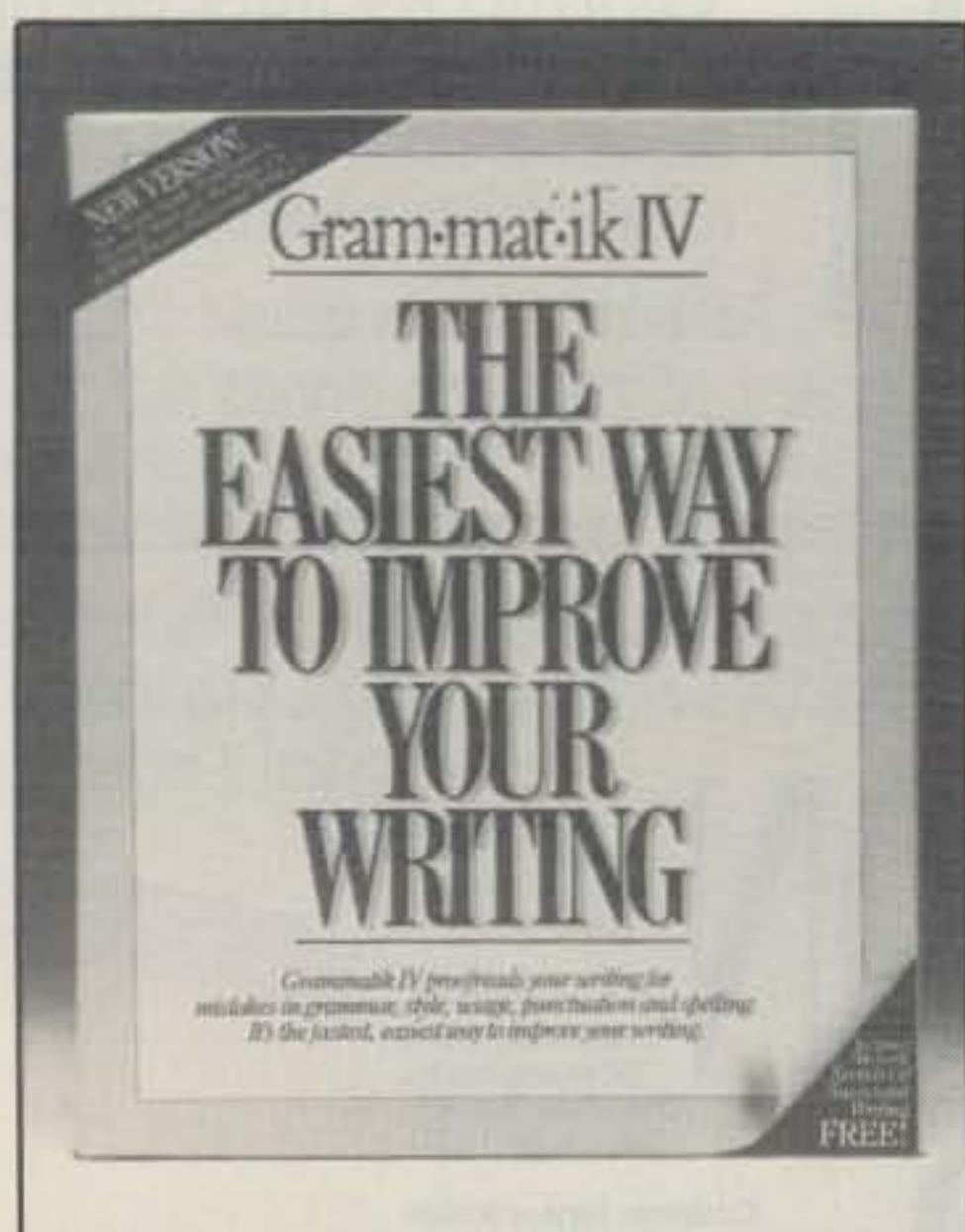
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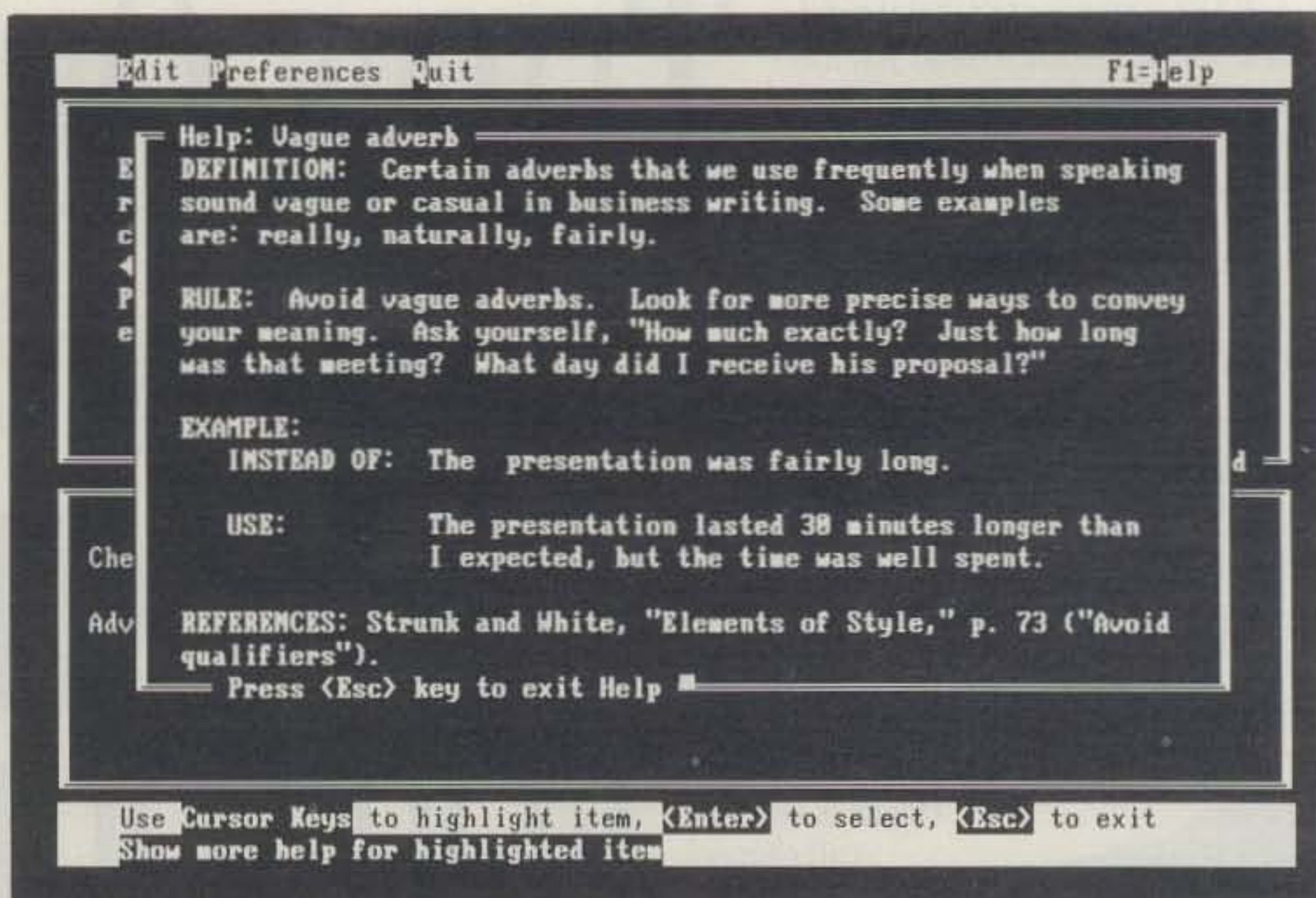
Grammatik IV is a high-tech grammar and style checker that proofreads your writing for mistakes in grammar, style, usage, punctuation, and spelling at the touch of a "hot key." The program is compatible with more than 33 popular IBM PC wordprocessors and works directly within several of the most popular ones. The program also is available for the Macintosh. (Photo courtesy Reference Software)

syntax errors, subject/verb disagreement, and many other errors and problems. There's a built-in rule dictionary that checks your documents for various style errors such as jargon, redundant and overused phrases, and vague terms. The program even offers alternative wording for many flagged errors. You have a choice of six writing styles: business, technical, general, fiction, informal, and custom (where you can design your own style). You can even modify the help screens and add your own rules. This lets you do custom proofreading and create your own electronic style guide to, say, check the documents you crank out for precise consistency of word usage and abbreviations.

There are many advanced features, too many to detail here. These include providing instant and complete advice, graphic comparison of your writing to other documents, and generation of various statistics on your finished product. If your favorite wordprocessor doesn't have a built-in spelling checker, Grammatik IV lets you use its built-in spelling checker.

One reason I take note of products such as KeyNotes and Grammatik IV is that I get to read a lot of software documentation and find that much of it is, frankly, "the pits." It seems almost an axiom that the typical software wunderkind (hamshack or otherwise) isn't much of a writer. Software users often suffer as a result of unclear, fractured-English manuals. Programs like these can help a great deal in shoring up your writing skills if they're at all on the shaky side. Grammatik IV repeatedly told me that I just loved the passive voice and super-long sentences. Both tendencies should be avoided (uh-oh, there goes the passive voice again!).

Grammatik IV is priced at \$99 and is available from Reference Software International,



Shown is a typical Grammatik IV help screen display. Here the program's built-in rule dictionary has picked up on what it considers to be the vague use of an adverb, giving you a definition, the rule involved, an example, and a book reference you can check out yourself if you care to. (Photo courtesy Reference Software)

330 Townsend St., Suite 123, San Francisco, CA 94107.

How Cold Is It?

Here's a helpful hint and a neat idea sent in by Richard Mollentine, WA0KKC, for those of you who live in some of our colder areas. Richard writes that although his antenna rotor is supposed to keep running at -20°F , it does periodically freeze up at 0°F . His solution (which may also be yours) was to install an

electric engine-block heater equipped with a magnet under the rotor. Within 10 minutes or so the rotor is warm as toast and ready to turn.

Wrapping It Up

That's all for this go-around, folks. Next time more Antennas & Accessories topics of current interest. See you then.

Overheard: The person who has forgotten his past mistakes most likely lives alone.

73, Karl, W8FX



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A LOOK AT THE WORLD AROUND US

WRTC '90: An Inside Report

A special magic filled the air on the night of July 20, 1990 when a spectacular and historical amateur radio event took place—the World RadioSport Team Championship competition. This 10 hour on-the-air activity was held in cooperation with the Goodwill Exchange Program which was part of the international 1990 Goodwill Games held in Seattle, Washington during that same time frame. "Uniting The World's Best" was the theme of the 1990 Goodwill Games, and their physical activities such as figure skating, gymnastics, track, and field events were carried extensively on international television. The Goodwill Exchange Program focused more on person-to-person cultural and art interests such as musical group visits, the Bolshoi ballet, and our own RadioSport competition.

Amateurs worldwide joined WRTC action via their HF rigs, and the event was a tremendous success. Future WRTC competitions also show good promise for being part of the 1994 Goodwill Games to be held in Leningrad. Such widespread exposure is great news for amateur radio, as it attracts public interest and newcomers vital to our continued existence. It also allows all present amateurs to be an active part of history in the making. WRTC chairman Danny Eskenazi, K7SS, summarized WRTC's concept as follows: "The idea was to put together an amateur radio activity that would capture the interest of amateurs and non-amateurs alike, plus illustrate the enjoyment of our great hobby to people of all lands. Combining RadioSporting competition that relies solely on operator ability rather than rig/QTH advantages with the Goodwill Exchange Program was the perfect solution."

WRTC was endorsed by the Radio Sport Federation of the Soviet Union and the American Radio Relay League of the United States. It was sponsored by ICOM America, MFJ Enterprises, Ameritron, Ham Radio Outlet, U.S. Towers, the North California DX Foundation, and Joe Mullan, W3RLR. Since *CQ* magazine was a proud supporter, it is only natural we report the details of this historical event.

4941 Scenic View Drive, Birmingham, AL 35210



The USSR team of UW9AR (left) and UA9AM getting ready for WRTC action. All stations were set up in operators' homes in the Puget Sound area.

This article is much more than an after-the-event report, however. Read closely and you will find it is filled with information to enhance your own amateur radio lifestyle.

WRTC Overview

The official World RadioSport Team Competition consisted of 22 two-operator teams representing their country's best amateurs and contesters. All teams competed on equal grounds and used identical equipment to truly establish operator expertise. Each of the 22 stations was set up in a home in the Seattle area. They were identically equipped with ICOM IC-765 transceivers as the main rig and ICOM IC-735's for spotting, backup, and monitoring other bands. They were also equipped with Heil BM-10 headsets with boom mikes. Their antennas consisted of triband beams on 50 foot towers for 20/15/10 meters and dipoles for 40/80 meters. If one QTH had an advantage, a non-removable in-line attenuator was employed for equalization.

The competitors came from the US, USSR, Japan, Canada, Spain, Yugoslavia, Hungary, Bulgaria, England, Finland, Italy, France, Germany, Czechoslovakia, and Brazil. They competed for gold, silver, and bronze medals, plus were recognized as the world's best by their esteemed colleagues. Each country's competitors were selected in their own way. Since the USSR had conducted similar amateur radio activities in the past, they

held regionals and selected their top finalists for WRTC '90. In the US initial applications were invited by the ARRL's *National Contest Journal* magazine (why not *OST*?). An anonymous committee then selected finalists for WRTC '90.

The honorary captain of the US team was Katashi Nose, KH6IJ, and one of the team members was *CQ*'s own John Dorr, K1AR. Noted USSR team members UW3AA, UA1DZ, UA9AM, UW9AR, RB5IM, UA9SA, UW0CA, UW0CN, UA3AO, UZ3AU, UA6HZ, and UW3AXX were led by another familiar name—Vasili Bondarenko, UV3BW. Additional teams/leaders/calls used during competition are listed in Table I. Look them over closely, as they are the champs.

The well-known DXer Martti Laine, OH2BH, was the event chairman and coordinator. There was even a team of referees in black-and-white shirts umpiring this event. Everything was above board and first class!

Amateurs outside the official competition (those of us at home that Friday evening) also pursued recognition and WRTC awards. Official WRTC certificates were available to all amateurs who contacted 5 WRTC/WG stations, and WRTC commemorative pins were awarded for 30 contacts with WRTC teams (possible by mixed bands/modes). The top 500 scoring amateurs (those working both /WG and non-/WG stations) won official WRTC T-shirts. These goodies will surely become collector's items. If you missed your shot at winning one, start making your plans for WRTC '94!



The Italian team of IK2DVG (left) at I2UIY test running for the big event. No their national flag atop the IC-765.

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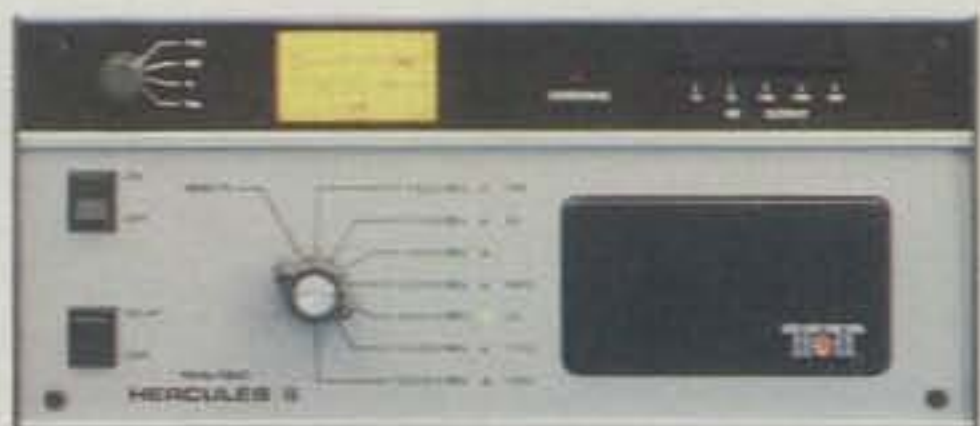
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THE MODEL 253, 2 KW AUTOMATIC ANTENNA COUPLER is the latest in our highly regarded line-up of tuners. Functions as an antenna management system with the front panel, four position, antenna switch. Positions 1 thru 3 are dedicated to coax fed antennas. Position 4 may be used for coax, single wire or balanced feeders through the built-in high power balun. Tuning is accomplished with a motor driven, roller inductor and fixed value capacitors selected with enclosed relays. The system is microprocessor controlled with one memory per antenna select position. Nine memories per antenna position are available when used with the Paragon or Omni V where band information is provided. The finishing touch for any station.

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QSK cw, real FSK and superb ssb performance. Standard features include speech processor, noise blanker, RS-232 interface, nonvolatile RAM for the 25 channel memory system, memory scratchpad and much more. Status register, clock and calendar are backed with a long life, easily replaced, "drug store" lithium battery. Options for FM and a remote frequency tuning encoder that can be positioned anywhere. The reasoned choice for the operator who places the first priority on optimized performance in the ham bands.

THE TITAN "LEGAL LIMIT" LINEAR AMPLIFIER is a workhorse of proven stamina. The heart of the Titan is a pair of Eimac® 3CX800A7 ceramic triodes. This tube is the popular choice among designers of high reliability commercial and military equipment in this power range. We consider the 3CX800 to be the 3-500Z of the 90s. 1500 watts continuous key-down output with ease. Super clean ssb. Unbelievably fast QSK cw using a Jennings® vacuum relay, rather than diodes. Assured reliability, even if you "pull the trigger" into high SWR. You older, really experienced operators never do that, right

Another Titan difference is the power supply. The power supply capacity required to maximize the performance of a pair of 3CX800 tubes, in our judgement, dictates a transformer size that will not fit into a RF deck of reasonable proportions. We also like the idea of not compromising the cooling of the tubes by adding the heat from the power supply. The Titan power supply is housed in a separate utility enclosure and remote controlled.

The TITAN has everything but the biggest price, including a limited three year warranty.

THE MODEL 961 POWER SUPPLY is a linear design that will operate at 22 amps and still deliver good clean dc and maintain regulation. A fast action circuit breaker is built-in to protect the transceiver power amplifier. Front panel speaker and styled to match the Paragon and Omni V.

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The Omni V, Model 562



The Titan, Model 425



Model 961,
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QTH	Op	Op	Call
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N7NKG	K7JA	W9RE	W7WKR/WG
W7KT	KQ2M	KR0Y	W7TSQ/WG
KT7G	VE7CC	VE7SV	K7ZR/WG
K7UU	DL5XX	DJ6QT	W7NG/WG
K7GEX	LZ1MS	LZ2PO	N7NKG/WG
KA7MCX	G3YDV	G4BUO	K7SS/WG
K7LXC	EA5BRA	EA9EO	KS7L/WG
K7LR	UA9AM	UW9AR	W7KJJ/WG
W7TSQ	AA4NC	W7EJ	K7LXC/WG
W7QGP	UA1DZ	RB5IM	K7WA/WG
K7SS	I2UIY	IK2DVG	N7ZZ/WG
WA7BUY	OH1XX	OH8PF	KE7V/WG
K7WA	OK1RI	OK2FD	W7KT/WG
WA7EBH	YU1RL	YT3AA	N7AY/WG
N7FSW	HA6NY	HA0MM	K7RI/WG
W7KJJ	UW3AA	UA9SA	K7LR/WG
N0AX	UW0CA	UW0CN	KR7G/WG
K7LZJ	JE1CKA	JE1JKL	K7LZJ/WG
KR7G	PY4OD	PY5EG	W7FR/WG
N7MJZ	FD1NYQ	F2CW	N7TT/WG
K7RI	JJ3UHS	JM3JOW	KM7E/WG

Table I - Breakdown of WRTC '90's 22 teams showing host station QTH, operators, and World Games callsign used.

Competitors' Perspective

What was WRTC '90 like for the 22 competing teams? Super challenging, to put it mildly! Each team was allowed to use only one transmitter and two receivers. The spotting station could not be used for transmitting unless their main rig failed. Additionally, all teams competed on all HF bands and on SSB and CW simultaneously!

Each station was equipped with a tape recorder and plenty of blank tapes, and each team had the responsibility of en-

suring all their logged tapes were also recorded on tape for the judges. If a logged QSO could not be verified on tape, the judges deleted it! Each station was also equipped with a computer and data-entry assistant who logged independently of team members. Broken or unverified QSOs were impossible. This competition played honest and serious!

Each team member's personal call was also "masked from our view" during the competition. Each used a special-issue call followed by /WG. That mask is unveiled in Table I, so you can now com-



Emcee and DX guru Martti Laine, OH2BH, steps back so gold-medal, first-place winners Dorr, K1AR, and Grant, K1DG, can display their awards.

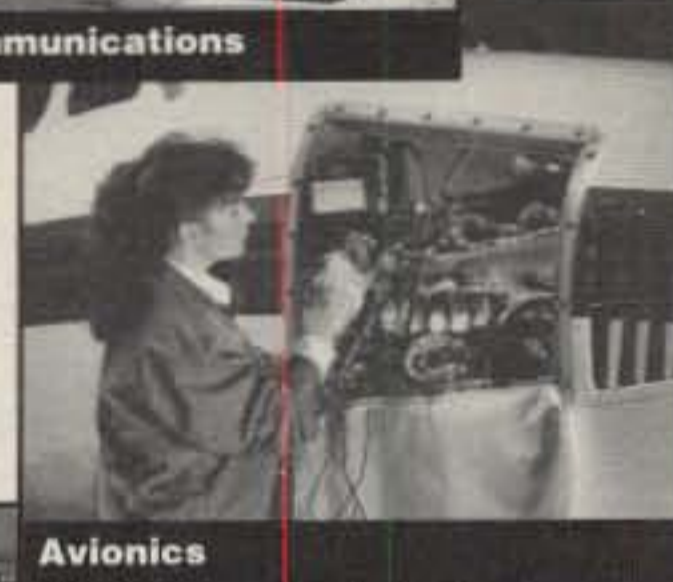
"The Best Prize Life has to Offer is the Chance to Work Hard, at Work Worth Doing"

Teddy Roosevelt

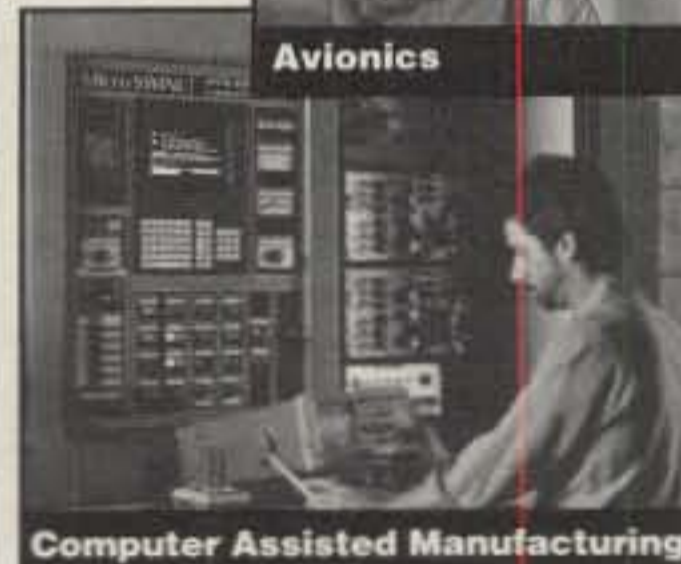
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ACQ-15



WRTC teams/contestants and their sponsors posed for this group photo during Monday night festivities. Note the gold, silver, and bronze medal winners in the third row.

pare it with your log to see whom you actually worked.

Results were tallied during the Saturday and Sunday following the competition, while the teams visited the Portland DX convention. They returned to Seattle on Monday night for the official results and awards ceremonies. The final scores were very close. The US team of Dorr, K1AR, and Grant, K1DG, came in first; Margelli, K7JA, and Wetzel, W9RE, were second; and Shoet, KQ2M, and Steinman, KR0Y, were third. In addition to being awarded their respective gold, silver, and bronze medals, these six world winners were also awarded special WRTC-commemorative electronic keyers from

MFJ Enterprises. All WRTC contestants also received special shirts, caps, and certificates from ICOM America.

The Magic

Simply listening to WRTC competitors in action on the air that Friday night was better than a front-row seat in the radio olympics. Joining that WRTC activity from your home station was like being right on the playing field with the competitors. I have been in many contests and special operations, but they have not compared to WRTC '90. It was fantastic! Remember, too, this was a first-time-ever event which usually means low participation.



Special WRTC commemorative electronic keyers were awarded to gold, silver, and bronze medal winners by MFJ Enterprises. Keyers are fully self-contained.

Not so for WRTC '90. It sounded like a major DX contest in full swing. Possibly some home-station operators felt they could turn a WRTC-competing score and challenge the world winners in WRTC 94; maybe some were striving to win a WRTC T-shirt; or maybe folks were learning from the pros by working and studying them. And it was indeed a crash course in super operating! The knowledge came so fast it boggled the senses!

WRTC competitors ran at 30 to 50 words per minute on CW and at a comparable speed on SSB. Their barefoot signals were not the strongest on the bands, but they were immediately recognizable by their efficient, professional, and congenial operating tactics. When strong-signal alligators (all mouth and no ears) moved in on top of them, the competitors kept right on trucking with QSOs as if nothing had happened. They worked strong and weak stations alike, they were understanding of everyone regardless of

Net CW QSOs	Net SSB QSOs	Net Counters	Team
614	703	55	K1AR/K1DG
512	781	54	K7JA/W9RE
515	550	75	KQ2M/KR0Y
594	573	58	VE7CC/VE7SV
608	563	57	DL5XX/DJ6QT
526	556	66	LZ1MS/LZ2PO
406	727	60	G3YDV/G4BUO
485	572	64	EA5BRA/EA9EO
497	496	69	UA9AM/UW9AR
391	610	70	AA4NC/W7EJ
524	610	52	UA1DZ/RB5IM
493	610	53	I2UIY/IK2DVG
558	457	59	OH1XX/OH8PF
556	449	58	OK1RI/OK2FD
463	540	57	YU1RL/YT3AA
550	528	47	HA6NY/HA0MM
524	421	53	UW3AA/UA9SA
455	475	56	UW0CA/UW0CN
500	288	58	JE1CKA/JE1JKL
282	618	51	PY4OD/PY5EG
377	448	44	FD1NYQ/F2CW
144	643	50	JJ3UHS/JM3JOW
480.6	555.4	57.5	Average Totals

Table II- Final results of WRTC '90.



Arriving competitors such as this Italian team were greeted by WRTC chairman Danny Eskenazi, K7SS, and given the grand tour of ICOM America by ICOM National Marketing Manager Evelyn Garrison, WS7A.



The winning team of Dorr, K1AR, and Grant, K1DG, in action.



The Finnish team of OH1XX and OH8PF with their ultra-clean setup.

proficiency, and they exhibited a unique instinct for knowing which callers to immediately acknowledge or delay and in what sequence.

In writing this article I also realize that a full, printed description is not possible. You simply had to be there on the air to experience the fast flow of prime knowledge firsthand! At 1 hour into the event WRTC competitors were giving out QSO numbers in the 170 to 190 bracket. At 8 hours they were beyond 1100 QSOs. Although these competitors came from all corners of the world, they knew US propagation like the back of their hands. They were rocking and rolling on 15 meters, for example, at midnight EDST.

One point I found particularly interesting was four WRTC competitors returned to my first call immediately with "hi, Dave, 599 (QSO number) K." Here's why it is noteworthy. Several well-known multi-multi group leaders demand their team cut everything to minimum (like five by nine; not five by nine, for example). They would scalp someone for taking time away from points to say "hi, friend" or "good luck" in the contest. Yet here were the world's best competing for their very own gold, silver, and bronze medals plus world recognition doing the forbidden and still winning! There's hope yet!

What else did we learn that fabled Friday eve? If you got into the large pile-ups over non-WRTC competitors (those without /WG for World Games after their 7-land calls), you probably spent several minutes (or longer!) trying to wrangle a contact. Okay, that's our point of reference. Conversely, your /WG station contacts were made and logged before gun-smoking Mat Dillan could draw his six shooter. That's the difference in top-notch operators. It was like they yanked the call right off your mike or key, slammed it in their log, and jumped to the next caller (on-the-air whiplash). If your /WR contacts did not happen similarly, now is a good time to doublecheck your operating finesse, and that includes knowing how to play propagation effects (or as the mouse at the bar said, "That goes for your cat, too!").

Now consider this, sports fans. When sharp operators are on both ends of DX pileups, the caller makes contact and is gone before others even know what happened. Less proficient DX operators often allow pile-ups to become hopelessly uncontrollable. Thus, sharp operators laugh and tune past or use their one-upmanship savvy to catch the DX attention—unknowingly! Sharp DX ops with unproficient callers work the pros right through zoo city, then pick up "promoters" they sensed would continue calling (and announcing their presence to others).

The people-to-people exchange part of WRTC '90 also occurred off the air in Seattle as owners of QTHs used by competitors watched first-hand how champions work. We understand the WRTC committee has put together a 30 minute VHS video tape showing the world's best "going for the gold" as it happened, so everyone can have a similar beside-the-rig view. This professionally produced video also includes interviews with team members, etc., and is available for a nominal sum from WRTC, 4821 51st SW, Seattle, WA 98116.

The US Sponsors

WRTC '90 was a massive undertaking by people seriously dedicated to improving our great hobby. Its US sponsors—ICOM America, MFJ Enterprises, Ameritron, Ham Radio Outlet, and U.S. Towers—deserve a hearty round of applause and our continuing support. They forked out some heavy-duty coins and untold efforts to make this event possible, and in my eyes they are real industry champions just like Collins, WRL, and Gotham were in eras past. Names such as Evelyn Garrison (ICOM), Martin F. Jue (MFJ and Ameritron), and Bob Ferrero (HRO and U.S. Towers) definitely have my vote for industry hall-of-famers alongside Art Collins, Leo G. Meyerson, and other notables. Step up and say hello to those stars at a hamfest soon and compliment their efforts. Kind words are the least expensive and longest remembered gifts in life.

Special thanks are also in order for the

many Seattle amateurs comprising the WRTC coordinating committee spearheaded by Danny Eskenazi, K7SS, Steve Morris, K7LXC, and Martti Laine, OH2BH. This project expanded well beyond their expectations, and they worked hundreds of their own hours to make it a success. They also developed a framework another group can pick up and continue for WRTC '94 or the 1992 Olympics. I will volunteer my services right now. Who else will join the team?

Please understand that personally recognizing all associated parties in WRTC '90 is an impossibility and forgive our omissions. You and your efforts are known by your colleagues. Thanks to all for your contributions.

Conclusion

WRTC '90 could easily be described as the world olympics of amateur radio. Reflecting on that point, all of today's HF operators are radio athletes in their own way. We ride the invisible waves of ether like a surfer riding the waves at Maui, playing a game of chance and skill with our taken-for-granted signal reflector, the ionosphere. And like that surfer, we know when the tide is up and how to go with the waves rather than against them. Ahh, the sheer nostalgic bliss of our present golden age!

73, Dave, K4TWJ

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Making The Rounds in Packet

Well, fall is about to set in. The air in Central Georgia seems to be filled with the scent of new-mown hay, and we see the pumpkins for sale by farmers at the roadside vegetable stands and stores.

These signals let us know that it is time to begin checking the coax and antenna connections. It won't be long before cold weather sets in, and during the winter I'm not much of the outdoors type.

Looking over the hamfest roster on the 145.050 GARDS-LAN BBS, WB4EZL (this is where I receive my packet mail), I notice there are several upcoming hamfests that have packet forums scheduled. One of them is at the Georgia Line Hamfest and Swapmeet in North Augusta, South Carolina on October 13 and 14. There is also always a good forum on packet radio at the Chattanooga Hamfest, and this year that is scheduled for the October 27 and 28.

For more information on the hamfests and packet forums in your area, look under "Announcements" in this and every issue of *CQ*. If your hamfest has a packet forum scheduled, drop me a note with the times and dates, and I'll mention it in this column. For those who like to take advantage of the Packet Mail Network (PMN), you can forward the announcement of your packet forums to my home BBS by routing it to **K4ABT @ WB4EZL**.

Speaking of announcements, how many times have you wished you could find an accurate SWR/wattmeter that is within the grasp of your wallet? A new addition to the MFJ line called the MFJ-817 Peak/Average, SWR/Wattmeter may well fit that category. It is designed with the VHF/UHF operator in mind for the 144 and 440 MHz bands. This new wattmeter shows both the forward and reflected power at the same time. The large, two-color, illuminated, cross-needle meter is equipped with two SWR/power levels. Twenty or 200 watts forward and 5 or 50 watts reflected power levels can be monitored. The MFJ-817 is priced at \$79.95 and is available from your MFJ dealer.

With A Cast of Thousands

Packet radio has a cast of thousands, and they are making packet radio better every day. In a recent issue of the "Pack-

506 Pheasant Ridge Drive, Warner Robins, GA 31088



The MFJ-817 VHF/UHF peak-reading SWR/wattmeter.

et Status Register" (PSR), the newsletter from TAPR, Lyle Johnson, WA7GXD, president of TAPR, brought out some interesting points concerning the number of satellites that we now have in orbit. In the "Presidents Corner" Lyle states, "Four Microsats, two UoSATS, and FO-20 have now been in orbit for a few months." He goes on to say that Webersat is downlinking images, and PACSAT and LUSAT are digipeating.

As for DOVE, it seems to be playing a "now you see it, now you don't." As soon as I can get more information on these "birds of space" I'll fill you in on how and where they can be found. Just about five minutes ago I was told that Bob McGuire, N4HY, uploaded some new code that ac-

tivated DOVE. I think I'll listen at 145.825 MHz for a day or two.

Thanks es Bon Voyage

A note to Heather Johnson: Thanks for the "I AM A PACKETEER" label labels. They were gone in the first morning at the SouthNet Packet Conference at Albany, Georgia in June (see the September column). Heather, I hope you and Lyle had a great time in jolly old England and Switzerland.

Networking Conference

I hope to have some new data for the readers of this column from the network-

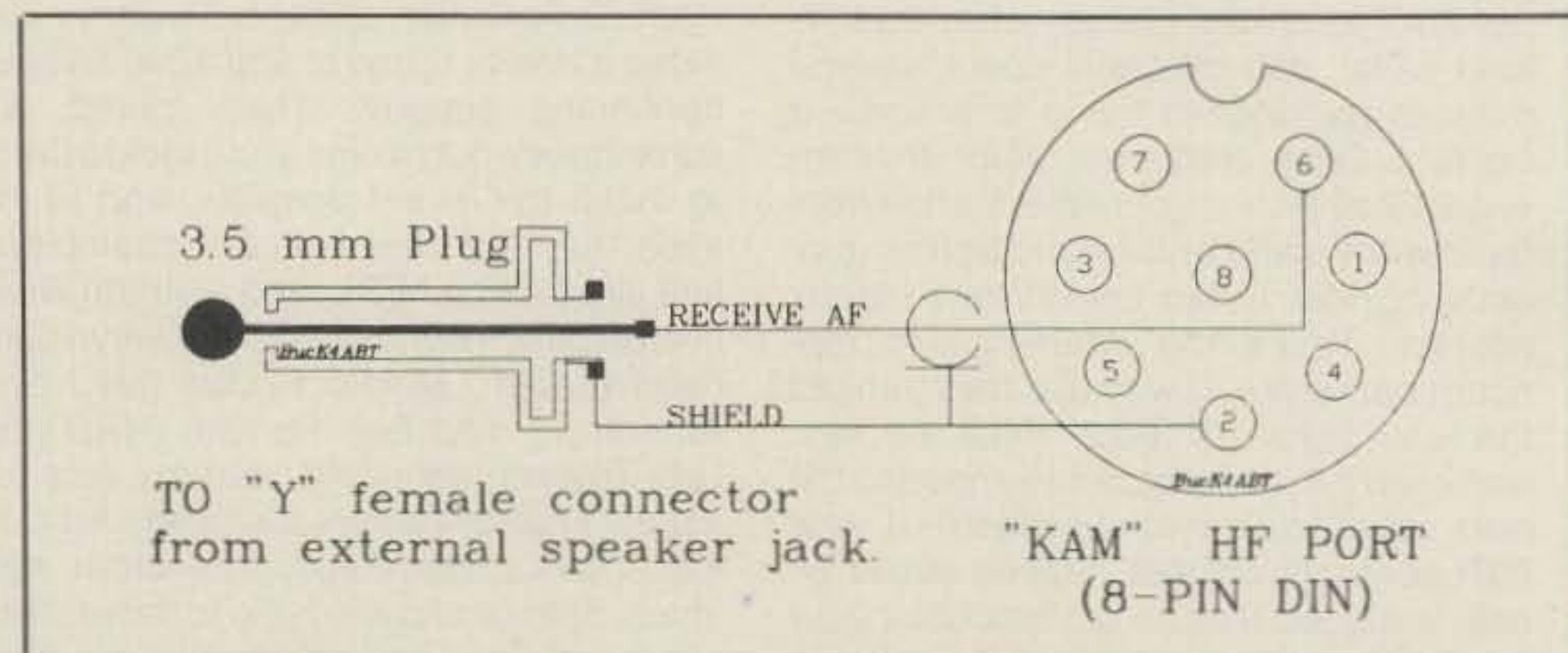


Fig. 1- For the notebook: Here is a simple modification that enables the KAM's tuning indicator to be used at 1200 bps on HF. Use the VHF port and connect to the HF rig. Set the MARK and SPACE commands as follows: MARK 1200, SPACE 2200. Above 28 MHz 1200 bauds is legal.

ing conference that was scheduled (9 AM to 5 PM) for September 22 in London, Ontario at the London Regional Art Gallery and Museum. Some of you will be reading this before the conference happens, so you may still have a chance to attend. This is the 9th Computer Networking Conference jointly sponsored by the American Radio Relay League and the Canadian Radio Relay League. If you recall, packet radio came to us from Canada.

Coming Attractions

For the avid computerist and packeteer, the November issue of *CQ* is one issue that you don't want to miss. This is the "digital issue," and it will have many good articles built around the world of data and digital communications, not to mention the glossary that you will have at your fingertips to point you in the direction of the next TNC and/or computer purchase. Digital news and reviews will be the watch-words for the November edition of *CQ* magazine.

My mailbox is getting more full each week. Yesterday the postman told me that I should consider installing a larger, commercial box. Now *that* made me feel good! Keep the letters coming, and I'll continue to use your input to make this column better. I really enjoy reading letters from packeteers, and thanks for including the SASEs. The mail on the BBS is also increasing, so use it as often as you like.

PROM—The "Packet Radio Operator's Manual"

My latest book about packet, the *Packet Radio Operator's Manual*, is to be released soon. You may soon purchase this next generation of "packet tutelage" from *CQ* Communications. The manual is not written specifically for the beginning packeteer. However, it does give the beginner a "heads-up" on what is occurring beyond the terminal. The book is crammed with schematics and drawings that make the difference when it comes to interfacing the next TNC, computer, or transceiver. If you think my last book had lots of interface drawings, then you have to see this one to appreciate the long nights of research and drawing that I encountered while writing this new book. For openers, if you wish to learn about or build networks, nodes, gateways, backbones, trunks, converse nodes, high-speed trunking systems, BBSes, and the AX.25 protocol, or interface TNCs to transceivers or computers, then you have just opened the front cover to my next book.

Don't forget the "goodies" we have for you next month in *CQ*'s "digital issue."

73, de Buck4ABT (K4ABT @ WB4EZL)

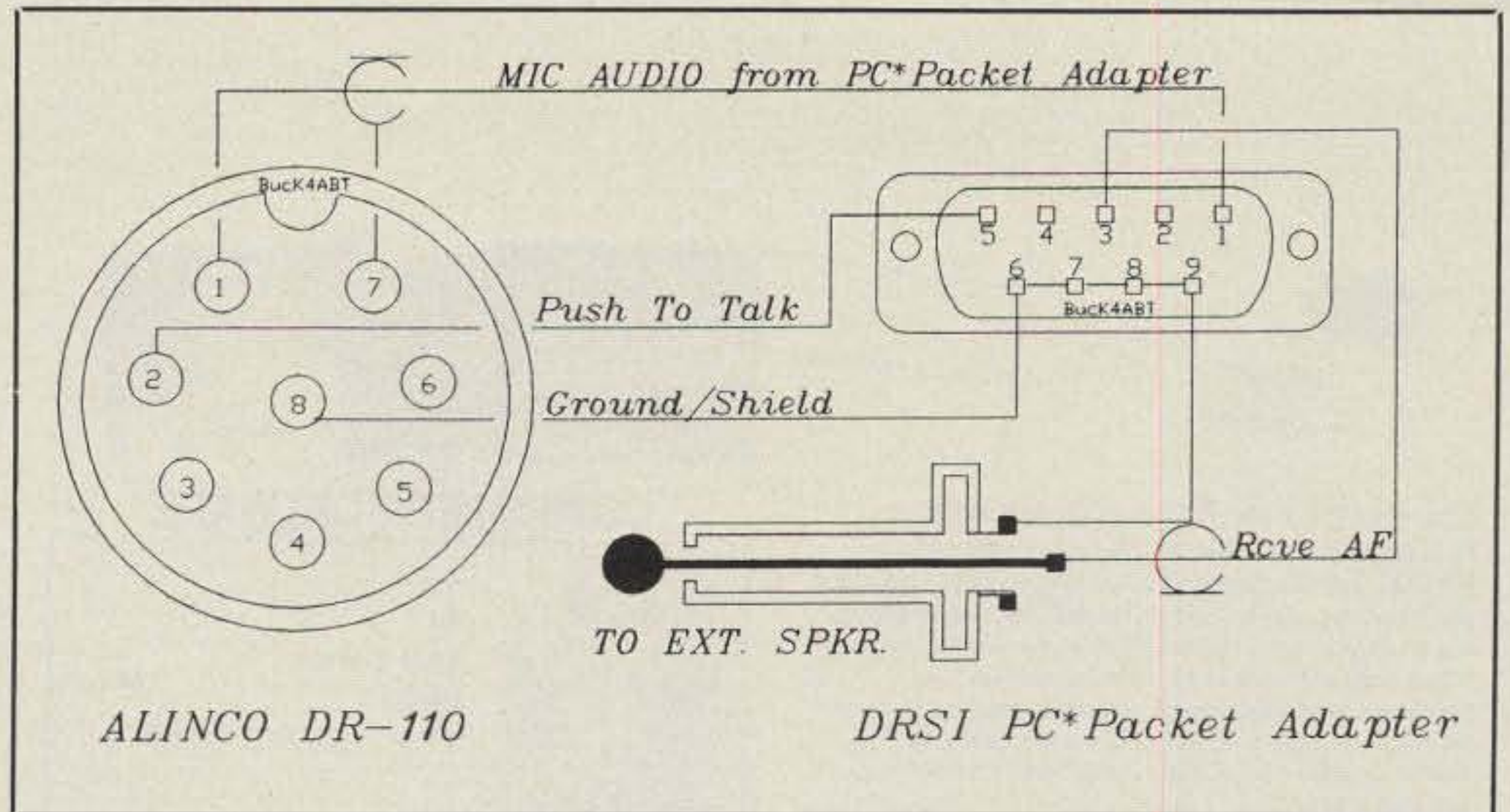


Fig. 2- For the notebook: This drawing illustrates the manner in which the PC*Packet Adapter is connected to the Alinco DR-110. The PC*Packet Adapter and DRSI M-2400 radio ports have the same wiring configurations. Note: The late-model Alinco DR-110 may have receive audio added at pin 6 of the mic connector.

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FALL HR

LOW BAND DX'ING COMPUTER PROGRAMS

By John Devoldere ON4UN - 30 programs for Apple II, MS-DOS, Commodore C-128 and Kaypro CPM Computer. Just about every interest or need is covered -- from antenna design and optimization to general operating programs. Antenna programs include: shunt and series input L network design, feedline transformer, shunt network design, SWR calculation plus 11 more! General Ham programs include: sunrise/sunset, great circle distances, grayline, vertical antenna design program, calendar plus 9 more! ©1986.

- FUN-Apple II \$39.95
- FUN-MS (MS-DOS) \$39.95
- FUN-CPM/Kaypro \$39.95
- FUN-C-128 (COMMODORE C128) \$39.95
- FUN-MAC (MACINTOSH) \$39.95

PRACTICAL ANTENNA DESIGN and analysis

by Robert Haviland, W4MB

32 original antenna programs for AMIGA, COMMODORE C64/128, APPLE II and MS-DOS Computers includes design and analysis for dipoles, verticals, loops, helix, horn, dish, Yagi and diskcone antennas to name just a few. Programs are written for ease-of-use and maximum utility. No theory needed to use these programs. Also includes a modified copy of the original public domain MININEC analysis program. Book includes hints for program use, description of limitations, program logic and BASIC listing. ©1989.

- FRH-AMIGA \$39.95
- FRH-C64 \$39.95
- FRH-APPLE II \$39.95
- FRH-MS-DOS \$39.95
- RH-PAD Softbound book \$39.95
- RH-SO Program and book (save \$9.95) \$69.95

PACKET PICTURE TRANSFER PROGRAM

(MS-DOS) from MFJ

This new program is designed to allow you to pass pictures to packet stations anywhere. Written to be compatible with all multi-function TNCs. Will convert most other formatted graphics into a compatible format for transmission. Allows you to set up your own Picture BBS. Prints to screen and saves to disk on receiving end. MFJ program required at both stations.

- FMFJ-PIX Introductory Special (MS-DOS) \$9.95

GRAY LINE DX ADVANTAGE (MS-DOS Computers)

Great computerized tool for predicting Gray line openings. Displays the overhead position of the sun as it passes over a detailed map of Earth's surface. Displays UTC time in any 24 QTH's. Includes high-speed mode to change time and date. This handy operating aid will help you tremendously as you work towards DXCC honor roll!

- FMFJ-GL (MS-DOS Computers only) \$29.95

RF-CAD ELECTRONICS DESIGN PROGRAM

Version 3.7 Includes Intermodulation and Distortion Program

By Joe Reisert, W1JR and Gary Field, WA1GRC

For IBM PC and compatible computers

This software package has been written by electronic engineers and contains nearly 40 tested and proven programs. Emphasis has been placed upon ease of use. Programs include: Filters, LC, active-LP, HP, BP; inductor design, toroid, solenoid, straight wire; Matching networks; Crystal oscillators; Microstrip; Transmission lines; Antennas; Yagi-Uda, helix, dish, horn, element scaling; Pi and T attenuators. Also included: Radio Path calculations; FM modulation analysis; Miscellaneous conversions; Geostationary satellite pointing; Moon tracking aids; Receiver noise figure calculations and Spurious receiver response prediction. Requires IBM-PC with at least one floppy disk and 128k of RAM. ©1985.

- FRF-CAD (MS-DOS) \$39.95

COMPUTER SOFTWARE



By Chip Lohman NN4U

FOR C-64

AMATEUR RADIO COMPUTER SOFTWARE

MASTER LOG New Version

Over three years of development went into this program. It creates a file of 2100 individual records with up to 13 different entries per record. Master Log can do a search and select based upon time, frequency, mode or any of the other variable parameters. It keeps track of DXCC and WAS status, prints QSL labels and can search its whole file in less than 5 seconds! Complete documentation is included to help you learn and use this truly state-of-the-art logging program.

- FHD-ML (For C-64) \$28.95

DX TOOL KIT

This handy tool kit should be in every ham's shack. Programs included are: Propagation chart, Beam heading, Grayline and Sunrise. The Propagation chart uses the NOSC Minimum 3.5 algorithm to compute both MUF and FOT for any QTH. The Beam heading allows you to create a customized chart of both long and short path headings. Grayline selects and sorts countries on the Grayline for your location. The Sunrise routine will help you predict upcoming DX openings.

- FHD-DX (For C-64) \$24.95

SUPER LOG

Super log gives you all the advantages of a computerized data base without significantly changing the traditional log format. For contesters, Super Log can be configured to either manually or automatically enter contact number as well as time of contact. Make an error and you can easily go back and edit the entry. Super log also allows you to print out either selected contents or the whole log. Will print QSLs.

- FHD-SL (For C-64) \$19.95

CONTEST LOG

This disk contains four different contest programs; ARRL Sweepstakes, Field Day, Universal WW Contest log, plus a dupe checking routine. Each program is designed for real time use. It automatically enters date, time, band and serial number for each contact. A 24-hour clock is displayed at the top of the VDT screen. When the contest is over, the program will print your results listing all duped and scored contacts in serial sequence with all the necessary information as well as completed score at the bottom of the page.

- FHD-CL (For C-64) \$24.95

SPECIAL LOW PRICES

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DX-EDGE (MS-DOS, C-64) software and slide rule

Particularly helpful in determining long path and gray line openings. Super fast speed and dazzling graphics make this program a treat to use. The MS-DOS version also includes a close up (zoom) feature for detailed examination, a MUF-calculator and a great circle bearing routine. All call sign prefixes and country names are built into the data base for easy pinpointing of locations. Requires 2 drives, 348k memory, Hercules, CGA or EGA graphics and DOS 2.1 or later.

- FXN-DOS (MS-DOS) SAVE \$15.00 \$19.95
- FXN-C64 (C-64 computer) SAVE \$25.00 \$9.95
- XN-DX (slide rule version) \$22.95

CONTEST SEASON

IS COMING!

CQWW SOON

CONTEST PROGRAMS (MS-DOS)

by John Berg, KA1HYU and Clint Wise, W1XN

If you haven't yet done a contest with a computer, you're missing one of life's true pleasures! No more dupe or log sheets strewn around your operating table. Instantaneous scoring eliminates hours of work at the end of the contest! Print out the dupe sheets and log, fill out the entry and mail to the contest committee. The following contest logs are available:

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| (ALL MS-DOS) | | |
| <input type="checkbox"/> FDBW-DX | ARRL DX Contest | \$39.95 |
| <input type="checkbox"/> FDBW-CQ | CQ WW Contest | \$39.95 |
| <input type="checkbox"/> FDBW-WPX | CQ Prefix Contest | \$39.95 |
| <input type="checkbox"/> FDBW-A60 | ARRL 160 Contest | \$39.95 |
| <input type="checkbox"/> FDBW-C60 | CQ 160 Contest | \$39.95 |
| <input type="checkbox"/> FDBW-A10 | ARRL 10 Meter Contest | \$39.95 |

SOFTWARE FOR THE C-64 AND MS-DOS COMPUTERS

From CaGen Program is customized with your call sign

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Fast acting, machine language program designed with the active contesteer in mind. Capacity of 2500 QSO's per disk. Includes accurate clock that is not affected by the disk drive. Each QSO is automatically read to disk upon entry. Prints the entire contest log and dupe sheet. Also computes QSO rate and displays on screen.

- FDCG-CL (C-64) \$34.95
- FDCG-CLMS MS-DOS CONTEST LOG (CW with AEA PK-232) \$49.95

UNIVERSAL LOG

General purpose logging program is written in machine language and will meet the needs of the most demanding Ham. Will hold up to 1200 records of 110 characters each per contact. To view the record you enter the key and the information is quickly displayed. Plenty of extra features are too numerous to be mentioned here.

- FDCG-UL (C-64) \$34.95

W2GGE CONTEST PROGRAMS (MS-DOS)

by Jack Schultz, W2GGE

Great contest logging programs! Written in machine language for maximum flexibility and speed. Compatible with most MS-DOS PCs. Shows log, countries worked, all band score on screen. Super fast dupe checking. Prints out log, checklist, and QSLs.

- FGGE-CQ CQ WW Contest (5000 QSO's per band) \$39.95
- FGGE-AR ARRL DX Contest (5000 QSO's per contest) \$39.95
- FGGE-WPX Prefix Contest (5000 QSO's per band) \$39.95



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Here's a unique tool that organizes your DXCC quest into a simple easy-to-use format. Enter a call. Easy-DX gives you azimuth and sunrise-sunset time. It also tells you whether or not you need the contact for a new country, band or mode. Packet radio users get a built-in terminal program designed to make the most of Pavilion Software's Packet Cluster™ system or any other packet node. When connected, Easy-DX alerts you when a country you need is spotted. Comes on two 5.25" disks. Hard drive recommended. Latest version will be shipped.

- FMFJ-EDX (MS-DOS) \$39.95

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QSLs are a very important part of our hobby. All sorts of awards, including the coveted DXCC, require confirmation of contact before the award can be issued. Of special interest, addresses are being added daily for Hams in the USSR and other countries. While by no means complete, it's a start and will be of tremendous help in getting QSLs. Handy operating aids round out this super book value. ©1990.

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by Jim Rafferty, N6RJ (for MS-DOS computers)

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FCB-RJ (MS-DOS Computers) \$59.95

WA9GFR COMMUNICATIONS ENGINEERING

Version 3.1 by Lynn Gerig, WA9GFR

Interesting program that will allow you to predict communications ranges based upon your stations operational capabilities. Useful from 3.5 MHz to 3.5 GHz. Also includes helpful Smith chart program for any type of matching network. Provides impedance results in both tabular and high resolution Smith chart graphics. Great value at a low price.

FGFR-DOS (MS-DOS) \$19.95

FGFR-C64 (Commodore C-64) \$19.95

MICROSMITH Smith Chart Utility Program (MS-DOS)

by Wes Hayward, W7ZO1

MicroSmith is a working Smith chart that has been optimized for impedance matching applications. The user can modify all variables to meet specific matching goals. Includes a clear and concise tutorial that all levels of interest will find useful. Complete text explanations with graphs aid full comprehension of the material.

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AR-RB Softbound \$9.00

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F107-PC (MS-DOS) \$19.95

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by ARRL staff 8th Edition

NOW INCLUDES TWO C-90 CODE STUDY TAPES!

This package has been revised to cover new digital & voice Novice requirements and contains THE goodies needed by the beginner to get started in Amateur Radio. Assuming that you have no prior knowledge of radio, the reader is taught how to pass the Novice exam, both code and theory, and how to set up a station. Unique code study method makes learning the Morse code easy as 1-2-3. And it's full of illustration to help clarify difficult technical points. 160 pages. ©1989 8th Edition.

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Four new sets of code practice tapes from the ARRL. Each set consists of two 90 minutes cassettes and gives you almost 3 full hours of practice. Great way to study when you can't get on the air.

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Use your home computer to study for Amateur Radio License. Questions and answers are taken from the VEC standard syllabus for each license class. You can either study the whole question pool or one of the individual sub-elements. Novice, General and Extra programs also include a Morse code program that will allow you to bone up on your code. The program can either generate code randomly or from a text file. State-of-the-art learning. MS-DOS only.

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by John Karpicke N9AVC

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AVC-QP \$14.95



CQ's Ham Radio Bookstore is a division of CQ Communications, Inc.

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Goodies—Part II, Conclusion

Here is the concluding segment of this two-part article. The first segment covered the ARRL, bail/tilt stand, belt buckles, bumper stickers, callsign items (cups, displays, licence plates, and signs), caps, cups, emblems, eyeball QSL cards, golf shirts, jackets, mugs, and T-shirts.

ICOM. ICOM America, Inc., offers free VHF/UHF and HF frequency charts, stickers, and key chains. Their address is 2380 116th Ave. NE, Bellevue, WA 98009-9029.

Identification Tags. JPW Enterprises sells high-quality stainless-steel identification tags at \$4.29 each ppd. These dog tags are 1.125 by 2 inches and each one weighs less than 1/4 ounce. You can have up to 17 digits (letters, numbers, and spaces) embossed on one to five lines. You may want to order these tags for your children, luggage, and pets, as well as for yourself. A 24 inch chain is supplied with each dog tag. The address is P.O. Box 353, Logan, UT 84321.

Kenwood. The Kenwood U.S.A. Corporation gives baseball-type caps, bumper stickers, and DXCC world maps to convention attendees. Their address is P.O. Box 22745, Long Beach, CA 90801-5745 (telephone 213-639-9000).

License-Plate Keychains. You can buy a 2.25 by 1.125 inch keychain showing your callsign on a miniature version of your state's license plate. The price is \$5.25 each, prepaid. The address is Andrew Plaks, N6RKO, 3241 Fleetwood Drive, Riverside, CA 92503.

Licence Plates. Amateur radio callsign license plates are available for use on our vehicles. They provide an effective way to advertise our amateur radio service. If you use such plates, I hope you drive courteously to enhance our image with the general public.

Patches. Another source of custom-embroidered patches is Hein Specialties, 7960 S.W. Manitou Trail, Glen Arbor, MI 49636-9711 (telephone 616-334-4385, FAX 616-334-4521). Custom-embroidered key fobs are also sold by this company. They also market custom-enameled emblems (cloisonnes). It is advisable to send an SASE (#10 envelope) with your request for details of their entire product line.

*45527 Third Street East, Lancaster, CA 93535-1802



Here is 75-year-old George Ambrester, KC4NCW, of Lanexa, Virginia. George worked for Kodak for 22 years and he was a technical representative for Kodak when he retired. George still provides photography lectures and demonstrations at colleges and museums. He received his Novice license during November 1989 and upgraded to Technician in January 1990. In addition to amateur radio and photography, George enjoys restoring antique radios. His Elmers were Larry Boellhoff, W4TMN, and Dwight Mc-Smith, K4KTR. (Photo by David C. Hodge)

Littlite. The best accessory I have added to my station during the past decade is a simple, variable-intensity desk lamp. It can be operated on 12 VDC or 115 VAC. It has a weighted base and color filters available as accessories. This lamp is available in a variety of forms, and it has a useful variety of accessories. A printed flyer can be requested from Littlite/CAE, Inc., 10087 Industrial Drive, P.O. Box 430, Hamburg, MI 48139. The lamp can be secured in place using the velcro fasteners which are supplied with the lamp. Also, screws are provided for use in mounting the lamp directly to a desired surface.

Medals, Pins, and Embroidered Emblems. Lane 4 Awards sells a nice assortment of these items, plus ribbons and tro-



Amateur radio callsign license plates are an effective way to advertise the service.



Littlite, shown in the center of this photo, is a handy variable-intensity desk lamp. Various accessories such as color filters are available.

phies. Their assortment is too extensive to cover in this article. Information can be requested by writing to Lane 4 Awards, P.O. Box 693944, Miami, FL 33269 (telephone 305-653-9434, FAX 305-592-5854).

Mugs. Regency Glass Engraving sells 10 ounce capacity coffee mugs at \$10 each ppd. The amateur's first name and callsign are engraved on the cup. The address is P.O. Box 802, Novato, CA 94948 (telephone 415-892-6587). Steve Heimberger produces a nice mug.

Pencils. John Alden, KC4AYP, sells a set of 36 multicolored #2 lead pencils. You may use up to 26 digits (letters, numbers, and spaces) in the name and callsign printed on each pencil. These pencils come with a 3 1/2 inch high clear acrylic holder. WRITE IT is printed on the side of the holder's base. The price is \$19.95 ppd. John's address is P.O. Box 11423, Blacksburg, VA 24062-1423 (telephone 703-951-4939).

Pins. Fallert's engraving sells callsign pins of one line (1 by 3 inches) at \$1.25,



This callsign ring is produced by H & M Jewelry Company.

two lines (1 by 3 inches) at \$1.50, and three lines (1 1/2 by 3 inches) at \$2.00 each ppd. Any desired logo (ARRL, CD, MARS, etc.) can be added at 75 cents more per pin. The address is 27 Verlynn Avenue, Hamilton, OH 45013.

Callsign pins are available in 14-karat yellow gold from Harold Sasnowitz, KB2MB. His company's address is H & M Jewelry Company, 26 Edgecomb Road, Binghamton, NY 13905-4017 (telephone 607-797-5458). Each pin sells at \$49.95, plus a \$4 shipping fee. A diamond can be added to the pin at an additional charge of \$19.95. A pin can be ordered with the callsign arranged in a horizontal, stepped, or vertical configuration. Callsign jewelry can be ordered in lavalier/charm (vertical only), or pin (horizontal, stepped, or vertical) styles. The callsign letters (and number) are about 3/16 inch high and approximately 0.7 millimeters thick. Two pins hold each callsign pin securely in place. Harold also sells 12 styles of chains in 8 lengths (7 to 30 inches). Chain diameters range between 0.4 and 4.8 millimeters. Chain prices range from \$6.58 to \$634.76. The photograph shows one of the excellent callsign rings which are also produced by this company. A \$5 discount is available to amateurs who mention this column. It is advisable to request a current flyer from KB2MB, and your SASE would be appreciated.

Bill Bahr, KB4WIT, sells a callsign lapel pin made from 14-karat gold. The letters and numbers are 3/16 inch high. Each pin costs \$48 ppd. Allow two to three weeks to receive a pin. A free catalog showing a variety of his products is available to anyone who requests one and sends a business-size (#10) SASE to BahrNo Products, 2535 Marietta Street NE, Palm Bay, FL 32905. Bill's telephone number is 407-768-2261.

Pottery Mugs. J. C. Cramer sells 16 ounce size handcrafted pottery mugs with name and callsign imprinted into the clay. The buyer has a choice of cinnamon brown



A 16 ounce, handcrafted pottery mug is available from Pottery by J.C.

or seacrest blue. The ARRL logo is available at no extra charge, if it is requested. The price is \$16.95 each ppd, with three weeks delivery allowance. The address is Pottery by J.C., 650 Cascade, Shelton, WA 98584 (telephone 206-426-7559).

QSL Cards Wall Display. Joe Saunders, K3UAL, has clear plastic QSL card holders which enable an amateur to display received cards without having to damage them with tape or thumb tacks. I have used this type of QSL display for many years. It has the added flexibility of allowing you to quickly and easily change the cards displayed. These plastic display holders sell at \$5 for a package of 3. Each holder can be used to display up to 20 QSL cards. Joe is also a QSL printer. His address is 1520 Jutewood Avenue, Hyattsville, MD 20785 (telephone numbers 301-773-9383 and 301-773-5074). If you want samples of his cards, send 50 cents (stamps or cash) with your request.

Rings. M. G. Allen, N1BLY, sells hand-engraved sterling-silver and 14-karat yellow-gold rings. Prices start at \$92. If you want detailed information, send a self-addressed, stamped envelope to P.O. Box 112, Waverley, MA 02179.

Rubber Stamps. Three-line rubber stamps are available at \$5 prepaid. An SASE brings information. The address is G. L. Pierce, 5521 Birkdale Way, San Diego, CA 92117.

Signs. The Sign Center offers an excellent 8 by 19 inch 100% magnetic sign at \$8 each, plus a \$3 shipping charge. The overprinting is black and orange against a white background. The Amateur Radio Emergency Service (ARES) insignia is accompanied by "AMATEUR RADIO COMMUNICATIONS" in large lettering. An area is reserved to add your callsign below the word "RADIO." Another area is reserved for a name or group insignia. The part number is AR819. The address is the Sign Center, Inc., P.O. Box 4097, San Diego, CA 92104. Their toll-free number for Californians is 1-800-

AMATEUR RADIO
W1AW

This sign from Sign-On is available in a suction-cup or magnetic-mount version.

553-7446; all other can use 1-800-654-5373.

Sign-On sells 2.25 by 8 inch signs featuring the words AMATEUR RADIO and a callsign in white lettering on black, blue, or red flexible plastic. These signs are sold in a suction-cup-mounted model, as well as a magnetic-mounted version; state which type. The address is 1923 Edward Lane, Merrick, NY 11566 (telephone 516-546-4362).

Sweatshirts and T-shirts. These sweatshirts are marked "I LOVE CW" and they sell at \$16.95 each, prepaid. The T-Shirts are also marked "I LOVE CW" and they sell at \$10.95 each, prepaid. Both are available in blue, white, or yellow. Orders can be sent to R. Daniel, P.O. Box 670, Williamsbridge Station, NY 10467-0670.

Leslie Shirk can put an enlarged version (about 8 by 10 inches) of your QSL card (or anything similar) on white sweatshirts or T-shirts. Except for neon, all colors can be reproduced. The QSL card (or whatever) is returned undamaged, and orders are filled within a couple of days.

PITTSBURGH, PENNA. 15227

WB3DPA

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JACK BEGER

An enlarged, full-color version of your QSL card can be put on a white sweatshirt or T-shirt (available from Laurelwood Designs).

Each sweatshirt (cotton/poly) and T-shirt (cotton) sells at \$23 and \$19, respectively, prepaid. Orders can be mailed to Laurelwood Designs, 2728 S.E. Laurelwood Drive, Milwaukie, OR 97267.

Paul Washa, W0TOK, sells T-shirts and sweatshirts featuring an enlarged reproduction of the 1964-1965 five-cent amateur radio stamp. T-shirts sell in all sizes (S, M, L, XL, and XXL) at \$10 each ppd. High-quality white sweatshirts sell at \$23 each in sizes S through XL and at \$26



Paul Washa, W0TOK, sells T-shirts and sweatshirts featuring an enlarged version of the 1964-65 amateur radio stamp.

each for XXL, delivered. The desired size must be specified, of course. The address is 4916 Three Points Boulevard, Mound, MN 55364-1245.

Tie Tacs and Lapel Pins. One-of-a-Kind Jewelers sells silver tie tacs and lapel pins with callsigns engraved on them. Their size is about 1 1/8 by 3/16 inch. Each costs \$19.95. Visa and MasterCard are accepted. The address is 145 East Sixth Street, Durango, CO 81301 (telephone 303-247-5884).

T-Shirts. Shure Brothers, Inc. offers a promotional T-shirt at \$7.25 each ppd. The stock number is PR-73. As usual, these T-shirts are available in S, M, L, and XL sizes. The Shure logo and slogan (BREAKING SOUND BARRIERS) appears on the front. T-shirt color changes from time to time. The present ones are athlet-

ic gray with red lettering. Orders may be mailed to Shure Brothers, Inc., Service Department, 222 Hartrey Avenue, Evanston, IL 60202-3696. Be sure to include the stock number. Their telephone number is 1-800-257-4873.

Vibroplex. The Vibroplex Company, Inc. offers several items which may be of interest to code enthusiasts. Each item features the famous Vibroplex logo (bug) in some way. Their baseball-type light-blue hat is fully adjustable. It has the Vibroplex emblem in black, red, and gold. The key chain is cast solid brass, and it features the bug logo. Their black-glaze English ironstone mug shows their bug logo in 22 karat gold. The black polyester patch shows the Vibroplex name and logo in gold and red threads. An 8 by 18 inch black felt pennant shows the Vibroplex name and logo in gold. Their light-blue T-shirt is half cotton and half polyester and is available in small, medium, large, and extra large. It features the bug logo. Except for the pennant (\$4), each item is priced at \$6.95. A \$3 shipping charge applies to orders being shipped to U.S.A. addresses. The Vibroplex address is 98 Elm Street, Portland, ME 04101. Their toll-free number is 1-800-262-8387, which is also 1-800-AMATEUR. Their FAX number is 207-775-7710. Vibroplex offers several other items that are of interest to amateurs. They have been in business since 1890, which means their centennial occurs during 1990. I have used their bugs for 45 years, and a Vibroplex presentation bug is an essential part of my home station.

World Timer/Digital Thermometer. Beam Solar and Electronics sells a com-



The Vibroplex Company sells a variety of items of interest to code enthusiasts.

bination world timer and digital thermometer which converts degrees Fahrenheit (F) to degrees Celsius (C). A data sheet can be obtained by sending a request and SASE to 6205 11th Avenue, Brooklyn, NY 11219.

Caveat Emptor

Several months elapsed between the time I started gathering information for this article and when it appeared in print.



Dick Randall, K6ARE, of Livermore, California is shown standing in front of a small portion of his extensive collection of telegraph instruments. My wife (Marie, W6JEP) and I recently visited him to view his fine collection of keys. Our son (Mark, KB6RXU) took this picture. If you are going to be in this area, it is worthwhile to make arrangements to view his display. His address is 1263 Lakehurst Road.

All prices are subject to change. They are just stated in this article to provide indications of costs. It is advisable to confirm prices before ordering merchandise.

If you know similar "goodies" which could have been included in this article, please send information to my California address. There are a few items which have been sold in the past, but which are no longer advertised. Some letters to previous suppliers were not answered, leading me to believe they are no longer in business.

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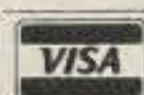


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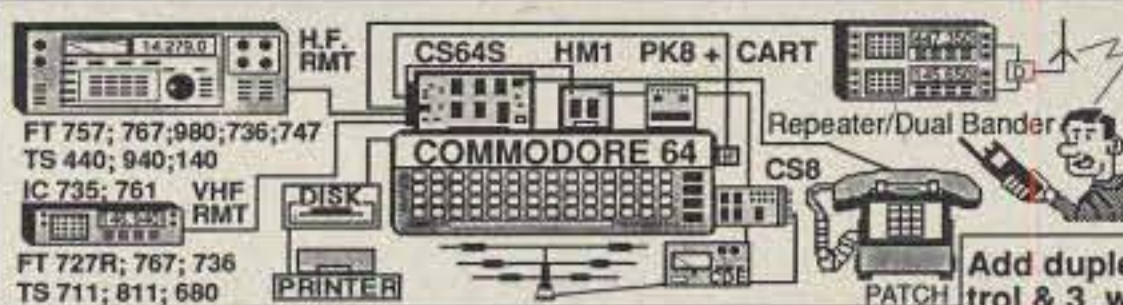


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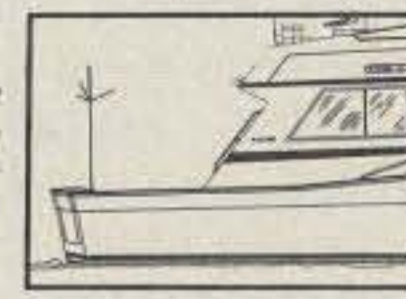
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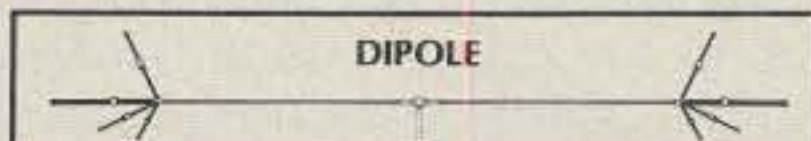
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NEWS/VIEWS OF ON-THE-AIR COMPETITION

1990 World Radiosport Team Championship

Under normal circumstances a serious contest operator competing for over 20 years has probably experienced everything there is to offer in the world of contesting. My experiences include meeting hundreds of testers from around the world, attending dozens of conventions, and operating from some of the world's best stations. The week of July 20th raised contesting to new heights for 44 competitors and dozens of others participating in the 1990 World Radiosport Team Championship in Seattle, Washington.

This past July gave witness to the arrival of 22 two-man teams in Seattle, Washington to participate in a newly conceived event, the 1990 World Radiosport Team Championship. The 1990 WRTC was designed in cooperation with the Goodwill Games to bring together contest operators from around the world in a competitive event without the burden of geographic/technical differences. Participants were something from contesting's "Who's Who" as representatives were present from 14 countries, including the USSR.

Imagine the thrill of walking into a competitor's planning meeting prior to the contest and witnessing the largest group of world-class operators ever assembled. For me, it was truly a breathtaking experience as I saw one contest winner after another. My initial thoughts raced from disbelief to a feeling that I was witnessing a "real-life" version of the CQ WW DX Contest results. As I entered the room I introduced myself to OH1XX and OH8PF. I said hello to K3EST and JE1JKL. I met for the first time my long-time friend Willy, UW9AR (chief operator at UZ9AYA). And then there were the introductions to UA1DZ, HA0MM, G4BUO, UW0CN, AH3C, etc., etc. Throughout that first evening I kept thinking to myself, "We get to experience this for an entire week!"

The Contest

In order to equalize operating conditions, existing stations were selected from a group of applicants around the Seattle area. The goal was to choose locations

2 Baldwin Street, Windham, NH 03087

Calendar of Events

Sept. 29-30	CQ WW RTTY DX Contest
Sept. 29-30	Idaho QSO Party
Sep.30-Oct.1	Fall Classic Radio Exchange
Oct. 6-7	F9AA Cup 1990 Contest
Oct. 6-7	California QSO Party
Oct. 6-7	Iberoamerica DX Contest
Oct. 6-7	VK/ZL Oceania DX SSB
Oct. 6-14	Wyoming Cent'l QSO Roundup
Oct. 13-14	VK/ZL Oceania DX CW
Oct. 14	RSGB 21/28 MHz SSB
Oct. 14-15	Illinois QSO Party
Oct. 17-18	YLRL CW Anniversary Party
Oct. 21	OMARC Midnight Special
Oct. 21	RSGB 21 MHz CW Contest
Oct. 27-28	CQ WW SSB DX Contest
Oct.31-Nov.1	YLRL SSB Anniversary Party
Nov. 3-5	ARRL CW Sweepstakes
Nov. 10	ALARA Contest
Nov. 10-11	OK-DX Contest
Nov. 17-19	ARRL SSB Sweepstakes
Nov. 24-25	CQ WW CW DX Contest
Nov.30-Dec.2	ARRL 160M Contest
Dec. 8-9	ARRL 10M Contest

with similar antennas and locations (e.g., tri-bander at 50 feet). All stations were equipped with an IC-765 main station and an IC-735 spotting receiver from ICOM, USA.

In our case, my teammate, Doug, K1DG, and I were hosted by Dick and Adele Bingham at W7WKR. As good luck would have it we could not have asked for better hosts. They were enthusiastic and literally made our stay a pleasure. Most of Friday, July 20th was spent preparing for the contest. We tried to learn "west coast" conditions, tested all the bands/modes, labeled log sheets and recording tapes (required for log checking), and completed our pre-contest organization.

The start of the contest was probably the closest I will ever come to the feeling experienced by an Olympic athlete about to start a 100 yard dash. It was simply exhilarating. Having never operated this type of contest made the development of a strategy difficult at best. Actual strategies varied dramatically from one team to another. Some competitors focused more on one mode, while others deemed multipliers critical to success. Our operating strategy included splitting the operating on the hour. We left the SSB/CW decisions to our instincts. Without exception, the activity level was higher than anyone expected (see Table II), which in-

deed made for an exciting 10 hours of operating.

To deem the log-checking process rigorous would simply not give it justice. Everyone's logs were extensively examined by an elite group of checkers including N6AA, K3EST, OH2MM, N6ZZ, K6NA, W6OAT, and OH2BH. As we have grown to appreciate over the years, there is checking and there is CHECKING. The "officials" performed magic as a 48-hour round-the-clock effort ensued to produce unique and unique + 1 lists that were later verified against the tape recordings from each station. All of the competitors waited anxiously as each log was processed and processed again. The scoring system for the competitors was based on a prorated system within the categories of SSB, CW, and Multipliers (or Counters, as they were called). We found it very unusual to see everyone's scores changing as category leaders lost QSOs.

The Post-Contest Extravaganza Saturday, July 21st

To assert the WRTC organizers successfully orchestrated an exciting event is like saying Mt. Everest is a big hill. It doesn't begin to put the adventure in the proper perspective. The WRTC was something like a sunspot peak. The pinnacle is anticipated and enjoyed by many people, but it will be a long eleven years before it happens again (hopefully sooner for the next WRTC). What followed after the contest was several days of camaraderie that simply cannot be described.

Saturday provided the teams with an opportunity to travel to the Northwest Convention in Portland, Oregon. Before arriving in Portland, we stopped at the Chkalov Monument. This is the only monument in the United States that specially honors USSR accomplishments (specifically the first trans-polar USA-USSR airplane flight). It was quite an emotional time as dozens of pictures were taken with USSR/USA competitors arm-in-arm.

The events of Portland were mostly quiet until the hospitality suite opened its doors following the banquet. Much to our delight we were joined by many testers, including AI6V, WA6VEF, N6TR, W7RM, W7WA, and others. There was little time to think about the next topic of

conversation. After all, most of us had 20-plus years of "non-visual" contact to catch up on. I can't begin to count the number of conversations I had with my fellow competitors ranging from life in their countries to contest operating strategy.

One of the evening's highlights was the 3 AM pizza delivery to the hospitality suite. Imagine the look on UW9AR's face as a delivery boy announced his arrival by saying "pizza for Willy Oumenets." Willy in his usual polite style said thank you and quickly gave the man a tip of one ruble! The political borders were non-existent in that room.

Sunday, July 22nd

Although a few brave souls awoke to hear Jacky, F2CW, speak during breakfast, most of the competitors took Sunday morning as an unofficial "off-time" to sleep. At mid-day we boarded the bus again and headed off to a military reservation to be welcomed by an outstanding cookout accompanied by a 31-piece band. The bus trip introduced us to each other in new ways as the air-conditioning failed. It was at the mid-point of the trip when we described our transportation as the "Bus from Hell"!

The cookout featured numerous highlights, including an international volleyball game, beer, food, beer, soccer, beer, and more beer. The Americans delighted in watching many of the USSR guys try a hamburger for the first time. Everyone knew that this was an event that had to be repeated. And quietly at a picnic table, a



The medal winners enjoying the moment.

committee had already formed to study the next steps, including a return visit to the Soviet Union.

As we boarded the "bus from hell" to return to our hotel, the tension began to mount as the log-checking process was winding down. After a quick dip in the pool, we gathered 10 competitors and headed off to a local Mexican restaurant and introduced George, UA9AM, and Willy, UW9AR, to Zone 6.

Monday, July 23rd

Our return to Seattle included a stop in Olympia, Washington for a tour of the State House and a brief meeting with the



The young alongside the experienced—NL7GP and KH6IJ.

Net CW QSOs	Net SSB QSOs	Net Counters	CW Pts.	SSB Pts.	Ctr. Pts.	Total	Team
614	703	55	100.00	90.01	73.33	263.35	K1AR/K1DG
512	781	54	83.39	100.00	72.00	255.39	K7JA/W9RE
515	550	75	83.88	70.42	100.00	254.30	KQ2M/KR0Y
594	573	58	96.74	73.37	77.33	247.44	VE7CC/VE7SV
608	563	57	99.02	72.09	76.00	247.11	DL5XX/DJ6QT
526	556	66	85.67	71.19	88.00	244.86	LZ1MS/LZ2PO
406	727	60	66.12	93.09	80.00	239.21	G3YDV/G4BUO
485	572	64	78.99	73.24	85.33	237.56	EA5BRA/EA9EO
497	496	69	80.94	63.51	92.00	236.45	UA9AM/UW9AR
391	610	70	63.68	78.10	93.33	235.12	AA4NC/W7EJ
524	610	52	85.34	78.10	69.33	232.78	UA1DZ/RB5IM
493	610	53	80.29	78.10	70.67	229.06	I2UIY/IK2DVG
558	457	59	90.88	58.51	78.67	228.06	OH1XX/OH8PF
556	449	58	90.55	57.49	77.33	225.38	OK1RI/OK2FD
463	540	57	75.41	69.14	76.00	220.55	YU1RL/YT3AA
550	528	47	89.58	67.61	62.67	219.85	HA6NY/HA0MM
524	421	53	85.34	53.91	70.67	209.91	UW3AA/UA9SA
455	475	56	74.10	60.82	74.67	209.59	UW0CA/UW0CN
500	288	58	81.43	36.88	77.33	195.64	JE1CKA/JE1JKL
282	618	51	45.93	79.13	68.00	193.06	PY4OD/PY5EG
377	448	44	61.40	57.36	58.67	177.43	FD1NYQ/F2CW
144	643	50	23.45	82.33	66.67	172.45	JJ3UHS/JM3JOW
480.6	555.4	57.5	78.30	71.10	76.70	226.10	Average Totals

Table I- WRTC final results.



The WRTC judges in full uniform.



Typical "IWG" antenna farm. This was W7WKR (N7MJZ/WG callsign).

Governor. He was truly fascinated with the group and made a point to ask several of us where we made our homes. The conversation lost a bit of its luster when the poll concluded by KQ2M informing the Governor he was from the exotic state of New York! Following the Governor's visit, we were warmly greeted by a local Olympia, Washington amateur radio club who fed us lunch. At this point we were all getting a little punchy as evidenced by Doug, K1DG, and George, UA9AM, switching name tags to have a little fun with our hosts.

The Awards Ceremony

With the log checking complete and winners identified, the competitors were treated to a visit via ferry to an Indian Reservation where we enjoyed a smoked salmon dinner. To be fair, however, the dinner took a back seat to the events that were about to transpire. The WRTC Committee outdid themselves another time as they created a ceremony that will be permanently etched in the minds of everyone. The events began with accolades for the remarkable accomplishments of the WRTC Committee, especially for Danny Eskanazi, K7SS. An extraordinary spectacle ensued as each team was introduced on stage. The moment had come for all the competitors even

Hour	Rate	SSB	CW
2100	135	105	30
2200	131	56	75
2300	140	79	61
0000	115	70	45
0100	137	123	14
0200	196	135	61
0300	165	151	14
0400	144	39	105
0500	134	1	133
0600	108	0	108
Average	140.5	646	759

Table II- N7MJZ/WG rate breakdown before dupes (K1AR/K1DG operators).

though the consensus was that everyone was a winner regardless of the final results. One by one they announced the winning teams: KQ2M/KR0Y—bronze, W9RE/K7JA—silver, and K1AR/K1DG—gold. In fitting style the medals were presented by the Chairman of the USSR Central Radio Club followed by special medals from the Soviet delegation and other awards. If anyone can think of a more moving experience in the hobby, I'd like to hear from you.

The evening ended with an invigorating ride on the ferry back to the mainland. We had the pleasure of being accompanied by a band aboard the boat including their lead guitarist, N7LOX. Everyone was in a partying mood as the dance floor became a multi-national celebration and deafening reminder of the good time we were having.

The Final Day, July 24th

The final day of our journey began quietly as we caught up on shopping and sight-seeing during the day in anticipation of our farewell cookout at the home of Gerry, WA7BUY. As with any momentous occasion, the end is always inevitable. Our calendars were a reminder that we all had jobs and families to return to in just a few short hours. With that evening our conversations continued as we seemingly had an endless array of topics to cover in that last meeting. I recall frantically moving from one competitor to another in the hope of having one more opportunity to learn something new about my friends. Near the end of the evening the USSR and USA competitors gave an emotional toast to each other and all the competitors as we finally realized that we had been a part of one of amateur radio's most memorable events. It seemed un-

fair that only 100 members of amateur radio's one-million worldwide fraternity could participate.

In Summary

There's very little more I can add in describing a true milestone in amateur radio. The boys in Seattle excelled as event after event was executed with precision. I'm sure my fellow competitors will join me in congratulating the WRTC Committee: K7SS, K7LXC, KE7V, N7MJZ, KM7E, W7NG, KS7L, KA7VMP, NV6Z, N0AX, W7QGP, K7LR, N7LSL, N7MYO, N7NKG, and KF7YB. The task of closely screening 22 logs was a gargantuan effort that never could have been completed without the dedicated efforts of N6AA, OH2BH, OH2MM, N6ZZ, K3EST, W6OAT, and K6NA. Finally, I want to thank the host station owners of Seattle who unquestionably made the competition a reality.

If anyone is interested, a video documenting the events in Seattle has been produced. This production is available for purchase by sending \$19.95 (US) plus shipping to the World Radiosport Team Championship, 4821 51st SW, Seattle, WA 98116. In addition, a worldwide WRTC calling frequency has been established on 14262 for participants and interested parties.

Closing Remarks

Next month will feature the results of my survey "Are Contesters Real Hams?" I'm looking forward to reporting the results, which should prove to be foretelling about our focus as contest operators.

As always, the deadline for the January issue is November 1st.

73, John, K1AR



Doug, K1DG, showing Willy, UW9AR, an American institution.

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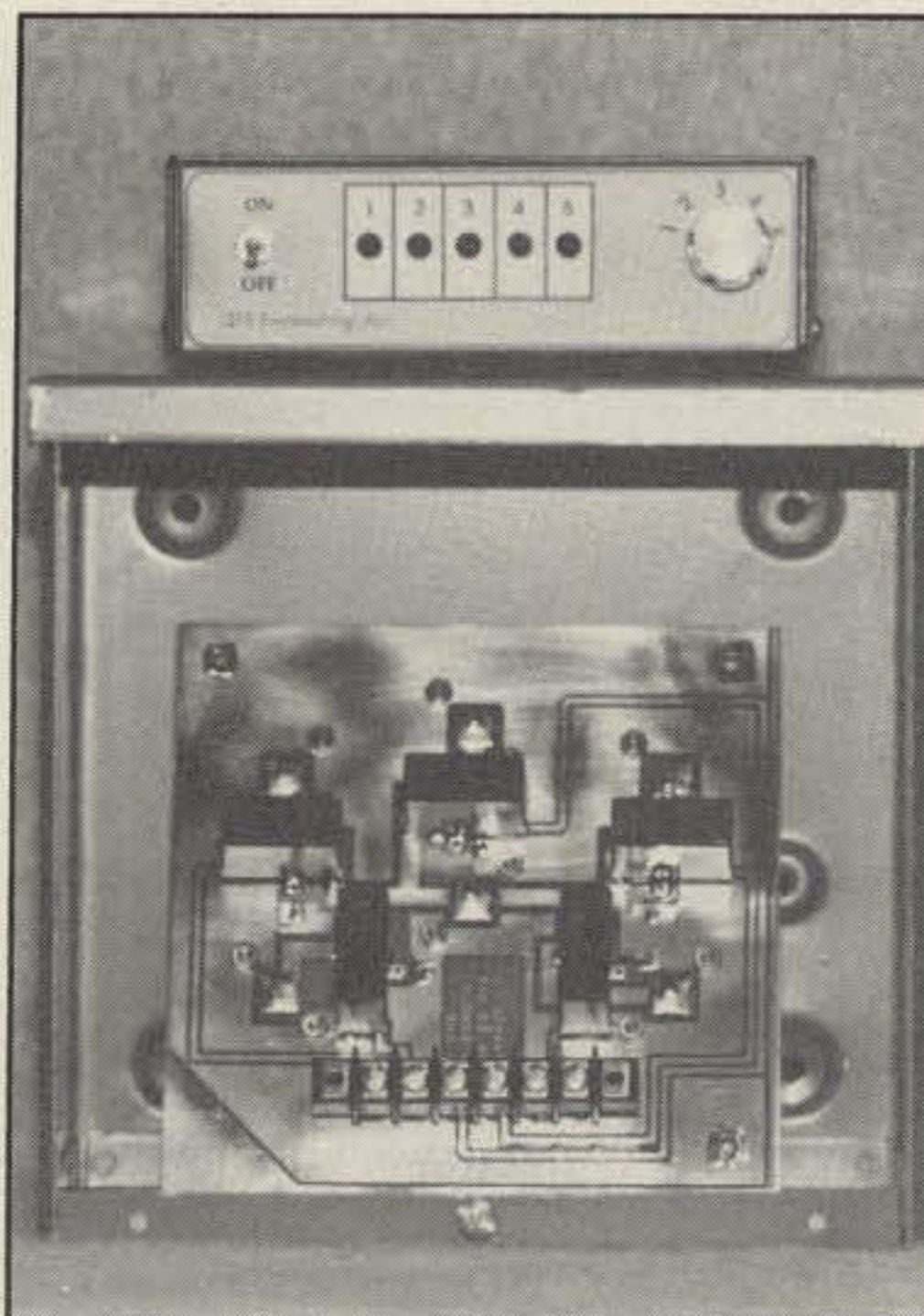
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CIRCLE 133 ON READER SERVICE CARD

1989 CQ WW RTTY Contest Errata

KF5YE/YV5 should be listed as a 21 MHz entry, #1 World.

FF1NZH should be listed as a 21 MHz entry, #2 World.

N8CWE was incorrectly listed as N9CWE, #1, 8th Call Area.

WB5YLT was incorrectly listed as WB5LYT.

Iberoamericano Contest

2000Z Sat. to 2000Z Sun., Oct. 6-7

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: Single operator and multi-operator, single transmitter; both Latin-American and non Latin-American. Single operator EC (EA novice), QRP, less than 5 watts output, and SWL.

Exchange: RS plus a progressive QSO number (001, etc.).

Bands: All six bands, 1.8 through 28 MHz, SSB only.

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 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: X-Concurso Iberoamericano, Gran Via de les Corts Catalanes, 594, 08007 Barcelona, Spain.

F9AA Cup 1990 Contest

1200Z Sat. to 1200Z Sun., Oct. 6-7

This contest was created in 1986 to celebrate the memory of Fernand Raoult, F9AA, who was the founder of the French Clubs Group. The URC was designed to benefit amateur radio by facilitating friendships between different club organizations.

Classes: Single operator private stations or multi-op club stations.

Bands: All HF bands according to IARU rules.

Exchange: Club stations—59(9) plus serial number and club name. Others eliminate the club designation.

Modes: First 12 hours are CW with the remainder of the contest on SSB. QSOs can be credited per band and mode.

Scoring: Club stations—5 points same continent, 10 points different continent. Individual stations—1 point same continent, 3 points different continents. Fifty bonus points/QSO for working FF6URC. Multipliers are DXCC countries and different radio clubs.

Awards: The first-place club station and SWL outside of France will receive the special F9AA Cup Award. The top ten individual stations receive other awards. All foreign club entries will be notified of the final results.

The log deadline for this one is November 7th and they should be mailed to: Union Des Radio Clubs, Coupe Fernand Raoult, 11 Rue de Bordeaux, 94700 Maisons Alfort, France.

VK/ZL/Oceania DX Contest

SSB: Oct. 6-7 CW: Oct. 13-14
1000Z Saturday to 1000Z Sunday

This is the 55th year of the VK/ZL contest. Be sure to look for the special bonus station ZL150A.

VK/ZL operators are limited to a maximum of 12 hours operating time in the 24-hour contest period. (SSB and CW are separate contests.)

Use all bands, 1.8-28 MHz, except WARC bands.

Oceania stations can work anyone. The rest of the world can work VK, ZL, and Oceania stations only. The same station may be worked on each band for QSO and multiplier credit.

Exchange: RS(T) plus a three-figure QSO number starting with 001.

Points: Two points per QSO. VK/ZL stations score points on a sliding scale: 160M—20 pts, 80M—10 pts, 40M—5 pts, 20M—1 pt, 15/10M—2 pts.

Multiplier: Each VK/ZL/O prefix worked on each band.

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

Awards: Special large, color certifi-

cates to top scorers in each country and to each continental winner. A participation certificate to all on request (2 IRCs, please).

There is an SWL section. Only VK/ZL/O stations are logged. Call of station being worked and RS(T) being sent must be reported. Scoring same as above but both SSB and CW scores are combined for final score (maximum total of 24 hours).

Use a separate log sheet for each band and underline each new VK/ZL/O prefix as it is worked on each band. Include a summary sheet showing the scoring and other essential information, and the usual signed declaration that all rules and regulations have been observed.

This year logs go to the new Contest Manager, ZL1AAS, 146 Sandspit Rd., Howick, New Zealand, and they must be received no later than March 1, 1991 (December 11, 1990 for VK/ZL).

Wyoming Centennial QSO Roundup

0000-2359Z Sat.-Sun., Oct. 6-14

One of the attractive aspects of QSO parties is the opportunity they provide for you to work rare U.S. states. This year's Wyoming QSO Roundup is being sponsored by the University of Wyoming Amateur Radio Club and is no exception. The contest is unusual this year as it is a week-long event to commemorate the Wyoming State Centennial. Wyoming stations can work each other and stations outside of the state.

Exchange: Non-Wyoming stations send RS(T) and State/Province/DXCC Country. Wyoming stations send RS(T) and County.

Scoring: A station may only be worked once per band/mode category for QSO credit (e.g., 20 meter QSOs with the same station on CW, SSB, and RTTY count as three valid contacts). Non-Wyoming stations use band/mode counties as multipliers. Wyoming stations use the same plus states, provinces, and DXCC countries. Scoring is computed by total valid QSOs times multiplier.

Bands: All bands are encouraged (excluding WARC frequencies) with CW lower band edge plus 50 kHz, SSB upper band edge minus 50 kHz, Novice CW sub-band edge plus 25 kHz, and Novice SSB on 28390 kHz.

Awards: All awards will be determined by a committee of the UWARC and will include certificates for top scorers in a variety of categories. Certificates of participation will be awarded to all entries submitting a large SASE.

Logs and entry forms should be post-marked by November 15, 1990 and sent to Bill Stacy, K7EY, 1912 Custer Street, Laramie, WY 82070.

RSGB 21/28 MHz SSB Contest

0700 to 1900 GMT Sunday, Oct. 14

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 49 prefixes available on each band. Following are the rules for areas other than the British Isles.

QSY Rule: All stations who QSY from one band to the other and make a scoring contact may not change bands again for a period of at least 10 minutes after the last contact on the original band (this does not apply to SWLs).

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 49 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.

Awards: Certificates to the three leading overall winners, and at the discretion of the committee, to the leading station in each country. Both for transmitting and SWL.

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 5th. This year they go to: RSGB Contest Committee, P.O. Box 73, Lichfield, Staffs. WS13 6UJ England.

Pennsylvania QSO Party

1600-0500Z Sat.-Sun., Oct. 13-14

1300-2200Z Sun., Oct. 14

This is the 33rd annual party sponsored by the Nittany ARC of State College, PA. The same station may be worked on each band and mode for QSO points. PA stations may also work other in-state stations for QSO and multiplier

credit, and mobiles in each county change. Novice stations must identify.

Exchange: QSO number and County for PA, ARRL section for others.

Scoring: One point for SSB contacts, 1.5 points for CW, 2 points if on 80 or 160. PA stations multiply total by (ARRL sections + PA counties + 1 DX country), total of 150 possible. Others use PA counties for their multiplier (total of 67 possible).

Mobiles add 500 points for each county operated from with a minimum of 10 QSOs. Mobiles on a county line give one QSO number, but get credit for two multipliers.

QRP stations multiply their score by 2, Novice/Tech by 3.

Final score is total points times multipliers.

Frequencies: CW—1810 and 40 kHz up from bottom of each CW band. SSB—1850, 3980, 7280, 14280, 21380, 28580. Novice—10 kHz up from bottom of each Novice band and SSB on 10 meters. Mobile—5 kHz below listed frequencies. Try 160 at 0300Z.

Awards: In six classes—Single Operator, Mobile, Multi-Single, Multi-Multi, QRP, and Novice/Tech. Certificates to winners in each PA county, ARRL section, DX country, and club entry (minimum of 3 members/20 QSOs per log). An impressive trophy program is available including a Club Trophy (members must reside within 175 mile radius), and Medium/Small Club Gavel (less than 75 members). In addition, there are 12 plaques available for winners in eastern and western PA, out-of-state, PA and out-of-state Novice, Multi-Single, Mobile, Portable, Central and Western Time Zones, NARC winner, and QRP.

Include a summary sheet with your entry showing the scoring, a check list of counties and 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. Send \$1.00 for a copy of the results (no SASE).

Mailing deadline for all entries is November 15th to: Nittany ARC, P.O. Box 614, State College, PA 16804.

Illinois QSO Party

1800Z Sun. to 0200Z Mon., Oct. 14-15

This is the 28th anniversary of the Illinois QSO Party sponsored by the Radio Amateur Megacycle Society. It's a shorty, only 8 hours long.

Stations may be worked once per band and mode, and IL stations can contact other in-state stations for QSO and multiplier credit.

Exchange: RS(T) and QTH. County for

IL stations; state, VE province, or DX country for others.

Scoring: One point for phone contacts, 2 points if on CW. Illinois stations multiply total QSO points by (states + provinces + IL counties + maximum of 5 countries) worked. Additional DX QSOs count for points but not multiplier.

Others use IL counties for their multiplier (maximum of 102).

Illinois mobiles add 200 points to final score for each county from which 10 or more QSOs were made.

All stations earn an extra multiplier for every eight QSOs made with the same county.

Frequencies: CW—3550, 7050, 14050, and 30 kHz above bottom edge of Novice subbands for CW and 28390 for phone. SSB—3890, 7290, 14290. Other bands may also be used.

Awards: Certificates to the top 10 scoring IL fixed stations, 5 IL mobiles, winners in each state, province, country, and the highest club/team aggregate score. A plaque goes to the top-scoring Illinois station.

Logs: Indicate band and mode, circle each new multiplier, and IL mobiles must indicate each county change. Stations with over 100 QSOs must submit a dupe sheet.

A summary sheet showing the scoring and the usual signed declaration is also requested.

Mailing deadline for logs is November 12th to: RAMS, c/o Joe LeKostaj, WB9GOJ, 9134 Ewing Ave., Evanston, IL 60203.

YLRL Anniversary Party

CW: Oct. 17-18 SSB: Oct. 31-Nov. 1
1400Z-1359Z, Wed.-Thurs.

This is the 51st 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 YLs only.

CW and SSB are separate contests and require separate logs. A station may be worked *once on each band* for contest credit.

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 YLs 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 1.5 for stations using 100 watts or less on CW and 200 watts PEP on SSB.

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, 21135, 28195. SSB—3955, 7255, 14265, 21395, 28395 (plus or minus 15 kHz). Look in DX portions of band on 40 and 80 meters.

Awards: Certificates to winning scores in each district, 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.

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 November 30th, and this year logs go to: Dana Tramba, NØFYQ, RR1, Box 213, Peck, KS 67120.

ARCI QRP Fall CW Contest

1200Z Sat. to 2400Z Sun., Oct. 20-21

This is the fall edition of the QRP Amateur Radio Club International. This year's activity will be found on CW only. Participants are limited to 24 hours out of the 36-hour contest period.

Exchange: RST 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: 0 to 1 watt—× 10; 1 to 5 watts—× 7. 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. And a bonus on each band if homebrew equipment is used, 2000 if a transmitter, 3000 if a receiver, and 5000 if a transceiver (maximum of 5000 per band).

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 + homebrew bonus.

Frequencies: 1810, 3560, 7040, 14060, 21060, 28060, 50060. Novice—3710, 7110, 21110, 28110.

Awards: Entries may be single or all band. Certificates to the top ten scores overall; to the top score on each band for single band entries; and to the top scores in each state, province, and DX country. There is a team category, 2 to 5 members, with a certificate to the highest scoring team.

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 K5VOL for official log forms.

Logs must be received by November 20th and go to: QRP ARCI Manager, Red Reynolds, K5VOL, 835 Surryse Road, Lake Zurich, IL 60047.

RSGB 21 MHz CW Contest

0700 to 1900 GMT Sunday, Oct. 21

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.

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 49 is possible. (GB does not count for QSO or multiplier.)

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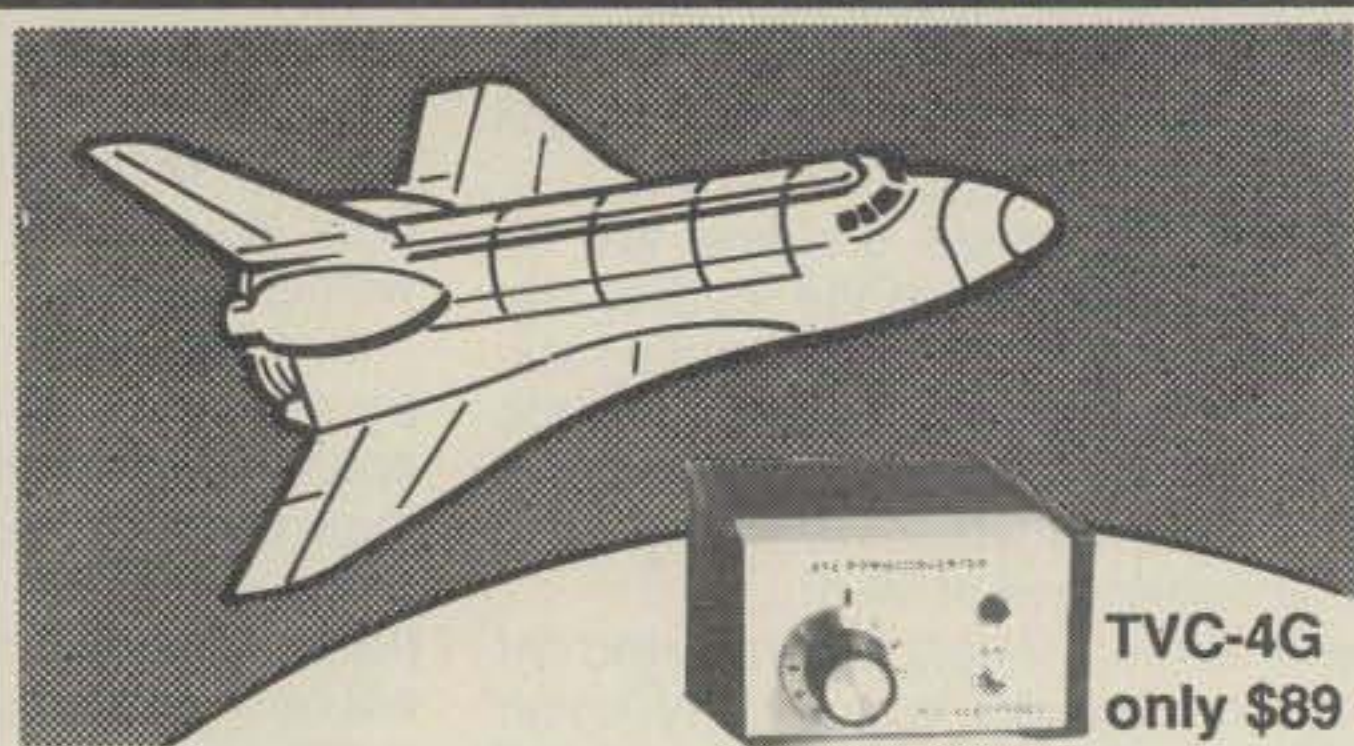
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which credit has been taken will be penalized ten times the points claimed. Logs containing more than five unmarked duplicates will be disqualified.

Only British Isles stations are to be logged by overseas SWLs. 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 overall winners, and at the discretion of the committee, to the leading station in each country. Both for 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 and they go to: RSGB Contest Committee, P.O. Box 73, Lichfield, Staffs. WS13 6UJ, England.

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.

Repeating the deadline, all entries must be postmarked NO LATER than De-

cember 1, 1990 for the phone section, and January 15, 1991 for the CW section.

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.

OMARC 25th Anniversary Midnight Special

0300-0400Z Sat., Oct. 21, 40M CW
0400Z-0500Z Sat., Oct. 21, 75M SSB

This is the third year the OMARC is sponsoring the Midnight Special, a short and fun operating event. Any station is eligible to participate with the emphasis placed on maximizing your total QSOs (no contest multiplier).

Bands: 3830-3880, 75 meter SSB, and 7030-7050, 40 meter CW.

Exchange: Name and USA county. OMARC members substitute "OMARC" for their county.

Scoring: Total number of valid QSOs. Only one QSO per station per band/mode is allowed.

Club Competition: Include the name of your club on the final summary sheet. You must be a member in good standing of your local club.

Send summary sheet, logs, and dupe sheets to: Bob Schwenk, W2XL, 133 Clifton Avenue, Kingston, NY 12401. The final deadline is December 1st.

CQ World-Wide DX Contest

Phone: Oct. 27-28 CW: Nov. 24-25
0000Z Saturday to 2400Z Sunday

Complete rules were published in last month's issue. There were several rule changes that should be reviewed.

A few awards have been eliminated or picked up by new donors. The detailed trophy list can be found in the rules announcement. Furthermore, all CQ WW trophies are now produced locally by CQ magazine, which should improve award consistency and delivery in the future.

You are again reminded to study the

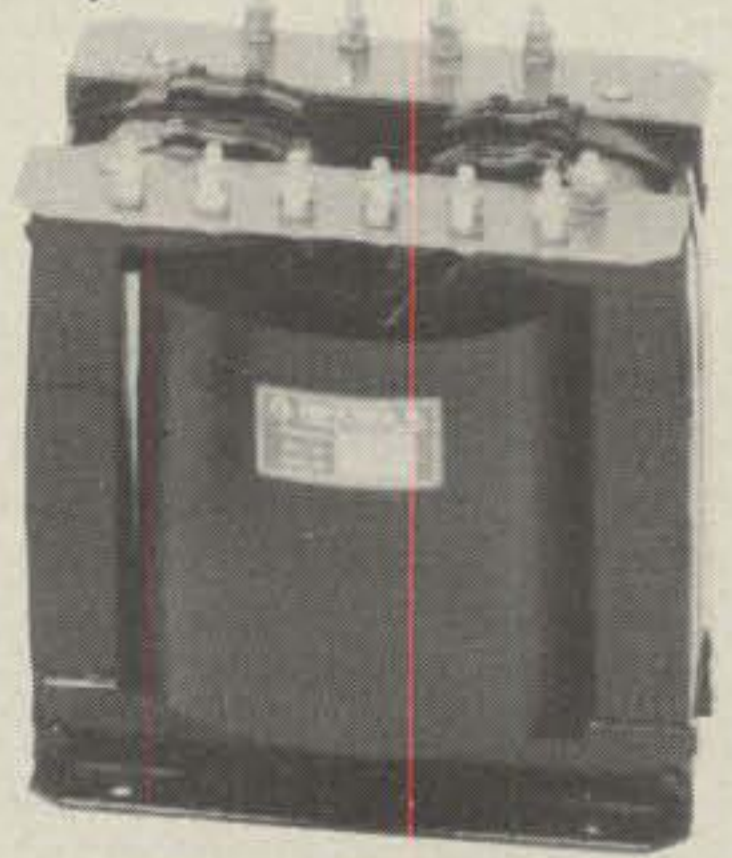
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75-6	09"	10	35	75	104-7	40"	57	70	60	117-6	1.57"	115	275	275
112-2	125"	18	31	38	104-6	40"	57	70	60	120-7	2.00"	120	400	240
112-4	125"	17	25	20	120-6	3.00"	41	80	60	120-6	2.00"	100	475	425
112-17	125"	7.5	40	35	120-5	3.00"	40	80	60	120-5	2.00"	100	310	340
116-52	160"	150	85	30	120-4	3.00"	40	80	70	122-5	2.25"	215	600	540
125-2	255"	34	40	35	120-3	3.00"	40	80	70	122-4	2.25"	190	600	540
125-6	255"	37	40	35	120-2	3.00"	40	80	60	120-3	3.00"	114	600	540
125-17	255"	12	40	35	120-1	3.00"	40	80	60	120-2	3.00"	100	475	425
126-2	300"	43	40	35	120-0	3.00"	40	80	60	120-1	3.00"	100	475	425
126-6	300"	34	40	35	120-0	3.00"	40	80	60	120-0	3.00"	100	475	425
126-17	300"	18	40	35	120-0	3.00"	40	80	60	120-0	3.00"	100	475	425
126-52	300"	23	40	35	120-0	3.00"	40	80	60	120-0	3.00"	100	475	425
127-6	375"	40	40	30	120-0	3.00"	40	80	60	120-0	3.00"	100	475	425
127-17	375"	15	40	30	120-0	3.00"	40	80	60	120-0	3.00"	100	475	425

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6 mix - Maximum Q range: 2-30 MHz. Permeability (μ) 4.0. RI transformer to 10 meters.
17 mix - Maximum Q range: 20-300 MHz. Permeability (μ) 4.0. RI transformer. HF VHF.
26 mix - Maximum Q range: DC-8 MHz. Permeability (μ) 7.5. DC, 40 Hz and EMI/RFI filtering.
52 mix - Maximum Q range: DC-1 MHz. Permeability (μ) 7.5. DC, 60 Hz and EMI/RFI filtering.

* Note: Toroids operate at 4 to 100 times the stated frequency range with reduced Q and efficiency.

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 - 220 MHz IsoPole** Antenna for 220, omni-directional \$ 55
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CIRCLE 88 ON READER SERVICE CARD

REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

World RadioSport Team Championship

Only a short time ago politicians were more concerned with megatonnage and armored divisions than international friendship. Glasnost changed that, and a vivid example of the changing international attitudes occurred recently during the Goodwill Games in Seattle, Washington.

The World RadioSport Team Championship competition was held in the Emerald City as a Cultural Exchange event of the games. It was probably the most unusual amateur radio contest held in this country. It brought together 22 teams of top contest participants from 15 countries of the world. Each team consisted of two amateurs competing to see who could work the most stations between 2 PM and midnight on Friday, July 20th. The favorable publicity generated for amateur radio was extensive.

The idea for the World RadioSport Federation was born two years ago when Danny Eskenazi, K7SS, of Seattle, Washington, became curious about contests in the Soviet Union. Danny had spoken for years with his good friend Willy Umanets, UW9AR. He learned that amateur radio contests in Russia (and Europe in general) were quite different from those held in this country. Wouldn't it be fantastic if the best operators could come to the U.S. for a contest from one location? About the same time as he started to dream the impossible dream, publicity for Ted Turner's Goodwill Games started to stimulate the public interest. Eskenazi put two and two together and came up with a lot more than four.

Danny mentioned the concept to his friend Martti Laine, OH2BH, of Espoo, Finland, and asked him to discuss the idea with the Soviet RadioSport Federation the next time he visited the USSR. Subsequently, Martti met with Boris Stepanov, UW3AX, the Deputy Editor in Chief of *RADIO*, the premier radio publication of Russia. Boris, working with Vasili, UV3BW, head of the famous Central Radio Club (Box 88, Moscow, USSR), started promoting the idea in his country.

Once it became apparent that a world radio contest was possible, Eskenazi started putting a team together and began looking for financial sponsorship.

*National Volunteer Examiner Coordinator,
P.O. Box 565101, Dallas, TX 75356-5101*



Amateur DX competition teams throughout the world participated in the World RadioSport Team Competition held at the 1990 Goodwill Games in July. The team shown here, YT3AA and YU1RL, was from Yugoslavia.

The first to step forward with more than verbal encouragement was ICOM America. Their financial contribution and support were responsible for bringing MFJ, Ameritron, Ham Radio Outlet, US Towers, and the Northern California DX Foundation into the fold. A certain amount of arm-twisting resulted in the competition being made part of the Goodwill Games as a Cultural Exchange event.

As the contest day neared, contestants started arriving from all over the world. After two or three false arrival indications, the AeroFlot plane touched down at Seattle's SeaTac airport late Tuesday afternoon. There was a very emotional meeting and greeting when amateurs from America and the USSR finally got to embrace after years of friendship established by radio communications.

In addition to the contestants, numerous support personnel came for the event. The Soviets had UW3AX cover the event for *RADIO* and Jacky Calvo, F2CW, represented the French publication *MegaHertz*.

The contest took place on schedule

with only minor "glitches." To ensure fairness, the locations selected for contest sites had nearly identical antenna installations. To ensure similar power levels, ICOM America provided transceivers for each site. On the morning of the event the station manned by Willy, UW9AR, was plagued by electrical interference. The local energy supplier, Puget Power, rolled no less than four trucks fully manned to wash the insulators in the area. The 60 Hz buzz was eliminated just before the contest started.

Over the weekend following the competition the committee compared and checked the logs of the participants. While this was going on, the entire group was bussed down to Portland, Oregon for the annual Northwest DX Convention.

Another first occurred during the trip. Mary Lewis, W7QGP (the ex-ARRL Northwest Director), conducted what is probably the world's first bus-borne W5YI VE session. A number of Russian and European amateurs passed their test. Notable was Jacky Calvo, F2CW's daughter, Celine. She is French, only 15, and managed



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Sunday morning at the Willamette Valley DX Club breakfast F2CW showed slides of the Bouvet DXpedition. Also, a significant meeting took place during the breakfast. The various participants laid the groundwork for a federation to be called the World Sport Radio Federation, which will officially sanction future events. While nothing is firm at this time, it is likely that another RadioSport contest will occur during the Goodwill Games in Leningrad during 1994.

Monday evening was the highlight of the visit. The committee chartered the ship *Goodtime II* to make the 9 mile voyage from Seattle to Blake Island for the famous salmon bake by the Tillicum Indians. The vessel came completely equipped with a four-piece rock band. Boris, UW3AX, showed he has talent in more areas than electronics, and Gene Cholgin, UZ3AU, proved to be quite a dancer!

Following a delicious salmon dinner the award presentations were made. Sponsoring companies provided many gifts to the participants. Medals similar to those given to the Goodwill Games champions were presented to the winning amateur teams. The bronze went to the team consisting of Jeff Steinman, KR0Y, and Bob Shohet, KQ2M. The silver was earned

by Chip Margelli, K7JA, and Mike Wetzel, W9RE. The overall winner, receiving the gold medal, was John Dorr, K1AR, and Doug Grant, K1DG.

Seattle-area amateurs helped make the event a success. Steve Morris, K7LXC, took care of the many organizing details. Adam Kerner, N7MJZ, coordinated publicity, and Patty Meeks, KS7L, was invaluable in locating housing for the contestants. All the visitors stayed with amateurs in the area.

One unsung hero of the event was Bob Cox, K3EST/6. Right up until the last minute it appeared that the visitors would have to use the call letters of their American hosts. Even though American amateurs visiting Russia had been granted Soviet call letters in the past, our State Department was reluctant to reciprocate the courtesy. The stalemate was broken by K3EST/6.

Many foreign competitors had U.S. amateur licenses. The UA, LZ, HA, and OK competitors were *not* allowed to use their own calls, but could use the calls of a pool of stations that were approved by the FCC. This was based on "imminent" reciprocal amateur radio licensing with the USSR and most Eastern European countries. The State Department used the event as the catalyst to pursue further reciprocal licensing, and the agreements will probably be a direct result of the

Goodwill Games event. The FCC waived the rules for a two-week period.

This was one of the most momentous events ever in the amateur radio community and in contesting specifically. It was deemed a success by all involved. The media exposure and publicity achieved were also unbelievable. They even got a call from *USA Today*! An American sweep was the end result of the contest, but now lifelong friendships have been established and an incredible amount of international goodwill has been generated.

Special Rules Proposed For Handicapped Amateurs

On August 1st the FCC, on its own motion, proposed amending its rules to make the Amateur Radio Service more accessible to handicapped persons. The FCC took this action to accommodate those persons who, because of severe handicaps, have extraordinary difficulty in passing the higher speed code telegraphy examinations for amateur operator licenses. The Commission is also responding to Congressional and Executive Branch action which recently enacted the Americans with Disabilities Act of 1990 into law.

The amateur service is open to qualified persons interested in radio technique for personal reasons and without

pecuniary interest, and provides those individuals with the opportunity for self-training, intercommunication, and technical investigation.

To qualify for an amateur operator license, applicants must pass both written and telegraphy examinations which are used by the administering volunteer examiners (VEs) to determine the class of operator license for which the person is qualified. Currently, the required telegraphy speed for the Novice and Technician classes of operator license is 5 wpm, 13 wpm for the General and Advanced, and 20 wpm for the Amateur Extra class.

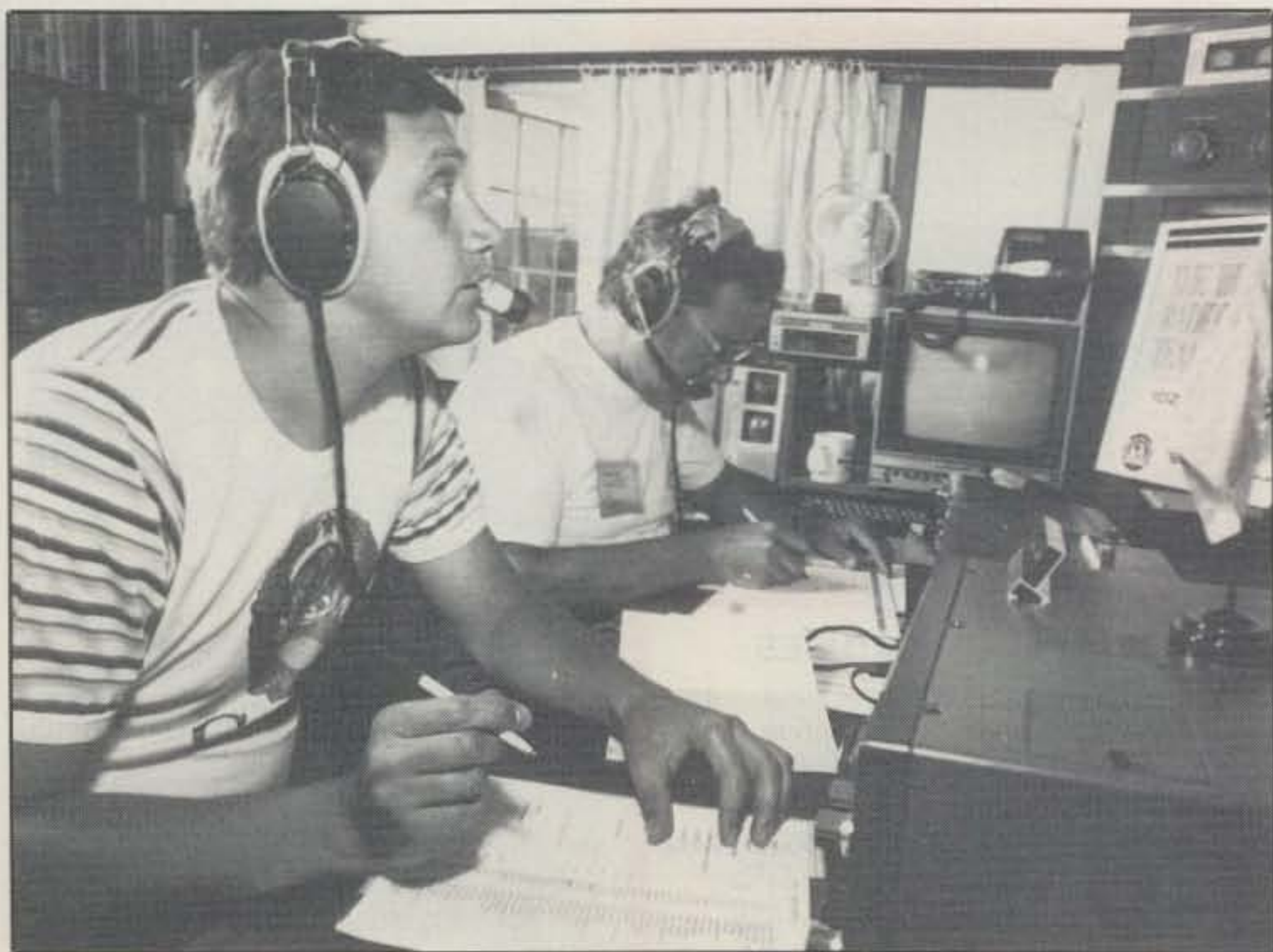
To make all classes of operator licenses accessible to persons who because of their handicaps cannot pass the required telegraphy examinations, the VEs, at the Commission's request, have already expanded special procedures to accommodate handicapped individuals. However, the Commission said that there still remains a significant number of otherwise qualified licensees who because of their severe handicaps cannot pass the higher speed examinations even when provided special accommodations.

To assist such individuals the Commission has proposed to exempt from these examinations individuals holding current or renewable Novice, Technician, General, or Advanced class operator licenses. The Commission said that the exemption provision would be incorporated into the existing volunteer examiner coordinator (VEC) system.

In accordance with the Rehabilitation Act of 1973, the FCC has proposed to define the term "severely handicapped individual" as a person having a severe physical or mental disability which seriously limits one or more functional capabilities. Under the proposed rules the VEs would give examination credit to severely handicapped licensees seeking exemption from the 13 wpm or the 20 wpm telegraphy examinations. The examinees would also be required to show an authentic certification signed by a physician attesting that they cannot pass these examinations because of physical or mental disabilities.

The FCC said the international requirement of this proposal would be met because all licensees would have demonstrated their telegraphy proficiency by having passed at least the 5 wpm telegraphy examination, Element 1A. Moreover, the proposed rule changes would be more efficient and effective than reviewing waiver requests from severely handicapped individuals on a case-by-case basis. The FCC is asking for comments from the public on all aspects of this proposal. As of this writing, the FCC has received eighteen requests for higher speed code waivers from disabled persons and has granted six.

FCC Commissioner James Quello, in-



RB5IM and UA1DZ formed a Soviet team which participated in the games.

terestingly, wondered how much Morse code is really used on the amateur bands. Ralph Haller, N4RH, FCC Private Radio Bureau Chief, assured him that it was very much in use. Later Commissioner Sherrie Marshall said she felt that Commissioner Quello had asked the real question that needed answering. (Notice of Proposed Rulemaking, August 1, 1990: PR Docket 90-356.)

Amateur Radio Test Study Software

Applicants and volunteer examiners (VEs) alike may now study and administer the written amateur radio operator tests at their personal computers. Several VECs now utilize theory examinations automatically generated by a microcomput-



This West German team of DL5XX and DJ6QT also participated in the competition.

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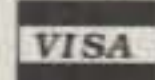
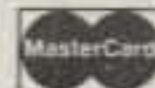
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RF Signal Strength Indicator	16 Segment Adjustable Bargraph	16 Segment Adjustable Bargraph	•	•
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er; some even allow applicants to simply key in the correct multiple-choice answer at the keyboard. A scored answer sheet, ready for filing with the application, is automatically produced at the end of the test.

If you have access to an IBM compatible (MS-DOS) computer, you might want to consider this high-tech method of determining if you are ready to pass a written examination.

There are five theory examinations: Novice, Technician, General, Advanced, and Amateur Extra class. Table I tells you exactly how many questions are in each question pool and how many of these questions will be selected in an actual examination.

The Amateur Radio Practice Test Software offered by The W5YI Group allows you to review questions on each of the sub-elements and to take actual practice examinations at your keyboard.

The software randomly selects the correct number of questions and displays each on your screen along with the four possible answers (A, B, C, or D). One of the choices is correct; the three wrong answers are called distractors. You choose the one you believe to be right. These are the actual answers—distractors and correct answers that appear in the examinations administered by every VE and VEC. By law all must use the same question sets verbatim. The actual test

Sub-Element	Novice Elem. 2	Technician Elem. 3A	General Elem. 3B	Advanced Elem. 4A	Extra Elem. 4B
A: FCC Rules	114-10	64- 5	46- 4	66- 6	117- 8
B: Operating Procedures	48- 2	30- 3	35- 3	10- 1	21- 4
C: Radio Propagation	18- 1	30- 3	30- 3	20- 2	12- 2
D: Amateur Practices	45- 4	44- 4	50- 5	40- 4	27- 4
E: Electrical Principles	44- 4	34- 2	41- 2	100-10	65- 6
F: Amateur Equipment	21- 2	37- 2	11- 1	60- 6	36- 4
G: Practical Circuits	20- 2	17- 1	10- 1	100-10	69- 4
H: Signals/Emissions	23- 2	28- 2	22- 2	63- 6	44- 4
I: Antennas/Feed Lines	39- 3	42- 3	41- 4	48- 5	49- 4
Total Questions/Selected	372-30	326-25	286-25	507-50	440-40

Table I—The above chart indicates the total number of questions in each of the five pools and the number of questions randomly selected for an examination. Example: There are 372 questions in the Novice question pool, 30 of which are arbitrarily chosen for the written test; ten come from FCC Rules, two from Operating Procedures, etc.

administered by your VE team is constructed exactly (word for word with no changes) like your computer randomly will do for you.

You are permitted during the computer practice test to review your answers and previously answered questions by pressing R (for Review), P (for Previous), and N (for the Next) question. You "End" the practice test when you type in the letter E. Your score, both number of questions answered correctly and percentage, will be automatically indicated, and whether you passed or failed. You will be graded by sub-element to highlight which of the topics you need to study further.

You may also print out each of the practice examinations in three different formats, and just about any type of dot matrix, daisy wheel, or laser printer will work.

All 1931 questions and all five license classes, Novice through Amateur Extra, are on four 5¼ inch floppy disks. Cost is \$19.95 (postpaid) for the set of four (IBM compatible MS-DOS) disks, money-back guarantee. The package is available from The W5YI Group, P.O. Box 565101, Dallas, TX 75356; VISA/MasterCard call toll-free 1-800-669-W5YI (9594).

Until next month . . .

73, Fred, W5YI

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for October is:

Barbara Baum, N3DRO
USA-CA All Counties #624, All SSB
6-24-89

"I'd never heard of amateur radio until a friend introduced me to it. I listened and found it interesting and decided to try for my license. After studying for three months, I went to the FCC office in Baltimore and took the test for General class. The code was no problem but I failed the theory. I went back home very disappointed. I studied for two more months, then went and took the theory again. This time I passed, and couldn't wait to get my license. It seemed it would never come, but it finally did, arriving in the mail on November 23, 1983.

"My first radio contact was on the Century Club, and that's where I met WD9ITQ and N9BAE. They were traveling and called me to ask if they could meet me and visit. I said sure, and a close friendship developed from there. On their third or fourth visit, after trying for a long while to get me into county hunting, they went through my QSL cards, entered the counties in a CQ Record Book, gave me a 'coloring book,' and said, 'Now you're a county hunter.'

"I started working counties then, but only on 75 meters. By the MARAC Convention in Maine in May 1988 I had worked 2698 counties on 75 meters. I was so close some of the people there convinced me to finish on 20 meters so I could get my USA-CA All Counties number, then finish on 75 meters and whatever else I wanted. I did so, and got my number on June 24, 1989.

"It's a lot of work and takes a lot of time, but I love it and wouldn't change it for anything. People in amateur radio are great, and I love it. I don't know how I did without it before deciding to become licensed. You make lasting friendships, learn about other countries, and just a lot of things.

"I enjoy running the counties more than working them, and I enjoy giving out states for the Century Club. I just plain enjoy getting all the calls from stations and helping people achieve their goals.

"I want to thank everyone for all their help in giving out the counties, especially



Barb, N3DRO, taking a rest between counties while on vacation last year.

the ones who went out of their way! A special thanks goes to K7IOO and his son for going to Lake County, Montana for my last for all.

"I will still continue to hunt and give out counties (if you can put up with me) and work on many of the other awards in county hunting. You'll hear me on the air for many years to come, because amateur radio is very special to me. Thanks again everyone! Be talking to you on the air!—73 & 88, Barb Baum, N3DRO."

USA-CA Special Honor Roll

Esther E. Frost, KA4IFF
 USA-CA All Counties #662
 All CW, 6-2-90

Joyce Ann Booth, WB9NUL
 USA-CA All Counties #663
 All SSB, 6-6-90

Richard D. Evans, K9ETB
 USA-CA All Counties #664
 All SSB Mobiles, 6-9-90

John "Jack" Bigelow, KA9JOL
 USA-CA All Counties #665
 Mixed, 6-20-90

Justino Mateiro dos Santos, CT1TZ
 USA-CA All Counties #666
 All SSB, 6-27-90

Walter J. Zyck, W9MY Y
 USA-CA All Counties #667
 All CW, 6-30-90

USA-CA Honor Roll

3000		1500	
KA4IFF	692	WB9NUL	920
WB9NUL	693	K9ETB	921
K9ETB	694		
W9MY Y	695	1000	
		WB9NUL	1118
		K9ETB	1119
2500		WA2CNJ	1120
WB9NUL	770		
K9ETB	771		
W9MY Y	772	500	
		TF6MM	2419
2000		K9ETB	2420
WB9NUL	836	KM4FO	2421
K9ETB	837	KA1JPR	2422
		WB8WEZ	2423
		VE4ACY	2424

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is \$4.00. For non-subscribers it is \$10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Communications, 76 North Broadway, Hicksville, NY 11801, USA for \$1.25. To qualify for the special subscriber rate please send a recent CQ mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending an SASE to Dorothy Johnson, WB9RCY, USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060, USA. DX stations must include extra postage for airmail reply.

Awards Issued

Esther E. Frost, KA4IFF, filed her good application and received USA-CA All Counties #662, and USA-CA 3000 #692, All CW, dated 6-2-90.

Joyce Ann Booth, WB9NUL, completed all of her paperwork and claimed USA-CA All Counties #663, USA-CA 3000 #693, All SSB Mobiles; and USA-CA 2500 #770, USA-CA 2000 #836, USA-CA 1500 #920, and USA-CA 1000 #1118, All 20M SSB Mobiles, all dated 6-6-90.

Richard D. Evans, K9ETB, did it all in one giant step, claiming USA-CA All Counties #664, USA-CA 3000 #694, USA-CA 2500 #771, USA-CA 2000 #837, USA-CA 1500 #921, USA-CA 1000 #1119, and USA-CA 500 #2420, All SSB Mobiles, dated 6-9-90.

Jack Bigelow, KA9JOL, put the finishing touches on his good record and received USA-CA All Counties #665, Mixed, dated 6-20-90.

Justino Mateiro dos Santos, CT1TZ, filed his final confirmations and received USA-CA All Counties #666, All SSB, dated 6-27-90, #1 to CT1-land.

Walter J. Zyck, W9MY Y, completed his quest and claimed USA-CA All Counties #667, USA-CA 3000 #695, and USA-CA 2500 #772, All CW, dated 6-30-90.

Ray E. Skrabut, WA2CNJ, collected

333 South Lincoln Ave., Mundelein, IL 60060

another group of confirmed county contacts and received USA-CA 1000 #1120, All 20M SSB, dated 6-25-90.

USA-CA 500 certificates went to:

Porvaldur Stefansson, TF6MM, USA-CA 500 #2419, Mixed, 6-7-90.

Richard D. Evans, K9ETB, USA-CA 500 #2420, All SSB Mobiles, 6-9-90.

Dwight Orten, KM4FO, USA-CA 500 #2421, Mixed, 6-14-90.

Percy E. Ford, KA1JPR, USA-CA 500 #2422, Mixed, 6-16-90.

Andrew A. Pitt, WB8WEZ, USA-CA 500 #2423, Mixed, 6-23-90.

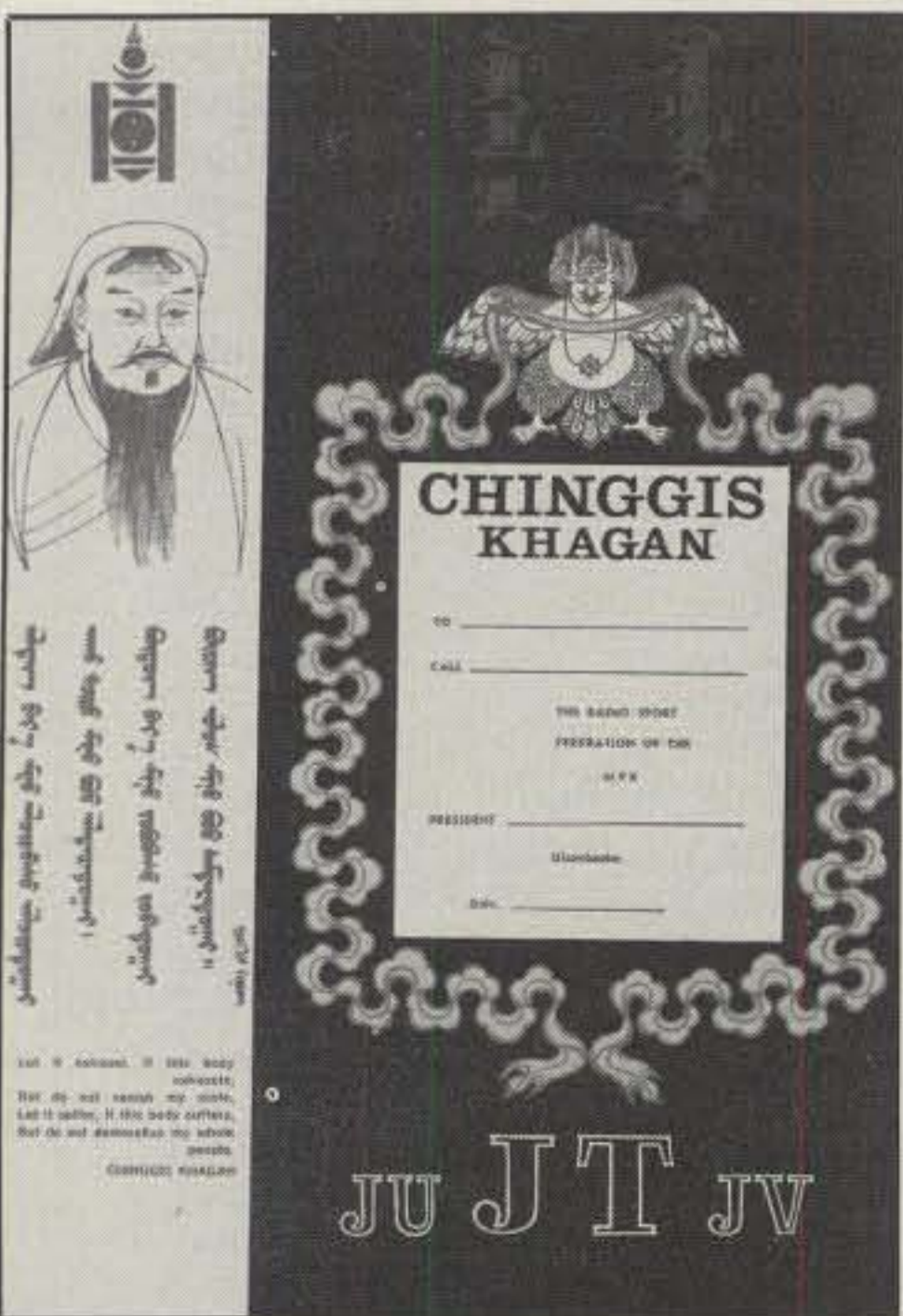
Walter E. Winters, VE4ACY, USA-CA 500 #2424, Mixed, 6-26-90.

Awards Available

Chinghis Khan Award. The Chinghis Khan Award is issued by the Mongolian Radio Sports Federation (MRSF) and JTCX Club on the occasion of the 750th anniversary of "The Secret History of Mongols."

This award may be earned by all radio amateurs who make contact with a Mongolian station, and it is subject to the following regulations.

The award is available to all licensed radio amateurs and SWLs. There are no time, band, or mode limitations. Applicants must submit proof of contact with one Mongolian station and twelve (12) stations of different DXCC countries, the suffix letters of the callsign of which spell out the words "CHINGHIS KHAN"—e.g., JA2WDC for the letter "C," WB1HGV for the letter "H," OZ5CI for the letter "I," etc.



The Chinghis Khan Award issued by The Mongolian Radio Sports Federation and JTCX Club.

Do not send cards. A list showing full details of the contacts (SWL) should be certified by a club official or two amateurs. The fee for the award is U.S. \$5.00 or 15 IRCs. Send fee and application in the form of a registered letter to MRSF, P.O. Box 639, Ulaanbaatar 13, Mongolia, Asia.

Ham Radio in Mexico. Early radio experiments began in 1908, and the first license was issued in 1921. Founded in 1932, the Mexican League of Radio Experimenters (LMRE) became a IARU founder in 1964. The correct name of the "Liga" since 1988 is Federacion Mexicana de Radio Experimentadores A.C. Grouped in 94 radio clubs, there are now some 5500 amateurs who manage an extensive net of repeaters.

There are three classes of license. First Class—code 10 wpm, all bands, HF 1250 watts, VHF 500 watts. Second Class—code 5 wpm, all bands, HF 500 watts, VHF 200 watts. Restricted License—no code, 45 watts VHF-UHF only. Those licenses are available to XE citizens and foreigners residing in Mexico. There is no license reciprocity at this time, but the FMRE manages to obtain temporary permits for amateurs touring in the country. This was made easier because Mexico signed the Lima Convention at the CITEL Meeting in 1987. Strangely, the FCC and DOC assisted as observers but did not sign the accord.

Activities on the bands are varied. Some amateurs operate EME, Oscar, and SSTV, while others like 160 or 6 meters. Packet is growing day by day. Some 250 work DX, and 5 have made the DXCC Honor Roll. The rest divide their radio time among rag chewing, emergency nets, and 2 meter "telefonito."

Mexico is in CQ Zone 6. As Revillo Gigeo Islands are a separate DXCC country, DXpeditions are made periodically to those islands. Clarion Island, the most westerly of Revillo, counts a point for IOTA. Special authorizations are required for landfall and amateur radio operations in those restricted naval areas.

A major problem is recruitment. As CB grew, the FMRE tried to attract the better CBers by public demonstrations, pamphlets, and radio bulletins. Lectures on technical topics and code sessions are given free by FMRE, which also publishes the bimonthly review "ONDA CORTA."

Amateur call prefixes for Mexico are XAA-XIZ, 4AA-4CZ, 6DA-6JZ. The national FMRE Bulletin is aired each Sunday at 1500 UTC on 7.080, 14.120, and 147.030 in Spanish. The National XE Hamvention is held each year in July in a different state capital city. All are welcome!

XE Awards Program of FMRE. To apply for an XE FMRE Award, send the required list of QSOs, verified by the award manager of your national amateur asso-

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The 626 Award offered by the Federación Mexicana de Radio Experimentadores.



The Mexico Award for working the states of Mexico.



WAXE Award offered by the Federación Mexicana de Radio Experimentadores for working Mexican call districts.



America Award by La Liga Mexicana de Radio Experimentadores.

ciation or district, along with \$3.00 US to cover expenses, to FMRE, Comisión de Diplomas, P.O. Box 907, Mexico DF 1, Mexico.

626 Award. Proof of 6 QSOs with any

different XE stations in one mode, one frequency. The Club of Radioexperimenters of Colima, "J. R. Levy A.C." in 1988 initiated the "6 Band Z 6" award program. The applicant must prove a contact on one band, from 10 to 160 meters, with a station in the 32 Mexican states (a Federal district counts as a state) and the Revilla Gigedo Islands. Contact XE1J, Radio Club de Colima, Clavel 333, Colima (Col) 28030, Mexico.

America Award. Proof of a contact with 20 XE amateur stations and at least 40 American (North and South) DXCC countries in one mode, except mobile stations. The award began January 1, 1957. Endorsements by band or mode are available.

Mexico Award. Proof of a contact with an XE station in each of 32 Mexican

united states. Revilla Gigedo counts as Colima.

WAXE Award. Proof of a contact in each XE district: XE1, XE2, XE3, XF3, and XF4.

Aztec Awards. Aztec and Golden Aztec Awards are issued to deserving XE amateurs and exceptional foreign operators who dedicate a part of their continuing activity to the service of amateur radio in the areas of teaching, experimentation, and social services.

Following is a list of the 32 Mexican states. Each state name is followed by the name of the capital of that state.

01	Aguascalientes	Aguascalientes
02	Baja California N.	Tijuana
03	Baja California S.	Ensenada
04	Campeche	Campeche
05	Coahuila	Saltillo
06	Colima	Colima
07	Chiapas	Tuxtla Gtz.
08	Chihuahua	Chihuahua
09	Distrito Federal	Mexico
10	Durango	Durango
11	Guanajuato	Guanajuato
12	Guerrero	Chilpancingo
13	Hidalgo	Pachuca
14	Janisco	Guadalajara
15	Edo. de Mexico	Toluca
16	Michoacan	Morelia
17	Morelos	Cuernavaca
18	Nayarit	Tepic
19	Nuevo Leon	Monterrey
20	Oaxaca	Oaxaca
21	Puebla	Puebla
22	Queretaro	Queretaro
23	Quintana Roo	Chetumal
24	San Luis Potosa	San Luis Potosi
25	Sinaloa	Culluacan
26	Sonora	Hermosillo
27	Tabasco	Villahermosa
28	Tamaulipas	Tampico
29	Tlaxcala	Tlaxcala
30	Veracruz	Veracruz
31	Yucatan	Merida
32	Zacatecas	Zacatecas

Is. Revilla Gigedo: The island group is made up of San Benedicto, Roca Partida, Socorro, and Clarion.

73, Dorothy, WB9RCY

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9140	40 meters	9112	12 meters
9130	30 meters	9110	10 meters
9120	20 meters	9106	6 meters
9117	17 meters		

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THE SCIENCE OF PREDICTING RADIO CONDITIONS

DX Contest Special

The 1990 CQ World-Wide DX Contest will be held on the following dates:

Phone: 0000 UTC Saturday, Oct. 27 to
2400 UTC Sunday, Oct. 28
CW: 0000 UTC Saturday, Nov. 24 to
2400 UTC Sunday, Nov. 25

For the 40th consecutive year this month's propagation column is devoted to special forecasts for both the Phone and CW contest weekends. The accuracy of the 39 previous contest forecasts is considerably in excess of 90%!

Stall Ended: Cycle 22 Drops

After being stalled at the 157/158 level for seven consecutive months, solar activity has taken a nose dive. Cycle 22 now appears to be on the decline.

The Royal Observatory of Belgium reports a mean sunspot number of 105 for June 1990. Daily values varied widely between a low of 57 reported for June 21st and a high of 224 for the 20th. This monthly mean value results in a 12-month running smoothed sunspot number of 154 centered on December 1989. The solar cycle is measured by this parameter. The latest figure represents a drop from the static 157/158 level of the past seven months. This could well establish that the present cycle is in fact declining, although there continues to be a debate about this among the experts.

There was a corresponding decrease in the level of 10.7 cm solar flux observed daily at the Algonquin Radio Observatory in Ottawa, Ontario. The mean level of 10.7 cm solar flux reported for June 1990 was 176. The results in a 12-month running smoothed level of 204 centered on December 1989.

High Solar Count Expected for 1990 Contest

The smoothed sunspot number for October and November 1990 is expected to be in the mid-130 range. A corresponding smoothed 10.7 cm solar flux level between the upper 180s and low 190s is expected. While these levels are lower than

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for September 1990

Propagation Index	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 7-8, 14, 26	A	A	B	C
High Normal: 1-2, 5-6, 12-13, 15, 21, 25, 29-30	A	B	C	C-D
Low Normal: 3-4, 9, 11, 16, 20, 24, 27-28, 31	A-B	B-C	C-D	D-E
Below Normal: 10, 17, 22-23	B-C	C-D	D-E	E
Disturbed: 18-19	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 S0 and S3, and with considerable fading and noise.

E—No opening expected.
3dB per S-Unit.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on Oct. 1 and 2, fair-to-good (B-C) on the 3rd and 4th, good (B) on the 5th and 6th, excellent (A) on the 7th and 8th, etc. Fair-to-good conditions are expected for the CQ World-wide DX Phone Contest weekend, October 27-28.

the 158 smoothed sunspot number and 206 smoothed solar flux level observed during the 1989 contest periods, they are still considered to be in the range of high solar activity.

A long-range CQ day-to-day forecast based primarily on the 27-day recurrence tendencies of geomagnetic, solar, and ionospheric conditions indicates a high probability that conditions during the CQ WW Phone Contest weekend of October 27-28 will be at least Low Normal, with a fairly good chance that they will climb to High Normal to many areas of the world. At the present time there doesn't seem to be any radio storminess likely during this weekend. An updated day-to-day forecast for the phone contest weekend will appear as a bulletin at the beginning of next month's column. The November issue of CQ should reach most subscribers before the phone contest weekend.

See the Last Minute Forecast box at the beginning of this month's column for additional information concerning expected day-to-day conditions for the entire month of October.

While HF propagation conditions during the 1990 contest period are not expected to be as good as they were during last year's contest, it may be difficult to detect much difference. Although solar activity is declining, expect another great contest period, as long as Mother Nature doesn't produce a surprise radio storm.

Band-By-Band Conditions

The following is a band-by-band summary of the DX propagation conditions expected from mid-October through mid-December, and centered on the 1990 Phone and CW contest periods.

10 Meters: Good, solid openings should be possible to almost every section of the world sometime during the *daylight hours*, with the band remaining open to southern and tropical areas well into the *early evening*. The band should open just *after sunrise* toward Europe, Africa, and the east, as well as in a southerly direction toward the Caribbean and Central and South America. Signals should peak toward Europe and the east an hour or so *before noon*, toward Africa about an hour or so *after noon*, and toward the south during the *late afternoon*. Optimum conditions toward the Far East, Australasia, Southeast Asia, etc., should occur during the *late afternoon* and *early evening*. Exceptionally strong signal levels can be expected on many 10 meter openings, particularly when conditions rise to High or Above Normal.

15 Meters: This should be the best band for DX during most of the *daylight hours*. Excellent propagation conditions are expected from shortly *after sunrise* through the *early evening hours*. The band may remain open as late as *midnight* toward southern and tropical areas. Expect signals to peak on 15 meters about an hour or so later than the peak on 10 meters from similar geographical areas.

20 Meters: This should be an *around-the-clock* DX band, with good openings possible to all areas of the world. Signals should peak from all directions for about an hour or two *after sunrise* and again during the *early evening*. Excellent openings

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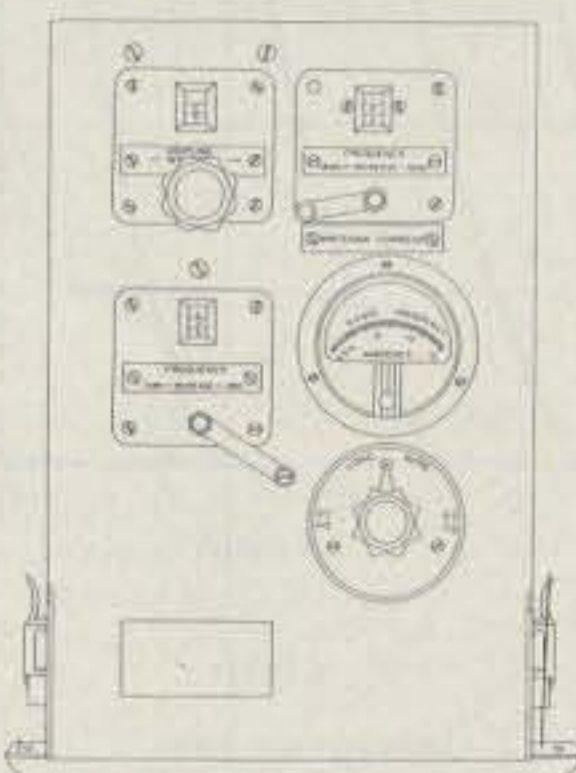
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CA-2X4SR	146 MHz 446 MHz	3.8dB 6.2dB	150W	3' 4"	MOBILE
CX-901	146 MHz 446 MHz 1.2 GHz	3.0dB 6.0dB 8.4dB	150W	3' 6"	BASE/REPEATER
CX-801	146 MHz 446 MHz 1.2 GHz	3.0dB 6.8dB 9.6dB	100W	3' 3"	MOBILE
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Time EST	Areas To Which DX Conditions Expected To Be Optimum
00-03	Europe, Africa, South Pacific & New Zealand, Australasia, Caribbean, Central and South America, Antarctica, Far East*
03-06	Western Europe*, Africa*, South Pacific & New Zealand*, Australasia*, Caribbean*, Central and South America*, Antarctica* (Good time to catch up on some sleep)
06-09	Europe, Central & South Asia, Far East, South Pacific & New Zealand, Australasia, Caribbean, Central America, Southeast Asia*, South America*, Antarctica*, Africa*
09-12	Australasia, Caribbean, Central America, Europe*, Africa*, Central and South Asia*, Far East*, South Pacific & New Zealand*, South America*
12-15	Europe, Caribbean, Central America, Africa* (Another good time for food and sleep)
15-18	Europe, Africa, Caribbean, Central America, South America*
18-21	Europe, Africa, Eastern Mediterranean & Middle East, Caribbean, Central and South America, Southeast Asia*, Far East*, South Pacific & New Zealand*
21-00	Europe, Africa, Eastern Mediterranean and Middle East, Central and South Asia, Far East, South Pacific & New Zealand, Caribbean, Central and South America, Antarctica, Australasia*

* Propagation index (2), all others (3) or (4).

Table 1—Sample 20 meter operating schedule for Eastern USA.

should be possible to many areas of the world during most of the *daylight hours* and throughout most of the *hours of darkness* as well. Expect *long-path* openings on this band for about an hour or so *after sunrise* and again for an hour or so *before local sunset*. Exceptionally strong signal levels should be noted during peak propagation periods. If you plan to operate on a single band during the contest, this should be the one to produce the longest period of DX, the strongest signals, and openings to more areas of the world than any other single band.

40 Meters: Good DX conditions are expected to most areas of the world on this band from the *late afternoon*, through the *hours of darkness*, and until *shortly after sunrise*. The band should open first for DX towards Europe and the east during the *late afternoon*. Signals should improve steadily as *darkness* approaches. During the hours of *darkness* expect good DX openings to most parts of the world. Signals should peak from an easterly direction about *midnight* and from a westerly direction just *after sunrise*. Excellent openings in a southerly direction should be possible *throughout the night*.

80 Meters: While not quite as good a *nighttime* DX band as 40 meters, expect relatively good DX openings on this band to many areas of the world during the *hours of darkness* and into the *sunrise period*. The band should peak toward Europe and the east around *midnight*, and toward the west just *prior to sunrise*. Expect good openings towards the south throughout *most of the night*.

160 Meters: Some DX openings should be possible during the hours of *darkness* and the *sunrise period*. The

band will be noisier than 40 and 80 meters, and signals considerably weaker, but look for some relatively good openings toward Europe and toward the south from the eastern half of the country and toward the south, the Far East, Australasia, and the South Pacific from the western half of the country. DX openings to other areas of the world may also be possible. A good propagation aid for determining DX openings on this band (and for 80 and 40 meters as well) is a set of sunrise and sunset curves, since DX signals tend to peak when it is *local sunrise* at the *easternmost* end of a path.

For a more detailed circuit-by-circuit forecast refer to the DX Propagation Charts appearing on the following pages. Instruction for the proper use of these charts is given elsewhere in this column.

Contest Work Plans

The DX Propagation Charts on the following pages show the times when each amateur band from 6 through 160 meters is expected to open from each of the continental USA time zones to the major areas of the world. The information contained in the charts can easily be reorganized into more convenient operating guides or schedules for use during the contest. For example, for multiband operation the charts will indicate the times when optimum conditions exist on each band. On the other hand, if you plan to operate single band, the charts will give you a good idea of what to expect throughout the day. Experience gained during previous contests has shown that such planning can be extremely useful in piling up

contacts and points with a minimum of wasted time.

Table 1 is an example of a *single band* schedule for 20 meters. It shows the times when propagation conditions are expected to be optimum to various areas of the world (propagation index 3 or 4, unless otherwise shown) for each three hour period throughout the day. An Eastern time zone location has been chosen for this example, but similar schedules can be devised for the other time zones, and for other bands and contemplated operating conditions.

The CQFCST computer program developed by Jack Baldwin, VE7RG, is ideal for rearranging the CQ DX Propagation Charts into work plans to meet specific operating habits. Other versions of Table 1 for use during the contest can readily be developed from this program. The program is available as shareware directly from Jack Baldwin at the following address: VE7RG, 2423 W. Tucana Street, Tucson, AZ 85745. Be sure to provide Jack with an MS-DOS formatted disk and IRCs for sufficient return postage.

Do-It-Yourself Forecasting

If you have a modem-equipped personal computer, you can obtain a wealth of updated daily summaries of solar and geophysical activity and a daily HF propaga-

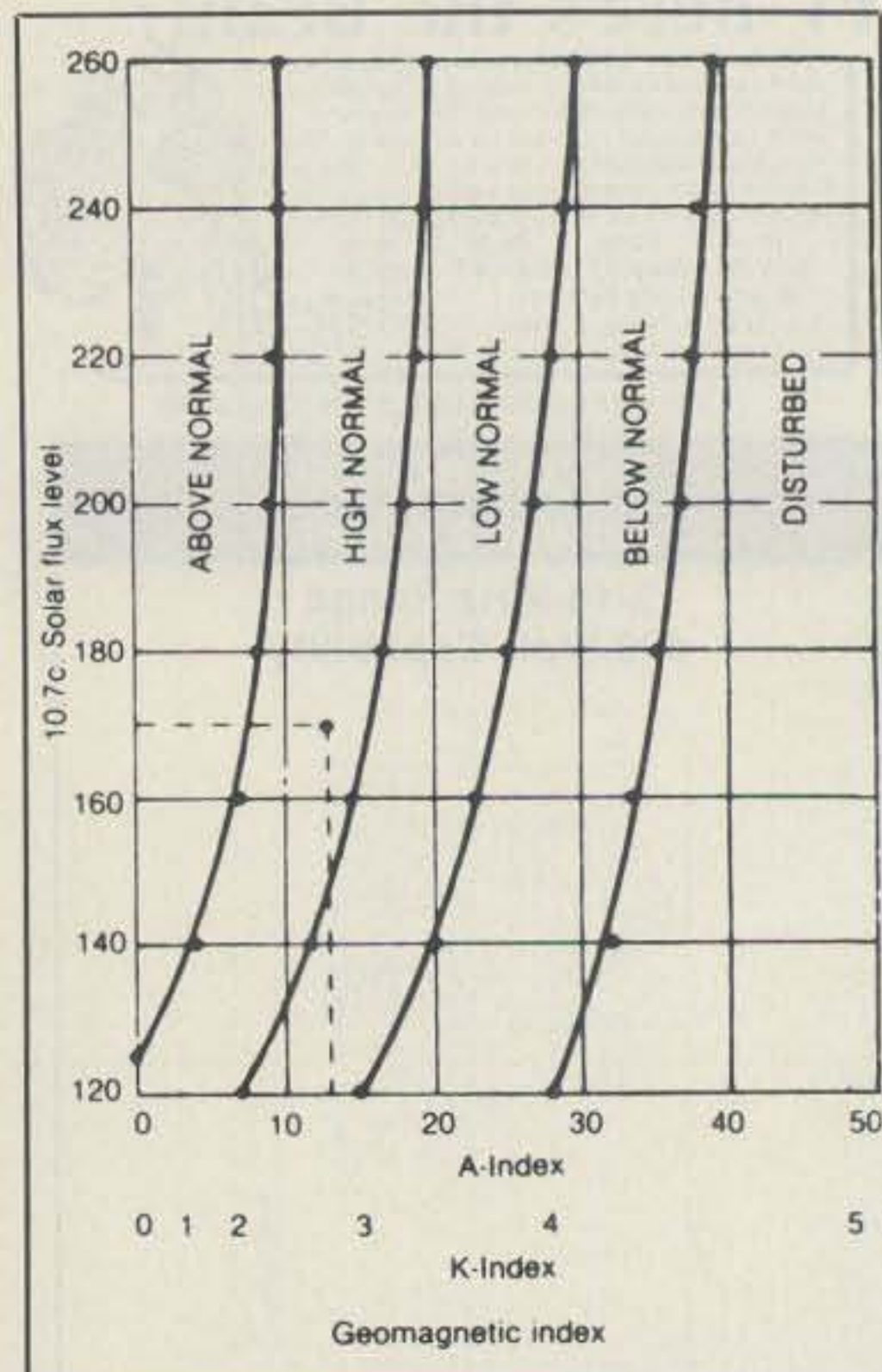


Fig. 1—Intersection of given values of solar flux and geomagnetic activity determine expected HF ionospheric propagation conditions. (Example: Solar flux is 170 and A-index is 13; expect High Normal conditions.)

tion summary and forecast (updated every six hours) directly from the NOAA Space Environmental Services Center (SESC) bulletin board in Boulder, Colorado. Information about a variety of other useful SESC services and products is also posted on the board.

The SESC bulletin board has recently been upgraded and is in operation 24 hours a day. Modem-equipped PCs can access the system at a new number (303-497-5042). Either 300, 1200, or 2400 baud can be used. Protocol is the standard 8-bit data word with one stop bit and no parity. There is no charge for the data that can be obtained from the SESC bulletin board, but the telephone call is not toll-free. The program is very user friendly and menu driven. A wealth of propagation data is available, including propagation and solar reports, solar and geomagnetic data, and MUF predictions.

Fig. 1 can be used with the updated values of geomagnetic activity (Ap or K figures) and the latest reading of solar flux available from SESC to determine real-time day-to-day conditions in terms of Disturbed, Below Normal, Low Normal, High Normal, or Above Normal. If you do not have a modem-equipped computer, the latest geomagnetic and solar flux levels can be obtained from National Bureau of Standards Radio Station WWV broadcasts at 18 minutes past each hour. These broadcasts are transmitted simultaneously on 2.5, 5, 10, 15, and 20 MHz. They contain the latest available geomagnetic Ap and K figures, as well as the 10.7 cm solar flux level and short-term forecast of expected conditions. The same information can be obtained at any time by calling 303-497-3235 (collect calls will not be accepted).

WWVH, located on the Island of Kauai, Hawaii, has resumed broadcasts of geophysical alerts at 45 minutes past each hour on frequencies of 2.5, 5, 10, and 15 MHz, with its signal audible throughout the Pacific Oceania area and farther into other parts of the world, depending upon radio propagation conditions. These augment the same alert broadcasts from WWV, which can be heard throughout the Western Hemisphere and other parts of the world as well. Both WWV and WWVH solar alert broadcasts are updated every three hours beginning at 0000 UTC, and they contain the latest information concerning geomagnetic and solar conditions, as well as radio-storm warning data. Alert data is also available at any time by calling the "on-duty forecaster" at SESC at 303-497-3171.

Several good computer programs are available for supplementing band-opening predictions contained in the CQ DX Propagation Charts appearing on the following pages. A simple-to-use program requiring no special graphics or color is MINIPROP.3™. This program, for use with an IBM-PC or clone, was written as

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

3. The propagation index is the number that appears in () after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

- (4) Opening should occur on more than 22 days
- (3) Opening should occur between 14 and 22 days
- (2) Opening should occur between 7 and 13 days
- (1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. Appropriate standard 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 c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-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 10dB 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.

Time Zones: CST & MST (24-hour time) CENTRAL USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	06-07 (1) 07-08 (3) 08-13 (4) 13-14 (3) 14-15 (1)	06-07 (1) 07-08 (3) 08-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	04-06 (2) 06-09 (4) 09-10 (3) 10-12 (2) 12-14 (3) 14-18 (4) 18-20 (3) 20-22 (2) 22-00 (1) 00-02 (2) 02-04 (3)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-23 (2)* 23-01 (3)* 01-02 (2)* 02-03 (1)*
Northern Europe & European USSR	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (3) 08-13 (4) 13-14 (3) 14-15 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-01 (3) 01-04 (2)	17-19 (1) 19-02 (2) 02-04 (1) 20-03 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-09 (3) 09-13 (4) 13-14 (3) 14-15 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-12 (1) 12-15 (2) 15-17 (3) 17-22 (4) 22-00 (3) 00-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 20-00 (1)*
Western Africa	06-07 (1) 07-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	04-05 (1) 05-07 (2) 07-14 (3) 14-20 (4) 20-22 (3) 22-00 (2) 00-01 (1)	03-04 (3) 04-06 (2) 06-13 (1) 13-15 (2) 15-17 (3) 17-03 (4)	18-22 (1) 22-01 (2) 01-03 (1) 00-03 (1)*
Eastern & Central Africa	07-08 (1) 08-09 (2) 09-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (3) 09-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-22 (2) 22-00 (1)	03-05 (2) 05-09 (1) 12-14 (1) 14-16 (2) 16-17 (3) 17-01 (4) 01-03 (3)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*

Southern Africa	07-08 (1) 08-10 (3) 10-14 (4) 14-16 (3) 16-17 (2) 17-18 (1)	06-08 (1) 08-11 (2) 11-13 (3) 13-16 (4) 16-18 (3) 18-20 (2) 20-22 (1)	06-09 (1) 11-14 (1) 14-15 (2) 15-17 (3) 17-21 (4) 21-02 (3) 02-05 (2)	18-19 (1) 19-22 (2) 22-23 (1) 19-21 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-20 (1) 20-22 (2) 22-00 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	18-21 (1) 06-08 (1)
Southeast Asia	10-12 (1) 12-14 (2) 14-15 (1) 17-18 (1) 18-20 (2) 20-21 (1)	09-10 (1) 10-12 (2) 12-13 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	02-06 (1) 06-09 (2) 09-11 (1) 18-21 (2) 21-23 (1)	18-20 (1) 05-07 (1)
Far East	08-10 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (1)	08-09 (1) 09-11 (2) 11-12 (1) 16-17 (1) 17-18 (2) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-04 (2) 04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 16-18 (1) 18-20 (2) 20-00 (3)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
South Pacific & New Zealand	09-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	08-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	13-19 (1) 19-21 (2) 21-22 (3) 22-02 (4) 02-04 (3) 04-07 (2) 07-10 (3) 10-13 (2)	00-02 (1) 02-03 (2) 03-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-12 (1) 14-16 (1) 16-17 (2) 17-18 (3) 18-19 (4) 19-20 (2) 20-21 (1)	07-08 (1) 08-11 (2) 11-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	07-08 (3) 08-10 (4) 10-11 (3) 11-12 (2) 12-14 (1) 17-19 (2) 21-23 (1) 23-00 (2) 00-01 (3) 01-03 (4) 03-04 (3) 04-07 (2)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (2) 08-11 (4) 11-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-13 (3) 13-20 (4) 20-21 (3) 21-23 (2) 23-01 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-02 (4) 02-03 (3) 03-06 (2) 06-07 (3)	18-19 (1) 19-21 (3) 21-04 (4) 04-06 (2) 06-07 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-09 (4) 09-11 (3) 11-15 (2) 15-16 (3) 16-20 (4) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	06-08 (2) 08-11 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-03 (3) 03-05 (2) 05-06 (3)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound Antarctica	16-17 (1) 17-19 (2) 19-20 (1)	15-17 (1) 17-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	16-18 (1) 18-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 07-09 (2) 09-10 (1)	00-06 (1)

October 15 - December 15, 1990 Time Zone: EST (24-hour time) EASTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1) 07-08 (3) 08-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-08 (3) 08-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	03-06 (1) 06-08 (3) 08-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-00 (1) 00-03 (2)	17-18 (1) 18-20 (2) 20-23 (3) 23-01 (2) 01-02 (1) 19-20 (1)* 20-23 (2)* 23-00 (1)*
Northern & Central Europe & European USSR	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-16 (3) 16-17 (4) 17-19 (3) 19-20 (2) 20-22 (1) 22-02 (2)	18-20 (1) 20-23 (2) 23-01 (1) 20-23 (1)*

shareware by Sheldon Shallon, W6EL, and produces a wealth of useful propagation data, including predictions for around-the-clock short- and long-path band openings between path terminals located anywhere in the world. The program also produces sunrise and sunset times, grayline times and bearings, and great-circle distances and bearings. A special feature of the program is the *DX Compass*, which for any location at a specific time will show the MUF in all directions at 30 degree intervals.

MINIPROP.3™ is well-prompted, self-explanatory, and easy to use. Details for its availability can be obtained directly from Sheldon C. Shallon, W6EL, 11058 Queensland Street, Los Angeles, CA 90034.

Base(2) Systems (2534 Nebraska Street, Saginaw, MI 48601) has produced a trio of very useful propagation programs. BANDAID™, for example, is intended for IBM and clone PCs, with color graphic cards. At the heart of the program is the propagation forecasting module, which makes it possible to predict band-opening conditions between any two points on earth. The result can be presented in either tabular or graphic form. Distance and bearings between stations are also provided, as are sunrise/sunset times and grayline data.

The program also includes several other very useful features such as a UTC time conversion table, a list of 10 and 20 meter beacon stations, a QSL databank, and a list of authorized amateur bands by class of license. The program also contains a world map that can be used to display the location of any station. The program is menu-driven, can be customized for your location, and is easy to use.

Base(2) Systems also produces a program called MUFLOT™, which is designed for use with Commodore and Apple II computers. While not as comprehensive as BANDAID™, it can be used for band-opening predictions.

The third Base(2) product, which was introduced during 1988, is called MUFMAP™. This is the most advanced propagation program that I have ever seen for radio amateur use. Its graphics are superb, and band openings are displayed on a world map in a manner previously only available in very advanced professional programs. It is also possible to produce a *MufMovie* with the program. This is a series of map-presented band openings in which solar flux, time of day, and date can be varied, and then presented frame after frame for comparison, much like a movie. Despite its being an advanced program, it is menu-driven and easy to use.

An updated version 3 of BANDAID™ has recently been released which is extremely user friendly, has pull-down and pop-up menus, and can be used with a mouse.

Eastern Mediterranean & Middle East	07-08 (1)	06-07 (1)	06-07 (1)	17-19 (1)
	08-09 (2)	07-08 (2)	07-09 (2)	19-22 (2)
	09-12 (3)	08-11 (3)	09-11 (1)	22-23 (1)
	12-13 (2)	11-12 (4)	11-13 (2)	20-22 (1)*
	13-14 (1)	12-13 (3)	13-16 (3)	
		13-14 (2)	16-18 (4)	
		14-15 (1)	18-20 (3)	
			20-22 (2)	
			22-00 (1)	
Western Africa	06-07 (1)	05-06 (1)	05-12 (1)	17-19 (1)
	07-11 (3)	06-10 (2)	12-15 (2)	19-21 (2)
	11-15 (4)	10-14 (3)	15-17 (3)	21-22 (1)
	15-16 (3)	14-18 (4)	17-23 (4)	19-21 (1)*
	16-17 (2)	18-19 (3)	23-01 (3)	
	17-18 (1)	19-21 (2)	01-05 (2)	
	21-22 (1)			
Eastern & Central Africa	07-09 (1)	06-07 (1)	06-14 (1)	20-00 (1)
	09-11 (2)	07-12 (2)	14-16 (2)	21-23 (1)*
	11-15 (3)	12-15 (3)	16-19 (3)	
	15-16 (2)	15-17 (4)	19-21 (4)	
	16-17 (1)	17-18 (3)	21-23 (3)	
	18-20 (2)	23-00 (2)		
	20-21 (1)	00-02 (1)		
Southern Africa	07-08 (1)	06-07 (1)	06-13 (1)	18-19 (1)
	08-09 (2)	07-10 (2)	13-15 (2)	19-21 (2)
	09-11 (3)	10-12 (3)	15-17 (3)	21-22 (1)
	11-14 (4)	12-15 (4)	17-20 (4)	19-21 (1)*
	14-15 (3)	15-17 (3)	20-23 (3)	
	15-16 (2)	17-18 (2)	23-02 (2)	
	16-17 (1)	18-20 (1)	02-04 (1)	
Central & South Asia	07-08 (1)	06-07 (1)	04-06 (1)	18-20 (1)
	08-10 (2)	07-10 (2)	06-07 (2)	06-08 (1)
	10-11 (1)	10-11 (1)	07-09 (3)	
	18-19 (1)	17-18 (1)	09-10 (2)	
	19-21 (2)	18-19 (2)	10-11 (1)	
	21-22 (1)	19-21 (3)	17-18 (1)	
		21-22 (2)	18-19 (2)	
		22-23 (1)	19-21 (3)	
			21-23 (2)	
			23-02 (1)	
			02-04 (2)	
	Southeast Asia	07-08 (1)	07-08 (1)	06-07 (1)
08-09 (2)		08-09 (2)	07-10 (2)	
09-10 (3)		09-10 (3)	10-12 (1)	
10-11 (2)		10-12 (2)	18-19 (1)	
11-13 (1)		12-13 (1)	19-21 (2)	
15-16 (1)		16-17 (1)	21-23 (1)	
16-19 (2)		17-18 (2)		
19-20 (1)		18-20 (3)		
		20-21 (2)		
		21-22 (1)		
Far East	15-16 (1)	08-10 (1)	04-05 (1)	02-03 (1)
	16-19 (3)	15-16 (1)	05-07 (2)	03-07 (2)
	19-20 (2)	16-17 (3)	07-09 (3)	07-09 (1)
	20-21 (1)	17-19 (4)	09-10 (2)	03-06 (1)*
		19-20 (3)	10-11 (1)	
		20-21 (2)	17-19 (1)	
		21-22 (1)	19-20 (2)	
			20-22 (3)	
			22-23 (2)	
			23-00 (1)	
South Pacific & New Zealand	09-12 (1)	08-11 (1)	11-17 (1)	23-01 (1)
	12-13 (2)	11-13 (3)	17-18 (2)	01-02 (2)
	13-15 (3)	13-16 (2)	18-20 (3)	02-07 (3)
	15-18 (4)	16-17 (3)	20-01 (4)	07-08 (2)
	18-19 (3)	17-20 (4)	01-03 (3)	08-09 (1)
	19-20 (2)	20-21 (3)	03-07 (2)	00-02 (1)*
	20-21 (1)	21-22 (2)	07-09 (4)	02-07 (2)*
		22-23 (1)	09-10 (3)	07-08 (1)*
			10-11 (2)	
			11-12 (2)	

Australasia	08-09 (1)	06-08 (1)	06-07 (2)	02-04 (1)	
	09-11 (2)	08-09 (3)	07-09 (4)	04-07 (2)	
	11-13 (1)	09-11 (2)	09-10 (3)	07-08 (1)	
	13-15 (2)	11-12 (1)	10-11 (2)	03-04 (1)*	
	15-16 (3)	16-18 (1)	11-12 (1)	04-06 (2)*	
	16-18 (4)	18-19 (2)	15-17 (1)	06-07 (1)*	
	18-19 (3)	19-20 (4)	20-22 (1)		
	19-20 (2)	20-21 (3)	22-00 (2)		
	20-21 (1)	21-22 (2)	00-04 (3)		
		22-23 (1)	04-06 (1)		
	Caribbean, Central America & Northern Countries of South America	06-07 (1)	05-06 (1)	06-07 (3)	18-19 (1)
		07-08 (3)	06-07 (2)	07-09 (4)	19-21 (3)
		08-10 (4)	07-08 (3)	09-11 (3)	21-03 (4)
		10-12 (3)	08-10 (4)	11-14 (2)	03-05 (2)
12-17 (4)		10-13 (3)	14-16 (3)	05-07 (1)	
17-18 (3)		13-18 (4)	16-00 (4)	19-21 (1)*	
18-19 (2)		18-19 (3)	00-02 (3)	21-02 (2)*	
19-20 (1)		19-21 (2)	02-06 (2)	02-05 (1)*	
		21-23 (1)			
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	06-07 (1)	05-06 (1)	04-06 (1)	19-21 (1)	
	07-08 (3)	06-07 (2)	06-08 (2)	21-01 (2)	
	08-10 (4)	07-09 (3)	08-14 (1)	01-03 (1)	
	10-14 (3)	09-13 (2)	14-16 (2)	03-04 (2)	
	14-17 (4)	13-15 (3)	16-18 (3)	04-06 (1)	
	17-18 (3)	15-20 (4)	18-00 (4)	21-05 (1)*	
	18-19 (2)	20-21 (3)	00-02 (3)		
	19-20 (1)	21-23 (2)	02-04 (2)		
		23-00 (1)			
McMurdo Sound, Antarctica	07-08 (1)	06-07 (1)	06-08 (2)	23-05 (1)	
	08-09 (2)	07-09 (2)	08-09 (1)		
	09-10 (1)	09-10 (1)	16-18 (1)		
	17-18 (1)	14-16 (1)	18-20 (2)		
	18-20 (2)	16-18 (2)	20-02 (3)		
	20-21 (1)	18-22 (3)	02-04 (2)		
		22-23 (2)	04-06 (1)		
		23-00 (1)			

October 15 - December 15, 1990
Time Zone: PST (24-hour time)
WESTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1)	06-07 (1)	05-06 (1)	18-20 (1)
	07-08 (2)	07-08 (2)	06-08 (2)	20-22 (2)
	08-11 (3)	08-10 (3)	08-10 (1)	22-00 (1)
	11-12 (2)	10-12 (4)	10-12 (2)	19-23 (1)*
	12-13 (1)	12-13 (2)	12-14 (4)	
		14-16 (3)		
		16-18 (2)		
		18-20 (1)		
		23-01 (2)		
Central & Northern Europe & European USSR	07-08 (1)	06-07 (1)	05-07 (1)	18-20 (1)
	08-10 (2)	07-08 (2)	07-09 (3)	20-22 (2)
	10-11 (1)	08-10 (3)	09-10 (2)	22-23 (1)
		10-11 (2)	10-14 (1)	19-22 (1)*
		11-12 (1)	14-17 (3)	
			17-19 (2)	
		19-23 (1)		
		23-02 (2)		
		02-03 (1)		
Eastern Mediterranean & Middle East	07-08 (1)	06-07 (1)	06-07 (1)	18-22 (1)
	08-10 (2)	07-08 (2)	07-10 (2)	06-08 (1)
	10-11 (1)	08-10 (3)	10-14 (1)	
		10-11 (2)	14-16 (2)	
		11-12 (1)	16-18 (1)	
			18-20 (2)	
		20-22 (1)		
		00-02 (1)		

More complete details and pricings are available directly from Base(2) Systems. MUFMAP™ and BANDAID™ are also available from Heathkit outlets.

Another excellent program which previously was only available for Commodore 64 and 128 owners, but which has also come out in an IBM-PC version, is the Super DX Edge™. In addition to calculating the MUF and great-circle bearings and distances between any two locations, the program gives a detailed graphical presentation of grayline conditions. It lets you see the shape and position of the grayline on keystroke command displayed on a high-resolution world map. At the same time you can see the area of the world in daylight and the part in darkness. If you do not have a computer, a slide-rule version of the DX Edge™ is available. This version calculates the grayline, but does not produce propagation band openings. For additional information and pricing data for both the Super DX

Edge™ and the DX Edge™, write directly to Xantek, P.O. Box 834, Madison Square Station, New York, NY 10159.

An excellent propagation program for Apple Macintosh computers is called Mac Trak™, which is also known as Satellite Helper™ as well as DX Helper. These programs present an hour-to-hour graphical presentation of Maximum User Frequency (MUF) versus time between any two points on earth. A MUF/map display depicts the areas of the world that are open for a particular band. The programs also contain a wealth of useful information for satellite tracking and DX hunting. Additional information and pricing for these programs can be obtained directly from MacTrak™ Software, P.O. Box 1590, Port Orchard, WA 98366.

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 Lee

Western Africa	06-07 (1) 07-08 (2) 08-11 (3) 11-13 (4) 13-15 (3) 15-16 (2) 16-17 (1)	05-06 (1) 06-07 (2) 07-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-10 (1) 10-14 (2) 14-15 (3) 15-20 (4) 20-22 (3) 22-02 (2) 02-03 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-08 (1) 08-10 (2) 10-14 (3) 14-15 (2) 15-16 (1)	06-08 (1) 08-12 (2) 12-16 (3) 16-17 (2) 17-19 (1)	06-14 (1) 14-16 (2) 16-22 (3) 22-23 (2) 23-00 (1)	18-21 (1) 06-08 (1)
Southern Africa	07-08 (1) 08-10 (3) 10-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-10 (1) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-19 (2) 19-21 (1)	06-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-01 (2) 01-03 (1)	17-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-19 (1)*
Central & South Asia	16-17 (1) 17-19 (3) 19-20 (1) 07-09 (1)	16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1) 07-09 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 16-17 (1) 17-19 (3) 19-21 (2) 21-22 (1)	17-19 (1) 04-09 (1)
Southeast Asia	08-09 (1) 09-10 (3) 10-11 (4) 11-12 (3) 12-13 (2) 13-14 (1) 14-15 (2) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-11 (3) 11-12 (2) 12-15 (1) 15-17 (3) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 19-22 (1) 22-01 (2) 01-03 (3) 03-06 (2)	02-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Far East	13-14 (1) 14-15 (3) 15-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (3) 15-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-23 (4) 23-02 (3)	23-01 (1) 01-05 (2) 05-07 (3) 07-08 (1) 01-05 (1)* 05-06 (2)* 06-07 (1)*
South Pacific & New Zealand	08-09 (1) 09-10 (2) 10-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	07-08 (1) 08-11 (4) 11-18 (3) 18-00 (4) 00-02 (3) 02-03 (2) 03-04 (1)	11-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 10-11 (2)	21-22 (1) 22-00 (2) 00-07 (3) 07-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	09-11 (1) 11-12 (2) 12-14 (4) 14-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	07-08 (1) 08-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-00 (4) 00-01 (3) 01-02 (2) 02-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1)	02-03 (1) 03-04 (2) 04-07 (3) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-06 (1) 06-07 (2) 07-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	06-07 (3) 07-09 (4) 09-10 (3) 10-13 (2) 13-15 (3) 15-23 (4) 23-01 (3) 01-06 (2)	18-19 (1) 19-21 (3) 21-02 (4) 02-05 (2) 05-06 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-13 (3) 13-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-13 (2) 13-15 (3) 15-20 (4) 20-22 (3) 22-00 (2) 00-01 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-23 (4) 23-01 (3) 01-03 (2) 20-22 (3) 03-05 (1) 05-07 (2) 07-09 (1)	20-22 (1) 22-04 (2) 04-05 (1) 22-04 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 19-20 (1) 20-22 (2) 22-23 (1)	06-07 (1) 07-09 (2) 09-12 (1) 14-17 (1) 17-20 (2) 20-23 (3) 23-01 (2) 01-02 (1)	16-18 (1) 18-20 (2) 20-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-10 (1)	00-05 (1)

* Indicates best time to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher. F-2 layer DX openings on 6 meters may occur at the same times and over the same paths shown with a propagation index of (3) or (4) under the 10 meter column. For 12 meter openings interpolate between 10 and 15 meter openings. For 17 meter openings interpolate between 15 and 20 meter openings. For 30 meter openings interpolate between 40 and 20 meter openings.

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Radio Storm

If Mother Nature should play a trick and produce a radio storm during the contest period, expect conditions to drop to Below Normal or Disturbed to many areas of the world, depending on the storm's severity. The storm's influence will generally extend outward from the polar regions, the more severe the storm becomes. Under storm conditions expect considerably fewer openings on 10, 15, and 20 meters, with weaker signals, increased fading, flutter fading, and higher noise levels. Paths passing through the polar regions and the upper latitudes are often more adversely affected than signals coming from mid and lower latitudes.

Conditions on 40, 80, and 160 meters are likely to become erratic as well. During certain types of storms conditions may actually improve at times for openings on all bands towards southern and

tropical areas, and on 40, 80, and 160 meters during the hours of darkness.

If a radio storm should develop, concentrate on working trans-polar paths on 10, 15, and 20 meters during the daylight hours. Check the 40, 80, and 160 meter bands for possible openings to some areas of the world during the hours of darkness.

VHF Ionospheric Propagation

Solar activity is now high enough so that exceptionally good DX openings can be expected on the 6 meter band during the hours of daylight. During October it should be possible to work stations in most areas of the world where this band is allocated for amateur use. Although the DX Charts contained in this month's column do not include the 6 meter band directly, 6 meter DX openings can be expected at those times and to those areas of the world where 10 meter openings are shown with a propagation index greater than 3. Generally speaking, check for openings from the eastern half of the USA

toward Europe and the east before noon, and toward Africa an hour or so after noon. Best chance for 6 meter DX openings toward the Caribbean and Central and South America from all areas of the USA should be during the afternoon hours. Look for openings toward the Far East, the South Pacific area, New Zealand, and Australasia during the late afternoon hours. These openings will favor stations located in the western half of the USA, but some openings should extend considerably eastward. There will be lots of DX surprises in store for the 6 meter band during the next six months, with a good chance for some new DX records to be established.

Trans-continental and 6 meter openings over shorter distances are also expected to increase dramatically during October and the fall, winter, and early spring months, with conditions likely to peak during the afternoon hours.

A major meteor shower, which could produce meteor-reflection-type ionospheric openings on the VHF bands, is expected October 20-22. Called *Orionids*, the shower should reach peak intensity at about 7 PM EST on October 21 with an hourly meteor count of about 25. Peaks in minor meteor showers are expected on October 3 and 12.

Auroral activity generally increases during October, and an increase in auroral-scatter-type VHF openings can be expected. There is also the likelihood for increased short-skip sporadic-E propagation resulting from expected auroral activity, particularly on 10 and 6 meters. The best time to check for such openings is when conditions on the HF bands are expected to be Below Normal or Disturbed, as shown in the Last Minute Forecast at the beginning of this column.

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CW Contest Forecast

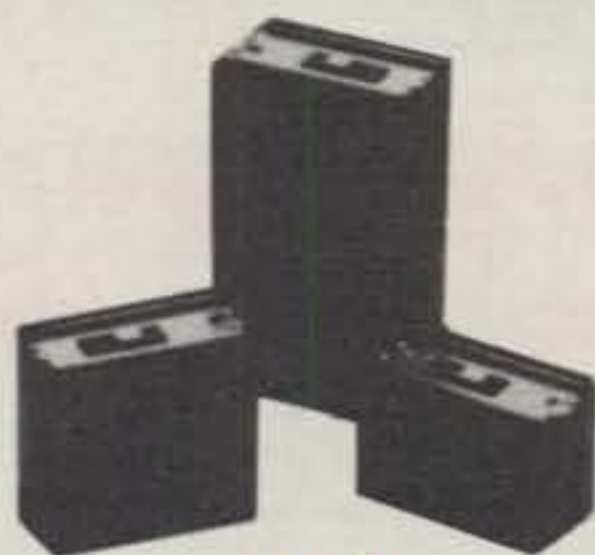
This month's DX Propagation Charts are valid for both the Phone and CW sections of the contest. Be sure to keep them handy for use during next month's CW section as well. Short-Skip Propagation Charts for use during October appeared in last month's column.

Experience from the past 39 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 1990 contest and the accuracy of these forecasts and predictions should be sent directly to W3ASK at P.O. Box 1714, Silver Spring, MD 20902. Good luck in the contest!

73, George, W3ASK

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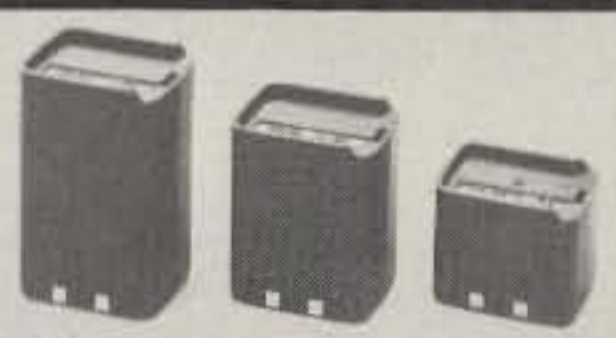
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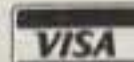
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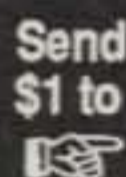


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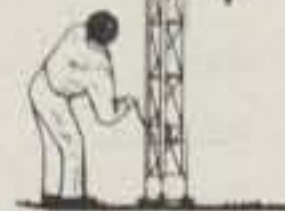
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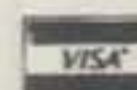


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NEWS OF COMMUNICATION AROUND THE WORLD

The Changing Face of the DX Century Club

On October 1, 1990 the American Radio Relay League will begin charging fees for many DX Century Club (DXCC) applications. According to the *ARRL Letter*, the purpose of the fees is to "encourage participants to send less frequent individual submissions to DXCC." In other words, the purpose of the new fees is to discourage more than a single DXCC application from a given DXer each year.

The DXCC program is extremely expensive for the ARRL. DXCC administrator Don Search, W3AZD, oversees five employees (one part-time) in the DXCC branch at ARRL Headquarters. In addition to the six employees in the DXCC branch, there are many other expenses related to the program, including the people who open the mail, the QSL bureaus, DX Advisory Committee correspondence, and much more. The work of the DXCC branch has increased dramatically in the past few years, especially with the addition of new single-band awards for 10, 40, and 80 meters. Despite the large number of people working on the program, the DXCC branch has continued to fall further and further behind in 1990, with the backlog of DXCC applications running more than four months in mid-1990.

The new fee structure should help reduce the backlog by cutting down the number of individual applications each DXCC member or hopeful submits each year.

Beginning October 1 each first-time applicant for DXCC will have to pay a fee of \$10 in addition to the usual cost of returning the QSL cards. (Anyone who already holds DXCC prior to October 1st will not be charged this fee.) Any ARRL (or CRRL) member will be allowed one free DXCC submission each calendar year (not including the first DXCC application). This submission may include any number of QSL cards, for any DXCC award or combination of awards. Any ARRL or CRRL member who sends in more than one application per year will be charged \$10 per submission. (Currently, ARRL or CRRL membership is required for DXCC applicants in the US and Canada.) Foreign DXCC applicants will be charged \$10 for their first DXCC appli-



Necdet Caglar, TA2AP, runs an ICOM IC-745 into dipoles and verticals on 10-40 meters. He thanks KB6LEA for getting the rig into Turkey for him.

cation each calendar year, and \$20 for any subsequent application. Again, each submission may include as many cards for as many of the DXCC awards as desired.

For the casual DXCC chaser, the only change under these new fees will be the one-time \$10 new-applicant fee. The dedicated DXer who is pursuing multiple DXCC awards will have to consolidate all DXCC applications into a single submission each year to avoid the \$10 charge.

These fees will not produce significant revenue for the ARRL, as most DXers will be content with the once-a-year free submission. However, they will help to reduce the number of individual DXCC applications, as DXers combine submissions. With any luck, this will help reduce the DXCC backlog, and DXers will see a faster turn-around on their applications.

The new fee structure is not the only change in the way the DXCC program is handled. Beginning in mid-1990 the ARRL started putting new, first-time DXCC applications on computer. In the future persons who request a copy of their DXCC record will receive a computer printout instead of the photocopy of the hand-written file as at present. There are no plans currently to put the thousands of previously issued DXCC files onto the computer, but this computer record will ultimately speed up DXCC processing.

Of even greater potential impact on the DXCC program is a study by the Membership Services committee of the League's Board of Directors concerning field checking of DXCC QSL cards. Most

award programs don't require that the actual QSLs or other confirmations be submitted to the award sponsor. The cards are checked by officers of radio clubs or selected agents. For example, the CQ award program has dozens of 'check-points' around the world for WPX, WAZ, and the other awards. (The 5-Band WAZ award is an exception; all cards for this award must be sent to K1MEM.)

The advantages of remote check-points are obvious. The valued QSLs never have to leave the hand of the DXer, who can carry the cards to a club meeting or convention for verification. This avoids the dangers of irreplaceable cards disappearing in the mail, and the frustration of having cards tied up for months in a backlog such as presently at the DXCC desk. The cost of the award application is less, as the applicant doesn't have to pay for the registered or certified mail both ways, which can cost from \$10-20. The ARRL currently accepts field checking of cards for many other award programs, such as Worked All States. However, the DXCC program has (almost) always required actual QSLs to be sent to ARRL Headquarters in Newington, Connecticut for direct inspection.

This requirement, coupled with careful scrutiny by the DXCC branch, has helped the DXCC program maintain its very high reputation. A DXCC certificate means that the DXer has confirmed contacts with stations in 100 or more DXCC countries. One seldom hears of faked cards or falsely obtained DXCC credits. Would the DXCC program be able to maintain this high level of trust and excellent reputation around the world if the QSL cards were not checked in Newington?

The combination of the large DXCC backlog, the increase in the number and variety of DXCC awards, and pure economics provide a very strong incentive for the ARRL to permit some kind of field checking of DXCC cards. One of the options being discussed is to identify some of the easier DXCC countries to work, and produce a list of 150 or so countries whose cards could be verified by selected DXCC checkers around the world. The first-time DXCC applicant could then provide 100 or more cards from countries on this "easy" list to the field checker, and have the application certified without the delay and expense of sending the cards to Newington. Any cards for

The WPX Program

Mixed

1463 IT9BCC 1465 JA1EL
1464 W3KH

SSB

2164 FD1OCN 2166 JE6LDS
2165 WB4ZGS 2167 OH3OJ

WPNX

259 N6WLF

Endorsements

Mixed: 450 IT9BCC, 500 IT9BCC, 550 IT9BCC, 600 IT9BCC, 650 IT9BCC, 900 IK2ILH, AA4LB, 1150 KJ3L, 1250 HA5NK, 1300 HA5NK, 1450 I2EOW, 1500 KS3F, 1550 SM6CST, 1950 W2FXA, 2250 IN3ANE, 2350 SM3EVR, 2800 N4NO, 2850 N4NO.

SSB: 350 WD8EOL, FD1OCN, JE6LDS, IT9SVJ, OH3OJ, IK4FNF, 400 WE8EOL, JE6LDS, IT9SVJ, OH3OJ, IK4FNF, 450 WD8EOL, JE6LDS, IT9SVJ, OH3OJ, 500 WD8EOL, JE6LDS, IT9SVJ, OH3OJ, W9GCH, 550 IT9SVJ, OH3OJ, 600 IT9SVJ, OH3OJ, KB8DAE, 650 OH3OJ, KB8DAE, 700 OH3OJ, 750 OH3OJ, 800 OH3OJ, 850 OH3OJ, 900 OH3OJ, 950 OH3OJ, I3ZSX, 1000 OH3OJ, JR4NUN, 1600 WE2L, 2100 N4NO, 2150 N4NO.

CW: 350 N2FKE, 400 N2FKE, 450 N5GFX, 850 KA1CLV, 900 K2PK, 950 K2PK, 1200 G3VQO, 1400 SM6CST, 2450 N4NO, 2500 N4NO, 2800 N6JV, 2850 WA2HZR.

10 Meters: G4MVA
15 Meters: K0BJ
20 Meters: UA9CGL, K0BJ, KC2FC
40 Meters: K0BJ, KA1CLV
80 Meters: G4MVA

Asia: K0BJ
So. Amer.: AA4LB
Europe: K0BJ, W9GCH

Award of Excellence Plaque Holders: DK5AD, WD1IC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, W8BYTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GO, VK9NS, DE0DXM, DK4SY, UR2**, AB9Q, FM5WD, I2DMK, W4BOY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, WB1LC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB00/G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YLW4, NN4Q, KA3A, VED7WJ, YB0TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ.

Award of Excellence Plaque Holders with 160 Meter Endorsement: VE7WJ, W9NUF, N4NX, VK9NS, DE0DXM, VE7IG, K9BG, AB9Q, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB00/G, F6BVB, W4BOY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, WB1LC, W1BWS, VE7WJ, K9QRF, NN4Q, W4UW, K9QRF, NN4Q, W4UW, NX0I, G4BUE, LU3YLW4, I4EAT.

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.



Mauro Pregliasco, I1JQJ, has worked 320 countries mixed and more than 200 on RTTY, as well as more than 100 on each of the new bands. His last contact for 5-Band WAZ was with KL7AF for Zone 1 on 80 meters.

computer program, the DXCC application could already be in the proper form to be added to the master DXCC database at ARRL Headquarters, eliminating the need to enter that information manually. The numerous award-tracking computer programs currently on the market could be easily adapted to produce the list in whatever form the DXCC desk required, as is presently done with the contest logs.)

Another option is to certify the first 100 (or 150) DXCC credits in the field, but require that *all* cards be sent to Newington for inspection at a certain level. That would make it easier for someone to earn the basic DXCC award, while ensuring that at higher, more competitive levels the award program maintained its historically high integrity. This option would eliminate the need to produce and maintain the list of the "easy" 150 DXCC countries, as well. W6CF, K6ITL, and League Vice-President KB6ZV are studying the issue. Send any comments or suggestions to them.

Meanwhile, DXers will continue to line up at DX conventions in front of the table manned by Don Search, W3AZD, who reviews DXCC endorsements at many such gatherings.

South Sandwich and South Georgia

Efforts continue toward a year-end major DXpedition to two of the rarest countries in DX: South Sandwich VP8 and South Georgia VP8. (See the DX column in the February issue of CQ for more details about these remote spots.) The team headed by Tony DeParto, WA4JQS, has reserved the ship "Indiana" for the 30-day trip from Chile to Port Stanley in the Falklands, and then on to South Georgia and South Sandwich. The ship alone will cost almost \$100,000, and that doesn't include the costs of getting the

operators and gear to Chile, nor the provisions needed on the islands themselves. The total cost of the trip will be well over \$150,000.

The plan calls for the ship to leave Chile on November 15, and sail for South Georgia from Port Stanley on November 18, with a November 22nd arrival at South Georgia. After dropping off the VP8SGI team, the ship will continue to Candlemas Island in the South Sandwich group, aiming to arrive around November 27. After about 10 days of operation on Candlemas as VP8SSI, the ship will go back to South Georgia, pick up the team of operators on that island, and return to Chile around December 15.

Kenwood is providing six complete HF stations to the DXpedition, and many other manufacturers, organizations, and individuals are providing additional assistance. However, the DXpeditioners are still looking for donations to make the trip a reality. Anyone interested in helping should send their donation to AA6BB.

The CQ WW SSB Contest

The CQ WW Contests provide an easy way for the DXer to work some additional countries or band-countries. Individuals and groups travel to rare (and not so rare) countries at the end of September, October, and November to operate from the

5 Band WAZ

As of July 1, 1990, 281 stations have attained the 200 zone level.

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

WB2P
F6BK1

The top 25 contenders for 5 Band WAZ are:

- | | |
|-----------------|------------------|
| 1. N4WW, 199 | 14. HA8XX, 199 |
| 2. UQ1GXX, 199 | 15. SV1JA, 199 |
| 3. W7OM, 199 | 16. K7UR, 198 |
| 4. SP9PT, 199 | 17. I8IGS, 198 |
| 5. K6YRA, 199 | 18. VE7DX, 198 |
| 6. K5UC, 199 | 19. W0PGI, 198 |
| 7. LA4HW, 199 | 20. SM6AHS, 198 |
| 8. PY7ZZ, 199 | 21. HA0MM, 198 |
| 9. DL9WW, 199 | 22. K1ST, 198 |
| 10. K0CS, 199 | 23. KB8DB, 198 |
| 11. KB0G, 199 | 24. ZS6BCR, 198 |
| 12. DJ7RD, 199 | 25. VE6OU/6, 198 |
| 13. ZS6BCR, 199 | |

669 Stations have attained the 150 zone level as of July 1, 1990.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Jim Dionne, K1MEM, 31 De Marco Rd., Sudbury, MA 01776. Applicants should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

countries not on the "easy" list would then be sent to Newington to count for DXCC credit.

(A side benefit of this type of system would be for the DXCC application to be submitted electronically, on computer disc. If the check-point had the proper

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The WAZ Program

Single Band WAZ

10 Meter SSB

359	VE7DX	361	K7ABV
360	VE3XN		

15 Meter SSB

344	SP1EYI	349	JE4DSA
345	VE3XN	350	F3TH
346	JH8JBX	351	JP1AOK
347	JA5SLM	352	WB2GOK
348	K0HQW		

20 Meter SSB

804	SP1JRF	807	KW7J
805	VE3XN	808	I6DOE
806	W6BDD	809	KB2DE

10 Meter CW

85	K7ABV	87	JE6LDS
86	KF2O	88	F3TH

15 Meter CW

186	VE3XN	187	K7ABV
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20 Meter CW

374	VE2GZ	376	VE3XN
375	W5USH	377	NZ7X

40 Meter CW

122	LA2QM	124	JA6PK
123	K7ABV		

All Band WAZ SSB

3580	K6QPZ	3590	TU2UI
3581	JA2BBH	3591	W6TKV
3582	G4XTA	3592	KD4YT
3583	W7LZG	3593	WB6GUX
3584	N8BSB	3594	K3CI
3585	W3MQF	3595	I2LXA
3586	KD4MM	3596	HK4HHG
3587	DL1OAO	3597	HK4DHR
3588	DJ4KP	3598	I3CRW
3589	DL6RA		

CW/Phone

6822	JH1XAP (CW)	6832	Y21XH (CW)
6823	PZ1AV (CW)	6833	DK3AX
6824	YT2IJ	6834	DF9ZO
6825	W7SX (CW)	6835	DL0FU
6826	WB9CIF (CW)	6836	WB9UQE (CW)
6827	KT2E (CW)	6837	N9AG (CW)
6828	WA6WHQ	6838	IK2ECP (CW)
6829	JR1YOZ	6839	11FY
6830	DJ6OR (CW)	6840	W4MLA (CW)
6831	DL1FU (CW)		

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Rd., Sudbury, MA 01776. 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 CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

other end of the pile-up in the contest. Especially on Sunday afternoon of the contest weekends, many of these stations are easy to work by even the most modestly equipped stations. This year the easiest of all the countries to work will probably be the Netherland Antilles PJ. A group of almost 100 Finnish amateurs and friends is planning what may be the largest contest effort ever from the island of Curacao.

PJ9W is the callsign of the SSB effort, and PJ9A will be on in the CW test next month. Between the tests, you will hear many PJ2/OH stations keeping the rigs warm. This RadioTeam Finland (RTF) effort includes 15 rigs and amplifiers, separate generators for each station (as the Curacao power company wouldn't be up to providing for their needs), and 28 antennas on 19 towers. The antenna farm includes two 3-element 40 meter beams, 20-element arrays on 15 and 10 meters aimed at Europe, and much more. Anyone who hasn't worked the Netherland Antilles by mid-November hasn't been trying.

Another station that will be active in the CQ WW SSB test is A61AD, from the United Arab Emirates. Don Greenbaum, WB2DND, who is QSL manager for Saeed, will be returning to the Middle Eastern country for the contest. Thanks to his computer logging program, Don is able to quickly confirm any contacts you make with A61AD.

There will be many more contest DXpeditions this season to islands in the Pacific, the Caribbean, and other locations around the world. The various DX newsletters will help you keep up to date on planned DXpeditions and QSL routes.

The Beginner's Corner: Timing Your Call

After every contest, upon their return home, stations operating from relatively rare locations hear the following lament from beginning DXers: "I called and called for hours, but you never came back to me." Why does this happen? Assuming that the beginner DXer has a good enough station to work stations more than 1000 miles away, the problem is most likely one of poor timing.

For the DX station to hear your signal, especially a weak signal, you must call when the DX station is listening and no one else is calling. Obviously, calling the DX station at the same time he or she is transmitting won't work, but one hears this all the time. Especially in contests, the DX station will establish a rhythm, a pattern of transmitting and listening. The DXer should time his or her calls at the same rhythm.

You can practice this without keying your transmitter. Simply speak or hit your key while listening to the pile-up, until you are in the same rhythm as the stations the DX operator is working. Then try your call on the air.

You can also improve your chances of working through the pile-up by listening closely to whom the DX operator is coming back. Sometimes the DX station is picking up the first callsign in the pile-up. The beginner can recognize this because the DX station is coming back to the first part of a callsign: "Whiskey Bravo Two

Charlie something, you're 5908." If after listening to the pile-up for a few minutes, the beginning DXer notes this pattern, he should try to time his call as close to beginning of the pile-up as possible. This is where the off-the-air practice to get into the rhythm of the DX station can really pay off.

On the other hand, the DX station may wait until the pile-up tapers off a bit before picking out a call. The beginner can tell this is happening because the DX station comes back to the tail end of the callsign: "Station ending in Hotel Oscar, you're 5908." If this seems to be the DX station's pattern, the DXer should slightly delay the call to catch the declining end of the pile-up. In either case the DXer should spend time listening to the pile-up, identifying which stations are successful, and what timing they are using. He should then spend more time off the air to pick up the rhythm of the DX station, and only then actually transmit. Then the beginner won't complain that he spent hours and hours calling without success.

And the Winner Is . . .

The winner of the QSL card design contest announced in the June issue is Earle White, KZ6W. Earle's card is a W4MPY

CQ DX Awards Program

SSB

1783	K2TQC	1787	WB7VUB
1784	KM4BS	1788	W5XQ
1785	IT9SVJ	1789	YC2OK
1786	YV5CWO		

CW

798	AA5NN	800	IK8DDY
799	IT9VDQ	801	JH2TPI

SSB Endorsements

320	VE3XN/324	310	IK8CNT/310
320	DL9OH/324	300	WB5TED/307
320	ZL3NS/323	300	W5LLU/306
320	K6YRA/323	300	W8YTM/303
320	N7RO/322	300	VE3DLR/302
320	VE2WY/322	300	N6CGB/302
320	K6JG/322	300	VE4AT/300
320	TI2HP/322	275	I4CSP/289
320	K2TQC/320	275	VE2GHZ/285
320	VE7DX/320	275	W5XQ/280
320	K9BWQ/320	200	IT9SVJ/222
310	G4CHP/319	200	WB4UHN/200
310	YV5CWO/318	150	KM4BS/183
310	W6NLG/313	150	KD5ZD/153
310	IK8BQE/311	28 MHz	WB7VUB

CW Endorsements

320	K6JG/323	275	W8YTM/297
320	SM3EVR/320	275	IT9VDQ/294
310	W7CNL/310	150	JH2TPI/164
300	K9BWQ/309	3.5/7 MHz	JH2TPI
300	F3TH/300		

Total number of active countries is 323. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

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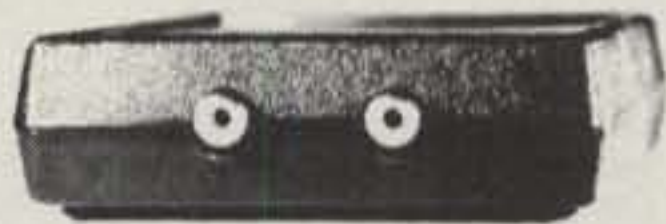


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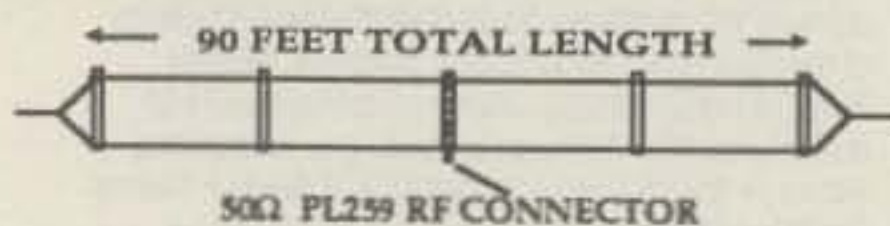
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3879	YU2AA	2197	YU7BPO	1718	SM6DHU	1293	YU3NU	1036	VE3NUP
3658	F9RM	2190	IN3ANE	1695	N6JM	1290	YB0TK	1020	YU1PJ
3415	K2VV	2181	4X4FU	1682	W8UMR	1285	I0AOF	987	ISZTC
2978	YU2TW	2181	KA5W	1680	K2POF	1276	YU7DR	966	YU3PG
2871	VE3XN	2176	SM7TV	1676	YU2TY	1242	JA6GWU	960	K1BAZ/DV1
2864	K6JG	2146	PY4OD	1666	WE2L	1241	YU1GR	943	K9BQL
2846	EA2IA	2116	IT9TQH	1665	K9LJN	1239	K7CU	939	W9IAL
2758	N4NO	2107	K9BG	1623	K8LJG	1228	AI6Z	917	YB0EMJ
2750	W4BQY	2102	N6CW	1564	K9QFR	1224	NE6I	909	NX9H
2724	K6XP	2077	I1EEW	1559	K2OLG	1202	JA1WJ	858	IK2BHX
2720	N6JV	2064	I2UIY	1557	YT7WW	1201	NV9S	816	N6IBP
2656	PY1APS	2059	W9NUF	1555	W6OUL	1190	PY2DBU	806	RB5MP
2611	N4MM	2041	I2MQP	1545	YU2CQ	1187	VE7EIK	798	JA7XBG
2571	WA8YTM	2039	K5UR	1511	SM6CST	1184	F1HWB	797	F6CDJ
2558	W9DWO	2027	YU2NA	1510	KB0G	1172	DF4ZL	781	NJ1T
2527	N9AF	2025	HA0DU	1501	WB8ZRL	1168	LZ2JE	776	W4WKQ
2472	I2PJA	1955	IT9QDS	1473	I2EOW	1158	WD9IIC	774	W6LC
2436	YU1AB	1935	W0SFU	1450	4N7ZZ	1157	K3UA	748	W4USW
2344	YU7BCD	1880	KF2O	1445	LA7JO	1147	KI3L	734	YU7FT
2317	SM3EVR	1851	SM0AJU	1402	AC2J	1136	YU7RU	711	WK0B
2264	N2AC	1834	HA8XX	1370	HA0IT	1130	KS0Z	661	IK2BLA
2243	PA0SNG	1812	W2FXA	1351	VE1RJ	1126	WB3DNA	650	WM0G
2237	YT7DX	1800	KL7AF	1345	W9IL	1115	I2EAY	638	DL6UO
2225	I8YRK	1765	W4UW	1338	GM4OBK	1098	5H3RB	638	5Z4BH
2217	I6SF	1740	I2DMK	1304	DF6EX	1036	G4SDJ	600	VE3OMM
2206	YU7SF	1737	N6AW						

SSB

3589	F9RM	1876	YU7BCD	1455	KD9OT	1097	AG2K	875	NE6I
3383	I0ZV	1859	WA4QMQ	1453	K9QFR	1084	DK5WQ	862	KB0G
2955	K2VV	1843	I1EEW	1424	PY4OD	1074	KB0C	850	IT9ONV
2861	ZL3NS	1805	KA5W	1402	AC2J	1072	I8LEL	834	K9BQL
2669	K2POA	1801	WF4V	1400	KL7AF	1063	WA2FKF	806	K3UA
2640	VE1YX	1795	EABAKN	1397	LU8ESU	1059	I2WZX	805	KB2DE
2593	K6JG	1757	I2UIY	1394	CT1BY	1044	K2POF	798	KA0ZFX
2478	I2PJA	1741	K5UR	1359	I2TZK	1041	K8LJG	797	LU8DWN
2429	WD8MGQ	1712	W3ARK	1356	KK0L	1029	YB3CEV	792	AI6Z
2420	K6XP	1690	HA8XX	1338	IK5ACO	1029	G4SDJ	776	5Z4BP
2370	N4MM	1676	EA3AQC	1302	I1POR	1028	W0ULU	775	KB4HU
2349	I0AMU	1650	W4UW	1246	N6FX	1017	EATAK	758	HR1FC
2303	W0YDB	1646	G4CHP	1243	CT1AHU	1002	IK2DUU	750	K8MDU
2232	CT4NH	1626	W9NUF	1242	KE6KT	1001	W3GXX	749	EA3FHT
2169	14ZSQ	1608	KF2O	1234	K9LJN	997	IT9JKY	744	IK0EIM
2110	N4NO	1590	CT1FL	1225	EA2AOM	995	IK7DBB	702	IK2AEO
2097	W4BQY	1587	YU2NA	1221	N2AC	989	WN5MBS	698	A41JV
2073	ZP5JCY	1572	EA4KK	1218	CX6BZ	989	KS0Z	697	A4XJV
2037	WA8YTM	1554	I5ZJK	1214	YU7SF	959	WB6GFJ	696	IK7BDN
2034	EA2IA	1543	WE2L	1205	YV1CP	941	W6OUL	676	NM5Y
2004	OZ5EV	1535	I8KCI	1195	AB9O	940	K3IXD	662	KA5YCM
1993	I2MQP	1525	PY4OY	1186	IK8GCS	934	I3ZSX	650	I6KYL
1976	PA0SNG	1524	K5RPC	1184	F1HWB	925	N6CGB	643	EA3EQT
1965	I8YZP	1521	KC8YM	1176	WB8ZRL	915	WB6SRK	631	KA5RNH
1937	NJ0C	1507	CT4UW	1174	HK6BER	909	W5ILR	630	SM6CST
1933	I8YRK	1482	G4CPJ	1169	SM6DHU	908	CT1DIZ	628	KF7RU
1932	I4CSP	1479	XE1OX	1153	PY4VX	904	KC2FC	612	K1BAZ/DV1
1917	IT9TQH	1474	I2EOW	1136	KC8CC	883	GM4OBK	612	KA9MOM
1878	W9DWO	1464	SM0AJU	1106	I8WYD	878	HA0IT	602	K5HT

CW

2803	K2VV	1630	VO1AW	1274	SM0AJU	1096	DL2HBX	845	NE6I
2779	WA2HZR	1611	K5UR	1266	I7PXV	1088	HA8XX	838	JJ1FSK
2700	N6JV	1609	W9NUF	1255	YU3NU	1078	AK9Z	830	YU2GIJ
2579	ON4QX	1586	I1ZEU	1240	F6HKD	1052	ZS6BCR	826	G4MVA
2412	N4NO	1546	IT9VDO	1234	KF2O	1039	SM5DAC	813	JA2GCW
2361	VE7CNE	1520	VE7DP	1203	I8YRK	1024	NN4Q	803	W0JIE
2206	W3ARK	1517	DJ4XA	1194	OK1CZ	1012	NF5Z	762	YU1PJ
2149	EA2IA	1515	N4YB	1188	G4SSH	1008	HA5LZ	757	W9IAL
2146	W4BQY	1506	KA7T	1184	KB0G	1004	OZ5UR	754	K1BAZ/DV1
2142	K6JG	1504	JH3CXL	1183	G3VQO	993	VE4CE	753	NJ1T
2116	W9DWO	1479	KA5W	1181	YU2CQ	985	AI6Z	744	IS0FIC
2088	YU7SF	1444	I2DMK	1177	G4UOL	972	GM4OBK	704	K8UXO
2042	I1YRL	1394	SM6CST	1177	LA9XG	965	I2EAY	700	WE2P
2034	K6XP	1374	I2UIY	1166	SM6DHU	938	K3UA	699	IK2ECP
2030	N2AC	1371	K9LJN	1150	DJ1YH	917	EA1AK	687	RB5MP
1965	I6SF	1349	KL7AF	1145	W8IQ	907	N4RNR	648	W4UW
1933	4X4FU	1346	N6FX	1134	N2AIF	879	N4IR	623	WB5MTV
1925	WA8YTM	1334	K2POF	1128	W6OUL	878	WB8ZRL	618	PY4WS
1868	YU7BCD	1326	YU2NA	1128	HA0IT	869	KA1CLV	610	AH6JF
1857	LZ1XL	1322	VE1ACK	1127	EA7OH	860	VS6UW	603	KA9EZM
1855	IT9TQH	1307	T14SU	1126	G3EZZ	857	YU3PG	600	4X6DX
1848	PY4OD	1292	W9PWM	1123	K8LJG	847	I1EEW		
1735	N4MM	1285	W1WAI						

Say You Saw It In CQ

KZ6W

EX: VK4DX, VK8DX, VP1EW, WA6UZB

CONFIRMING QSO WITH	DATE			UTC	MHz	RST	2-WAY
	DAY	MONTH	YEAR				

XCVR: KENWOOD TS-930S, HW-2036
 LINEAR: HENRY 3KA
 ANTS: 5 EL 3/4 YAGIS ON 15M, 20M (AT 84 FT & 74 FT.)
 5 EL DRIVEN/PARASITIC ARRAY ON 40M (AT 60 FT)
 VERTICAL AND WIRE ARRAYS FOR 10M, 80M, 160M
 2X15 YAGI STACK FOR 2M (AT 92 FT.)

EARLE WHITE
 14095 Christopher Robin Way
 Grass Valley, CA 95945 U.S.A.
 (NEVADA COUNTY)

HIGH IN THE WOODS ABOVE GRASS VALLEY AND NEVADA CITY IN THE SIERRA MOUNTAINS, KZ6W CAN BE HEARD "WORKING THE RARE ONES" USING HIS SECRET WEAPON: DX HOUND DOG "TOBY", WHO TRACKS THE SCENT OF RARE DX. WRITER, BLUEGRASSMUSICIAN, AND PUBLIC BROADCASTER "BROTHER EARLE" CAN ALSO BE HEARD REGULARLY ON KVMR FM 89.5 IN NEVADA CITY.

PSE QSL TNX QSL A W4MPY QSL



The winning QSL card design from KZ6W, and Toby, the DX hound.

KØBJ

The SANTA FE TRAIL

ROAD OF COMMERCE AND CONQUEST
 1821 - 1880



BRUCE J. FRAHM
 COLBY, KANSAS
 THOMAS COUNTY

KØBJ KANSAS CENTRAL USA

TO RADIO	QSO DATE	TIME	RST	MHz	MODE	QSL PSE TNX
			z			

73, BRUCE J. FRAHM KØBJ
 P O BOX DX COLBY, KS 67701 U S A

other calls held - KZ5BU VK2BZJ VP1RY VR6BJ V3BJ Y38BJ ZF2CM ZLØADB
 5W1BY 3Z4YN WNØTAS WAØTAS KØBJ/ - CEØA C6A EA7 G4 HCZ
 H44 KH6 KHR OH1 VEB 3D2 MMr 1, 2, 3
 guest opr. - BV2Ø CK8MB HSIWR JA3RL NN3SI OH1AI OH7C VE7EXPO
 VP1ØA W1AW WA4KFS W6RO WØQQQ XE1NCC YØØSEA ZS6ANE 1NP
 9M2FK 9M2MW 9N1MM 9V1CI

I live 6 km. west of Colby, a town of 5000 on the flat High Plains of western Kansas. Indians, pioneers and Spaniards once traveled here; now we produce cereal grains - wheat and corn to feed the world.

Honorable mention in the QSL card design contest goes to KØBJ.

style with the callsign and photo on the front, but repeated on the back so that the DX station or QSL manager doesn't have to flip the card over. The card also provides some personal information, lists equipment and antennas, and includes previous callsigns and county of operations. Congratulations to KZ6W.

Honorable mention in the contest goes to Bruce Frahm, KØBJ, whose unique card provides a glimpse into life in Kansas, while including many of the features above. And thanks to the dozens of DX-ers who sent in their cards for the contest.

QSL Notes

The QSL manager for **ZC4CZ** is G4SSH. Operator Glynn Burhouse used that call from March 1984 to March 1987, and again since December 1989. He operated as **ZC4HMS** in 1985.

P29CG now QSLs via new manager Ron Lewn, N9FIV. Previous manager WB9SVK will forward all cards and requests to Ron, so don't send duplicate requests. Ron can be reached via Compu-Serve at 76376,2567.

Steve Hodgson, **ZD8LII**, says to QSL direct to P.O. Box 2, Ascension Island, South Atlantic.

Luis Marques G., **YV5LMG**, handles QSL duties for **YY5M**, **YW5LR**, and

YY5LB. Luis's address is POBA 377, Box 521308, Miami, FL 33152 USA.

QSL **JG6CVO/JD1** on Ogasawara to operator Kenichi Matsumoto, 511 Funajima, Ueki-Machi, Kamoto-gun, Kumamoto 861-02, Japan.

QSL **JN1BPM/JD1**'s Ogasawara op-

eration to Hideki Suzuki, 12-6 Tenra, Ota, Gumma 373, Japan.

Alexander (Sandy) Belousov, **RV3GJ**, says he is not getting cards via the bureau for his **UG/RV3GJ** Armenia operation in 1989. Try direct to Sandy at Box 8, Lipetsk 398000, USSR.

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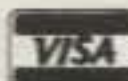


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M, T, W (9-6)
 Th, F (9-8)
 Sat (9-3)

The July 1989 operation of **RZ6AWL/UF60** can be confirmed via UW6DR, P.O. Box 11, Armavir 352900, USSR.

Bob Preston, W7TSQ, reports that his **YB3ASQ** QSL card is over-sized. Send a business-sized SASE to receive an unfolded card. Address: 809 Cary Road, Edmonds, WA 98020.

QSL the June 1990 SSB DXpedition to Belize as follows: **V31SQ** to K5TSQ, **V31KA** to KB5LVH, **V31VX** to W5VX, and **V31RR** to WN4KKN. Note that **V31BB** is now a Silent Key. No word yet if anyone will handle his outstanding QSLs.

Dick Barnes, **S79D**, recently left the Seychelles after 20 years. His new QSL route for S79D is c/o Ford Aerospace Corp., NAVSUPFAC, Box 55, FPO San Francisco 96685. Dick is currently operating as **VQ9RB** and new QSL manager Ed Blalack, WA4DPU, can confirm his contacts since May 1990. Ed's **new address** is 147 South View Drive, Huntsville, AL 35806. (VQ9RB is a re-issued call, and Ed doesn't have earlier logs.)

QSL Jacques Quillet's Tromelin operation as **FR5ZU/T** to 1 Cite Meteorique, 97490 Saint-Colotilde, Reunion Island, via France.

QSL Doctor Abdelkrim Bendriss, **7X2AX**, to P.O. Box 1, El-Abjiba 10160, Algeria.

Douglas Donley, KG4DD, has taken

QSL Managers

388DB to NA5U
3D2XV to VK2BCW
4K30DX to RA10A
4K4/UZ4KWJ to UA9KM
4K400 to RA10X
4S7CF to 9V1JY
5V7RF to NC6A
5W1KY to WA3HUP
601YN/JI to F6AJA
6W10F to DK3NP
701AA to 9K2CS
7Q7RM to K6KII
8J90XPO to JA3RL
9H3KE to PA0PAN
9H3MS to PA2HEM
9K2IC to 9K2YA
9L1US to WA8JOC
9Q5SL to DL8DF
A61AD to WB2DND
AK1RA to VP2E
BV2DA to DL7FT
C6AFR to K4MOG
CE0MTY to CE0ICD
ED9CI to EA9KQ
EG8CAC to EA8ZX
EM7BKR to UB4KWA
EN3A to RW3AG
E09AAM to UA9AQN
E09AQ to UA9QCC
ER2Q to UQ1GWW
ES10D to UR2QD
EU9A to UC2ADX
EV4AW to UA4WE
EW8A to UC2AHZ
EX8S to UA0SAU
F1LZN/TR8 to FF6KGU
F2JD/CE6 to F6AJA
F65BP to KA3DSW
FK8GJ to F6CXJ
FO8IGS to F6EEM
FO8SST to AA6LF
FT4XG to FD1AAS
FT5XA to F6ITD
FT5XH to F6GYV
FY5FO to F6BYZ
GU8ALD to GU4GNS
H44AP to WA2NHA
H44RW to ZL1AMO
HK8BKX to WB9NUL
HL9KL to KA6V
HS8AC to WA4BCQ
HV3SJ to I0DUD
HW2C to F2CW

HY6JUN to FF1DFW
I2YSB/190 to I2YSB
I90/18NHJ to 18NHJ
IQ5AP to IK5HHA
IX2A to I2YAE
IY4FGM to IK4IKW
IZ8MR to I0JBL
J3/N5XX to N5XX
J39BS to WB2LCH
JH1MA0/JDI to JA1GUC
JX7DFA to LA2KD
JY9SR to W3FYT
K2ZJ/HZ to K2ZJ
KA2IJ to WB3EXR
KG4GD to WD4GDQ
LA/FF1PGG to FF8OU
OD5MM to HB9CYH
OH2AP/OJ8 to OH2AP
OM7LO to OK3LO
OM7MB to OK3MB
P29BT to N5FTR
P29PL to VK9NS
PJ2/OH6NU to OH6NU
PY8FF to W9VA
R1ATM to UZ1TWW
R4FA to UA3RF
RB8RB5EX to RB5EX
RB5FF to OK3EY
RB9R/RB5SQX to RB5QX
RC0A/UC2W0 to UC2W0
RD70DWW to UD8DWW
RH8E to UH8EA
RT8U to UT4UWV
RT8UD to RT5UO
RU3Y/UJ8JW to RA3YF
RW2F/RA3YF to RA3YF
S79VD to OH5VD
SM80IG/YN to SM8KCR
SV1ACL/8 to SV1YH
SV9/DL6RAI to DL6RAI
T20AA to N4FJL
T30JH to VK2GJH
TA5KA to HA0NNN
TJ1RK to AH6HQ
TM2X to F2VX
TU2UI to WA8ZWR
U5WF to RB5WA
UA8QT/UA8K to UA0KBZ
UC9C to UC2ACH
UC9C/RC2AR to RC2AR
UD6DKW to W3HNC
UF6FJ to UF6FFF
UJ5K to UJ8JCO
UL8PA to W2ZWW

US1A to W1AF
UX3XR to OZ3PZ
V31JP to K0GHK
V310A to W4IBS
V47KTG to AI6M
V73AT to K2QL
VE8YQ to KA1JC
VK9EW to W5EW
VK9TR to VK5FG
VP2E/G4JVG to G4JVG
VP2EXX to KG8JH
VP2MAM to VE3IKM
VP2MO to WB2LCH
VP5P to WN5A
VP88XX to W9ARV
VP9SS to N6SS
VQ9AN to K1VUD
VR6MW to NZ9E
VU20RE to W8FI
XE1L to WA3HUP
XT2PS to DL1RH
Y22QE/RC60 to Y22QE
Y90ANT to Y21RO
YC4GDZ to YB4FNN
Y03CD to KY0A
Z21BA to N5FTR
Z21KA to NM7K
Z08GT to WB6VPS
Z08Z to W6CF
ZK1TB to W7TB
ZK3EKY to WA3HUP
ZP1000EA to ZP5AA
ZS10JUN to ZS6TJ
ZS9A to ZS1IS
ZX5WKE to PY5AKW
ZY8TK to PS7KM
ZY8TW to PT7AA

Direct QSL Addresses (add country name if not given).

4S7KG to P.O. Box 80, Columbo
5N6ZHM to P.O. Box 66, Jos
6V1A to P.O. Box 971, Dakar, Senegal
7P8EB to Richard Atherton, Box 1668, Maseru, Lesotho
9K2KS to Box 3181, Safat, Kuwait
9Q5AA to Amer. Embassy, APO NY, NY 09662
9V1YC to Box 1265, Singapore 9117
BV2AB to Box 93, Taipei

C30EJA to Box 1713, Limoges 87025 France
CE8DFL to P.O. Box 7, Easter Island
E85AAK to Box 1778, Palma
EN8TJ to Box 19, Sevastopol 335038
E03ATD to Box 90, Dzerjinsk 606029
ES2WX to Tom Kull, P.O. Box 13, Viimsi 203006 Estonia, USSR
ES3XV to Box 88, Moscow
FG5ED to Box 444, Guadeloupe Island
FO/JA1CMS to Box 16, Ebina
FP5DX to Box 4204, Saint Pierre & Miquelon
FY4FS to Box 60, St Launet 97320
N6TRE/HZ to Rick, American Embassy, Riyadh, APO, NY 09038
RH880 to Box 19, Drasnovodsk 745000
RZ8T/UA4FDS to Box 555, Penza 440061
TA3D to Box 963, Izmir
UB9R/RB5AA to Box 8, Sumy 244014
UD70GF to Box 169, Baku
UL8M/UZ9SW0 to Box 7, Orsk 462401
V31MI to 177 Fourth Ave., Corozal CA Belize
V51P to P.O. Box 9080, Windhoek, Namibia
VS6WS to Scott, Box 1373, Hong Kong
W88MX/KH2 to P.O. Box 20921, GMF, Guam 96921 USA
XF3R to Box 1, Cancun Island, Mexico 77505
YC9CB to Box 1040, Denpasar, Bali Island, Indonesia
ZD7DP to Box 86, St. Helena Isle, South Atlantic Ocean
ZD8LI to Steve Hodgeson, P.O. Box 2, Ascension Island
ZD8PJ to P.O. Box 3, Ascension Island
ZS8MI to P.O. Box 13077, Jacobs 4026 RSA



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over the Guantanamo Bay QSL bureau, and is forwarding cards to the proper personnel. To speed QSLing, you may QSL these KG4 stations as follows:

KG4TM—Box 73, FPO NY 09593

KG4SM—via WFG

KG4RN—1764 Bay Ilse Dr., Point Pleasant, NJ 08742

KG4FB—NFBC

KG4JO—WI2T

KG4XO—KH6XO

Doug can supply routes for other KG4 stations; send your inquiry with an SASE to him at Box 692, FPO Norfolk, VA 23593.

A61AD's QSL card is over-sized. Send a business-sized SASE to manager WB2DND.

Kappy Kaplan, WA4WTG, handles QSLs for **9M8MG** and **9M8PV** as of April 1, 1990. SASE to 718 SE Three Lane, Dania, FL 33004.

Jon Ferrara, KJ4GK, assumed the QSL chores for **A41JV** as of July 4, 1990.

SASE or SAE and postage, please. Any excess postage will be donated to INDEXA. Bureau cards okay. (Contacts before July 4, 1990 should be sent to A41JV direct, or via the Oman bureau.)

Mohammed Al Sabah, 9K2CS, operator and manager of the **701AA** operation, reports that the address in the Callbook is that of his father, but Mohammed will receive those cards. Mohammed's direct address is P.O. Box 8944, 22060 Salmiyah, Kuwait.

QSL the **1S0XV** Spratly operation to INDEXA, c/o W4FRU. Donations are urgently requested to help cover the very high cost of this trip. Please help out.

QSL Paul Bavassano, Jr., I1RBJ's various special call signs to Paul at Via Bardonecchia 99, 10139 Torino, Italy. Among the calls are: **IM1A**, **IB1T**, **I1RBJ/9**, **IE1A**, **XF3R**, **IU1ITU**, **IA1A**, **IN1U**, **IV1A**, **IJ1M**, **I90M**, **IG1A**, **IC2A**, **IQ1A**, and **IO1RBJ**.

Announcing (from p. 9)

WB2EIG, 283 East Longview Ave., Columbus, OH 43202.

W9OFR, from 50th anniversary of Joliet ARS; 1400Z Oct. 20 to 2400Z Oct. 21; SSB 3955, 7255, 14255, 21355, 28455; CW 3555, 7055, 14055, 21055, 28055; FM 146.55 MHz. For certificate send QSL and #10 SASE to W9OFR/W9DE, 602 Manhattan Rd., Joliet, IL 60433.

WV7T/9, from 214th birthday of U.S. Navy, Great Lakes, IL; Great Lakes ARC at Naval Training Center Great Lakes; 0000Z Oct. 13 to 2359Z Oct. 14; General portion of bands and Novice phone portion of 10 meters. For QSL send SASE to Mike Anderson, WV7T/9, 2381-C Delaware Ave., Great Lakes, IL 60088-2510.

AA0A, from Silver Anniversary of St. Louis Gateway Arch, St. Louis, MO; Monsanto ARC; Oct. 27-28; lower portion of General 40, 20, 15 meter phone bands and Novice 10 meters. For QSL send SASE and QSL to KA0IAR, 12 W. Glendale Rd., St. Louis, MO 63119.

W000, from Halloween celebration, Frankenstein, MO; Mid-Mo ARC; 2100Z Oct. 31 to 1400Z Nov. 1; 35 kHz uo from bottom of CW, Novice, and General phone subbands. For certificate send QSL and SASE to Jeff Kunce, N0JUH, 1213 E. Dunklin, Jefferson City, MO 65101.

• The following hamfests, etc., are slated for October:

Third week in October, **El Paso Hamfiesta**, El Paso, TX. Contact W.J. Deragisch, 301 Ridgemont Drive, El Paso, TX 79912-5330 (915-584-1649).

Oct. 6, **Northern Oklahoma/Southern Kansas Swapmeet & VE Session**, Ponca City, OK. Contact Mark Byard, N50GP, 504 Foster, Ponca City, OK 74601 (405-762-1966). (VE exams 9:30)

Oct. 6, **Fallfest '90**, Green Bay Community Center, Green Bay, WI. Contact Green Bay Mike & Key Club, P.O. Box 13351, Green Bay, WI 54307 (414-432-3491). (VE exams)

Oct. 6, **Hamarama '90 & Mid-Atlantic States VHF Conference**, Conference—Warrington Motor Lodge, Fleamarket—Bucks County Drive-in Theater, Warrington, PA. Contact Hamarama, P.O. Box 311, Southampton, PA 18966.

Oct. 6-7, **Mississippi Coast Ham/Swapfest**, Point Cadet Plaza, Biloxi, MS. Contact Charlie Kunz, AA5QJ, 601-377-6495 days, 601-875-9516 evenings.

Oct. 7, **Independent Radio Assn. Hamfest**, Springfield, OH. Contact Independent Radio Assn., P.O. Box 523, Springfield, OH 45506.

Oct. 7, **CPUG Computer/Electronics Exposition, National Guard Armory, Palmdale, Hershey, PA**. Contact Central PA 99/4A Users Group, P.O. Box 14126, Harrisburg, PA 17104-0126, or call Dave Ratcliffe, 717-238-5414.

Oct. 7, **Yonkers ARC Ham Fair**, Yonkers Municipal Parking Garage, Yonkers, NY. Contact John A. Costa, WB2AUL, 914-969-6548.

Oct. 7, **Springfield Hamfest & Computer Expo**, Springfield, OH. Contact Springfield Independent Radio Assn., P.O. Box 523, Springfield, OH 45501 (SASE).

Oct. 7, **Central Michigan ARC Hamfair**, National Guard Armory, Lansing, MI. Contact Rowena Elrod, KA8OBS, 111 Lancelot Pl., Lansing, MI (517-482-9650).

Oct. 7, **Huntington County ARS Hamfest**, P.A.L. Club, Huntington, IN. Contact Jim Covey, KC9GX, 1752 Koche St., Huntington, IN 46750 (219-356-3269).

Oct. 7, **Bergen ARA Hamfest**, Bergen Community College, Paramus, NJ. Contact Jim Joyce, 286 Ridgewood Blvd. No., Westwood, NJ 07675 (201-664-6725). (VE exams 7 to 10 AM)

Oct. 13, **Grand Forks, North Dakota Fall Hamfest**, City Auditorium, Grand Forks, ND. Contact Warren Tobin, WF0V, 515 Sixth Ave. SE, East Grand Forks, MN 56721.

Oct. 13, **RAGS Hamfest**, NY State Fairgrounds, Syracuse, NY. Contact Viv Douglas, WA2PUU, 315-469-0590. (VE exams, preregistration)

Oct. 13-14, **Palm Beach County Hamfest &**

Computer Show, South Florida Fairgrounds, West Palm Beach, FL. Contact PBRA Hamfest, P.O. Box 461, Lake Worth, FL 33460. (VE exams)

Oct. 13-14, **Augusta Hamfest & Computer Fair**, Augusta-Richmond County Civic Center, Augusta, GA. Call 404-790-7802. (Exams both days)

Oct. 14, **USECA Swap & Shop**, Eisenhower High School, Shelby Township, MI. Contact Arpad R. Miklos, 3180 Chard, Warren, MI 48092 (313-751-3804).

Oct. 14, **CARA Hamfest**, Howard County Fairgrounds, Columbia, MD. Call 301-997-5052 (answering machine). (VE exams)

Oct. 14, **Northwest Ohio ARC Hamfest**, Allen County Fairgrounds, OH. Contact WD8BND, P.O. Box 211, Lima, OH 45802 (419-647-6513). (Handicapped accessible)

Oct. 15, **Kettle Moraine RAC Ham, Computer, Video Fest**, Waukesha County Exposition Center,

Waukesha, WI. Contact KMRAC, P.O. Box 411, Waukesha, WI 53187 (SASE).

Oct. 20, **Greenwood ARC, VE1WN, Ham Flea-market**, Gilwell Hall, Greenwood, Nova Scotia. Contact Lance Peterson, VE1VCL, Greenwood ARC, P.O. Box 63, Greenwood, Nova Scotia, Canada B0P 1N0.

Oct. 20, **Tri-Cities Hamfest**, Appalachian Fair Grounds, Gray, TN. Contact Tri-Cities Hamfest, P.O. Box 3682 CRS, Johnson City, TN 37602.

Oct. 20, **Triangle East ARA Hamfest**, Moose Lodge, Smithfield, NC. Contact Kirk Ellis, P.O. Box 255, Smithfield, NC 27577 (919-965-9577, 5:50-9:30 PM).

Oct. 21, **Centralia Wireless Assn. & Kaskaskia College Anniversary Hamfest**, Kaskaskia College, Centralia, IL. Contact Bud King, WA9U, 618-532-6606.

(continued on p. 131)

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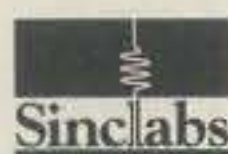
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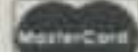
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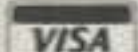
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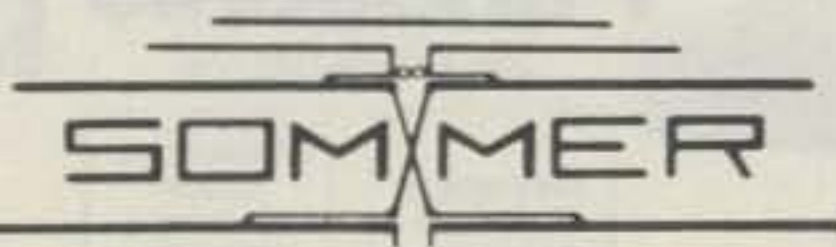
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Oct. 21, **Cumberland County ARS Hamfest**, Carlisle Fairgrounds, Carlisle, PA. Contact C-CARS, P.O. Box 448, New Kingstown, PA 17072 (SASE).

Oct. 21, **Tradefest '90**, Yezzi Athletic Field, Bendalem, PA. Contact Steve, 215-752-1202. (VE exams)

Oct. 21, **Rocky Mountain Radio League Swapfest**, Jeffco Fairgrounds, Golden, CO. Contact Dan Duryee, KB0J, 303-458-5444 (days). (Handicapped accessible)

Oct. 27, **SARA Hamfest & SC ARRL State Convention**, Sumter County Exhibition Center, Sumter, SC. Contact Hap, WA4UMU, 803-469-6381. (VE exams)

Oct. 27, **Tri-City ARC Auction**, Uncasville VFW, Uncasville, CT. Contact WA2RYV, 203-464-6555. (Handicapped accessible)

Oct. 27, **Hamfest Minnesota & Computer Expo**, Hennepin Technical College/Brooklyn Park Campus, Brooklyn Park, MN. Contact Hamfest Minnesota & Computer Expo, P.O. Box 5598, Hopkins, MN 55343, or call 612-474-1529. (VE exams)

Oct. 27-28, **Hamfest Chattanooga AR Convention/ARRL Tennessee State Convention**, Chattanooga-Hamilton County Convention and Trade Center, Chattanooga, TN. Contact Hamfest Chattanooga, P.O. Box 3377, Chattanooga, TN 37404. (VE exams, preregistration)

Oct. 28, **Heart of Ohio Hamfest**, Marion County Fairgrounds Coliseum, Marion, OH. Contact Ed Margraff, KD8OC, 1989 Weiss Ave., Marion, OH 43302 (614-382-2608).

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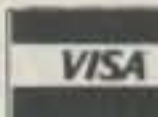
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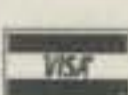
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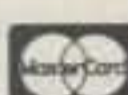
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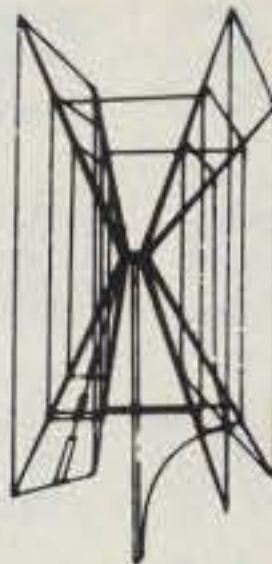
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Advertiser's Index

AEA/Adv. Elec. Applications.....	44, 45
ARRL.....	111
AVC Innovations.....	43
AXM Inc.....	105
Ace Communications.....	81
Ace Systems.....	131
Alexander Manufacturing.....	9
Alfa Electronics.....	51
Alinco Electronics.....	6, 7
Aluma Towers.....	129
Amateur Electronic Supply.....	23
Amateur Wholesale Electronics.....	43
American Antenna.....	104
American Reliance Inc.....	40
Ameritron.....	119
Antenna Service.....	35
Antenna Specialists.....	111
Antennas West.....	107, 112, 132
Antique Electronic Supply.....	132
Antique Radio Classified.....	46
Associated Radio.....	93, 121
Astron Corp.....	61
Austin Amateur Radio Supply.....	67
Austin Custom Antennas.....	122
Azimuth Weather Star Comm.....	121
Barker & Williamson.....	96
Barry Electronics.....	127
Base 2 Systems.....	56
Beezley, Brian, K6ST1.....	111, 134
Bencher, Inc.....	66
Bilal Co./Isotron Ants.....	134
Buckmaster Publishing.....	112, 129, 132, 134
Burghardt Amateur Center.....	131
Butternut Electronics.....	47
CATS.....	128
CB City International.....	111
CQ Bookshop.....	84, 85
CRB Research.....	105
C & S Sales.....	57
Certified Comm. "The Wireman".....	132
Cleveland Institute of Electronics.....	79
Colorado Comm. Center.....	105
CommPute, Inc.....	83
Communications Concepts Inc.....	93
Communications Electronics Inc.....	41
Contest Radio.....	114
Cushcraft Antennas.....	75
DX Edge.....	129
DX Engineering.....	93
Dahl Co., Peter.....	97
Datacom International.....	39
Delta Loop Antennas.....	121
Digitech Concepts.....	43
EDCO/DAIWA.....	69
ETO.....	65
Electronic Engineering.....	135
Electron Processing.....	128
Engineering Consulting.....	89
Fair Radio Sales.....	130
G.A.P. Antenna Products.....	134
GRE America.....	125
Gauthier's Covers Plus.....	35
Gem Quad Products.....	135
Geochron Enterprises.....	66
Grapevine Group.....	135
H & M Jewelry.....	114
Hal Communications.....	19
Ham Radio Outlet.....	10
Hamsoft.....	129
Hamtronics, Inc.....	123, 128
Henry Radio.....	136
ICOM America, Inc.....	70, 71, Cov. IV
International Radio Exchange.....	93
Japan Radio Co.....	73
Jensen Tools.....	93
Jun's Electronics.....	43

(Continued on page 139)

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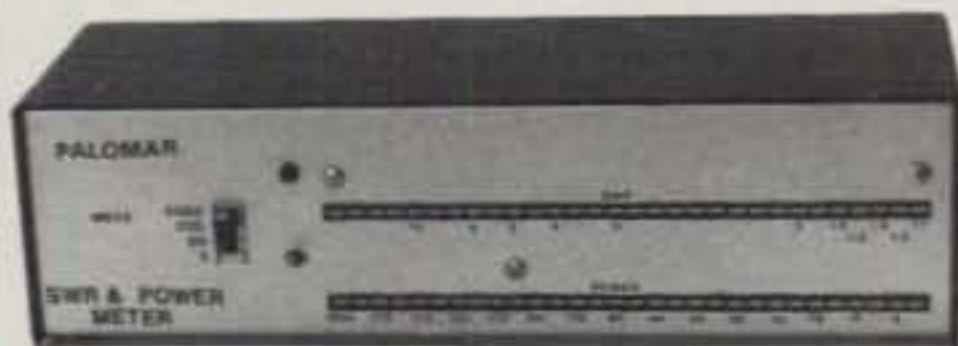
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Advertiser's Index

K2AW's "Silicon Alley"	128
Kantronics	138
Kenwood, USA	Cov. II, 1, 2
Lakeview Co.	105
LaRue Electronics	46
Lewallen, Roy, W7EL	130
Litsche, Norman	107
MFJ Enterprises	27, 29
Madison Electronics	32
Martin Engineering, Glen	113
Maxcom Inc.	132
Memphis Amateur Electronics	107
Missouri Radio Center	140
Motron Electronics	126
N4EDQ Amateur Radio Sales	88
NCG Company (Comet Antennas)	107
Nemal Electronics	112
Oklahoma Comm. Center	114
OPTOelectronics Inc.	99, 101
PASS Publishing	128, 130, 132
PC Electronics	96
Pacific Cable Co.	46
Palomar Engineers	130, 139
Periphex Inc.	121
Phillips-Tech Electronics	135
Pilot Electronic Co. Inc.	46
Pouch, The	113
QSLs by W4MPY	129
Quorum Communications	89
RF Concepts	78
RF Connection	132
RF Enterprises	133
RF Parts	137
Radio Amateur Callbook	135
Radio Engineers	131
Radio Works	47
RadioKit	129
Renaissance Development	103
Reno Radio	35
Ross Distributing	126
SCO Electronics	121
SGG, Inc.	15, 122, 124
Schultz, Jack, L.	132
Sherwood Engineering	134
Sinclabs, Inc.	126
Sommer Antenna Systems	128
Spectrum Communications Inc.	93
Spectrum International	113
Spider Antennas	89
Stinson, Walt, Radio Op's World Atlas	130
Surplus Sales of Nebraska	97
Synthetic Textiles	128
TGE	126
TNR Technical, Inc.	130
Telex-HyGain	63
Ten-Tec	76, 77
Texas Towers	33
Trans World Cable Co.	128
Traxit	134
Tucker Surplus Store	55
US Cable TV, Inc.	89
Universal Amateur Radio	113
Universal Manufacturing	32
VHF Communications	57
W5YI Marketing	105
W9INN Antennas	128
W & W Associates, Batteries "R" Us	113
Wacom Products	131
West Radio School, Gordon	132
Williams Radio Sales	83
Yaesu Electronics	8, Cov. III
Yost & Company	89
ZCo Corporation	135

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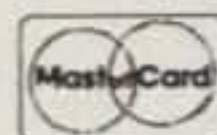
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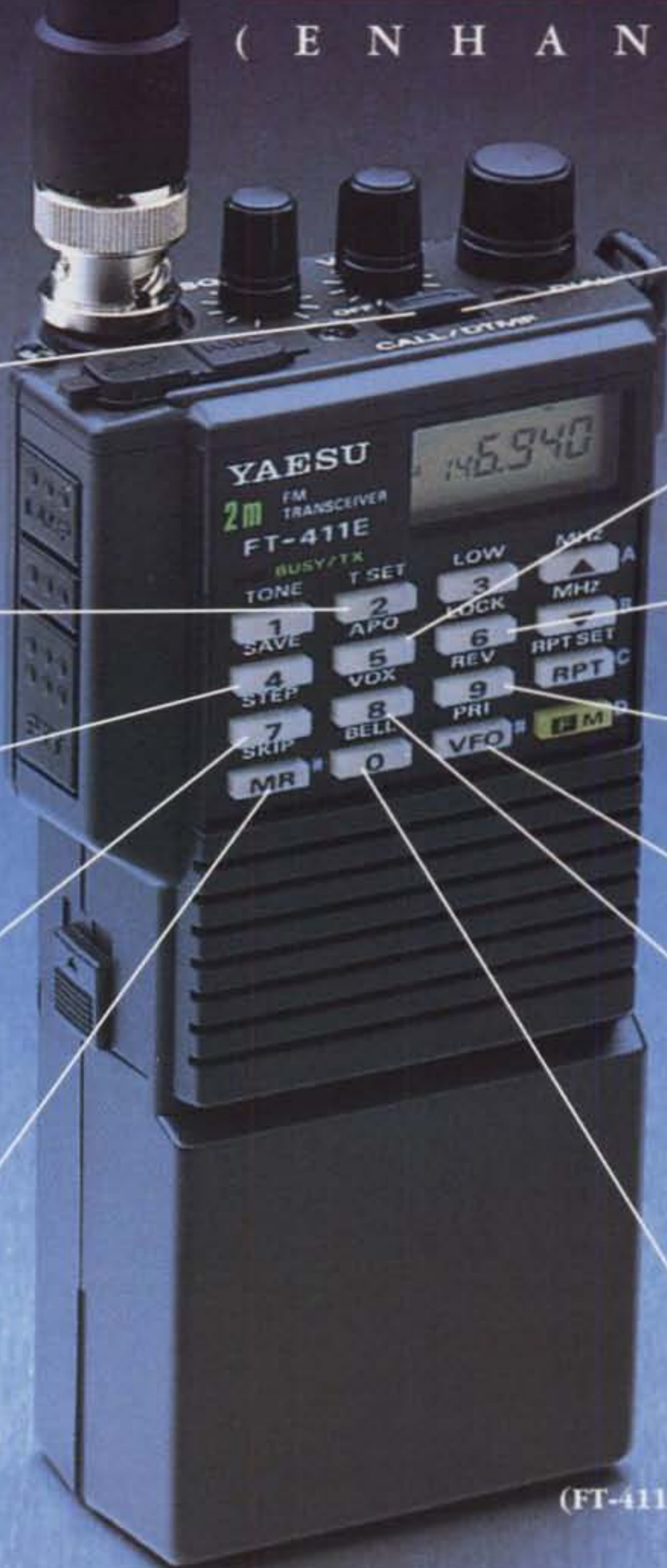
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