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Amateur Radio



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Build A QRP Transceiver For 15m. CW

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On the cover: Tom Harke, AA9A



746

AMATEUR'S JOURNAL

KENWOOD

Compact Champion!

TH-27A/47A

2 m and 70 cm Super Compact HTs

Here is a great new addition to Kenwood's HT family — the all new TH-27A for 2 meters and TH-47A for 70 cm! Super compact and beautifully designed, these pocket-sized twins give you full-size performance.

- **Large capacity NiCd battery pack supplied.** The standard battery pack is 7.2 volts, 700 mAh, providing extended transmit time with 2.5 watts. (TH-47A: 1.5 W.)
- **Extended receive coverage.** TH-27A: 118–165 MHz; TH-47A: 438–449,995 MHz. TX on Amateur bands only, (TH-27A modifiable for MARS/CAP. Permits required. Specifications guaranteed for Amateur bands only.)
- **Multi-function scanning.** Band and memory channels can be scanned, with time operated or carrier operated scan stop.
- **Frequency step selectable for quick QSY.** Choose from 5, 10, 12.5, 15, 20, or 25 kHz steps.
- **Built-in digital clock** with programmable timer.
- **Dual Tone Squelch System (DTSS).** Compatible with the TH-26AT Series and the TM-941A Triple bander, as well as other Kenwood series transceivers, this selective calling system uses standard DTMF to open squelch.
- **Five watts output** when operated with PB-14 battery pack or 13.8 volts.
- **T-Alert for quiet monitoring.** Tone Alert beeps when squelch is opened.
- **Auto battery saver, auto power off function, and economy power mode extends battery life.**
- **DTMF memory.** The DTMF memory function can be used as an auto-dialer. All characters from the 16-key pad can be stored, allowing repeater control codes to be stored!

- **41 memories.** All channels store receive and transmit separately for "odd split."
- **DC direct in operation.** Allows external DC to be used (7.2 – 16 volts). When external power is used, the batteries are being charged. (PB-13 only.)

Optional accessories:

- **BC-14:** Wall charger for PB-13 • **BC-15:** Rapid charger for PB-13, 14 • **BC-16:** Wall charger for PB-14 • **BH-6:** Swivel mount
- **BT-8:** Six cell AA Alkaline battery case
- **HMC-2:** Headset with VOX and PTT
- **PB-13:** 7.2 V, 700 mAh NiCd pack • **PB-14:** 12 V, 300 mAh NiCd pack • **PG-3F:** DC cable with filter and cigarette lighter plug
- **PG-2W:** DC cable • **SC-31:** Soft case
- **SMC-31:** Standard speaker mic • **SMC-32:** Compact speaker mic • **SMC-33:** Compact speaker mic with controls
- **WR-2:** Water resistant bag.



- **Automatic offset selection (TH-27A).**
- **Direct keyboard frequency entry.** The rotary dial can also be used to select memory, frequency, frequency step, CTCSS, and scan direction.
- **CTCSS encode/decode built-in.**
- **Supplied accessories:** Rubber flex antenna, battery pack, wall charger, belt hook, wrist strap, dust caps.

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
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KENWOOD

Mobile Companion!

TM-241A
TM-441A/TM-541A

Compact FM Mobile transceivers



Here are your new mobile companions — at your service whenever you're on the road! Their compact size makes installation a snap, and the remote control options allow you to customize your installation for that "professional" look!

- **Wide band receiver coverage.** The TM-241A receives from 118–173.995 MHz. Transmit range is 144–148 MHz. (Modifiable for MARS and CAP operation, permits required.)
- **TM-441A** covers 438–449.995 MHz, and the **TM-531A** covers 1240–1299.995 MHz.
- **CTCSS encode built-in, selectable from the front panel.**
- **Selectable frequency steps** for quick and easy QSY.
- **TM-241A provides 50 W, TM-441A 35 W, and TM-541A 10 W.** Three power positions, 5, 10, and full. The TM-541A has two power positions, 1 and 10 watts.
- **20 full-function memory channels** store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2m is automatically selected.** There are four channels for "odd split" operation.
- **Tone Alert System with Elapsing Time indicator.**
- **Auto-power off function, and time-out timer.**



RC-20 Remote Control Unit

As supplied, one RC-20 will control two transceivers. **Most often-used front panel functions** are controllable from the RC-20. The RC-20 and IF-20 combine to allow control of up to four radios.

- **Selective calling and pager option.** The DTU-2 option enables the Dual Tone Squelch System (DTSS), allowing selective calling and paging using standard DTMF tones.
- **Digital recording system option.** Used in conjunction with the tone alert system, the DRU-1 allows message storage of up to 32 seconds.
- **Multiple scanning functions.** Band and memory scan, with selectable scan stops and memory channel lock-out.
- **Large LCD display with four-step dimmer control.**
- **Automatic Lock Tuning (ALT) for the TM-541A.** Compensates for drift.

- **Supplied accessories.** Mounting bracket, DC cable, fuses, MC-44DM multi-function DTMF mic.

Optional accessories

- **DRU-1** Digital Recording Unit
- **DTU-2** DTSS unit
- **IF-20** Interface unit, used with the RC-20, allows more than two transceivers to be remotely controlled
- **MA-700** 2m/70cm dual band antenna with duplexer (mount not supplied)
- **MB-201** Extra mounting bracket
- **MC-44** Multi-function hand microphone
- **MC-55** (8-pin) Mobile mic. with time-out timer
- **MC-60A, MC-80, MC-85** Base station mics.
- **PG-2N** Extra DC cable
- **PG-3B** DC line noise filter
- **PG-4G** Extra control cable
- **PG-4H** Interface connecting cable
- **PG-4J** Extension cable kit
- **PS-50/PS-430** DC power supplies
- **RC-10** Handset remote controller
- **RC-20** Remote control head
- **SP-41** Compact mobile speaker
- **SP-50B** Mobile speaker
- **TSU-6** Programmable CTCSS decoder

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Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications and features are subject to change without notice or obligation. Specifications guaranteed for Amateur band use only.

KENWOOD

The DXpeditioner!

TS-440S

Compact high performance HF transceiver with general coverage receiver

Portable reliable performance and ease of use makes the TS-440S your obvious "low bands" choice. It is "Every Ham's" rig to go – ham shack, portable or mobile. But don't let the small size fool you – there's lots of "big rig" performance packed into this package. Built-in antenna tuner option. Continuous duty transmitter. Super DynaMix™ front end. Five filter functions. The TS-440S is at your service wherever you wish to operate.

- **Covers all Amateur bands**
General coverage receiver tunes from 100 kHz–30 MHz. Easily modified for HF MARS operation.
- **Direct keyboard entry of frequency**
- **All modes built-in**
USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.
- **VS-1 voice synthesizer (optional)**
- **Built-in automatic antenna tuner (optional).** Covers 80–10 meters.
- **5 IF filter functions**
- **Superior receiver dynamic range**
Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m.)
- **100% duty cycle transmitter**
Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB. 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)
- **Computer interface port**
- **Adjustable dial torque**
- **100 memory channels**
Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**

- **MC-43S UP/DOWN mic. included**
- **Superb interference reduction**
IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and opt. filters fight QRM.
- **Dual SSB IF filtering**
A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, dual filtering is provided.
- **VOX, full or semi break-in CW**
- **AMTOR compatible**



Optional accessories:

- **AT-440** internal auto. antenna tuner (80 m – 10 m)
- **AT-250** external auto. tuner (160 m – 10 m)
- **AT-130** compact mobile antenna tuner (160 m – 10 m)
- **IF-232C/IC-10** level translator and modem IC kit
- **PS-50** heavy duty power supply
- **PS-430** DC power supply
- **SP-430** external speaker
- **MB-430** mobile mounting bracket
- **YK-88C/88CN** 500 Hz/270 Hz CW filters
- **YK-88S-88SN** 2.4 kHz/1.8 kHz SSB filters
- **MC-60A/80/85** desk microphones
- **MC-55** (8P) mobile microphone
- **HS-4/5/6/7** headphones
- **SP-41/50B** mobile speakers
- **MA-5/VP-1** HF 5 band mobile helical antenna and bumper mount
- **TL-922A** 2 kw PEP linear amplifier
- **SM-220** station monitor (no pan display)
- **VS-1** voice synthesizer
- **TU-8** CTCSS tone unit
- **PG-2C** extra DC cable.

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ON THE COVER: Contester Tom Harke, AA9A at the helm of his
 Appleton, Wisconsin station. (Photo by Larry Mulvehill, WB2ZPI)



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Fun Is Contagious

This is it—the issue a lot of you have been waiting for. The results are in and tabulated for all to see. The next big one is coming up, and it's *CQ* World-Wide DX Contest time once again. The *CQ* WW is the ultimate in operating contests and sparks more interest and participation than any other amateur radio contest.

If you're into grumbling and having your hackles raised over the level of activity on your pet frequency, ponder for a moment the fact that some 250,000 unique calls show up in the logs. The excitement and activity generated by contests and award programs indicates that a large number of us are more competitive, aggressive, and simply far less passive than we think we are in our pursuit of amateur radio's potential.

While it may seem that there are two or three contests going on each and every day, plus each year a couple of thousand special-event stations and a few hundred DXpeditions, there's no truth to the rumor that *CQ* sponsors them all. A lot of folks and groups sponsor all sorts of events and contests throughout the year, primarily because they are fun, there's immediate positive feedback, and they tend to improve operating-skill levels.

Many amateurs like to think of our hobby as a cerebral service, whereby we contemplate lofty technical theory and confine our operating to handling emergency traffic. For the most part, the majority of us simply like to communicate, even if it's just exchanging signal reports. Whatever we do, we should remember that the operative word is "do," and that implies, infers, and specifies action. Operating is doing and is both quantitative and qualitative in nature, and as such can certainly be goal oriented. Since it can be measured, it's just a simple extension to determine a yardstick for achievement recognition. States, countries, islands, counties, prefixes, you name it—they're all yardsticks of achievement.

If we now add in a time constraint and ask ourselves, "How many can we accumulate in X amount of time?" then we have a contest. The contest or competition can be with ourselves or with 5,000-plus amateurs who think alike and go the distance to actually send in logs. It's called having a good time. Having a good time also means having fun, and if you try to dissect that to determine what it

means, you destroy it.

Now if this is not your thing, that's okay. It really is okay to do whatever you want to do and enjoy in amateur radio (within the confines of the law). Before we all become too wizzled, we should come to grips with the fact that we all enjoy something or get fun out of some aspect of the hobby. If we can start to think through that tiny aspect of enjoyment, we might be able to branch out and have others join us to have fun, too.

Speaking of numbers of people having fun, the June/July issue of *The JARL News* (the Japanese Amateur Radio League's publication) featured the following item: As of March 31st there were 1,027,101 licensed Japanese amateurs. Before some of you get ultra-serious on me and go into diatribes on license classes and what they do or don't mean, look at the overall picture. Just 20 years earlier, March 1970, the 100,000th Japanese amateur was licensed. Somehow, in 20 short years over 900,000 Japanese thought they would enjoy and have a good time with amateur radio. When you look through Japanese amateur radio magazines, it is also amazing to see the many photographs of clubs and outings featuring numerous amateurs all smiling and apparently having a good time.

Maybe some of you think I stress too much the idea of having a good time and having fun. Maybe some of you think we should seriously build our technological base instead. Truthfully, I don't know how to do that. I'm not an educator, psychologist, or sociologist, and I'm not too sure that there's a one-to-one relationship between amateur radio and a technological base. I don't know which comes first, people becoming engineers and scientists because they are amateurs, or the other way around. The only constant I have seen over the years is that people become something or do something because they enjoy it, achieve some level of satisfaction by becoming proficient at it, and feel some sense of reward by doing it. That goes for work as well as a hobby.

For most of us there is an aspect of amateur radio that we "like" more than something else. If we are lucky, we have been exposed to many avenues of amateur radio expression and have picked out an area with which to spend most of our time. Why we have chosen a particu-

lar area may be hard to explain or rationalize, but it stems from an inner enjoyment. It's hard to explain, for example, why we can sit and listen to a dead band for hours just in the hopes of hearing a rare one and never feel that we wasted the time. The listening itself is satisfying, even if it is simply noise, and the promise of the unknown is exciting. Try to explain that to someone who asks you about amateur radio and what you do.

If you had to come up with a word or thought that best describes amateur radio, it probably would come down to its being an activity that lets your imagination soar and sometimes makes your dreams and wishes come true. If you look at the pages of contest scores in this issue, you will see that a lot of amateurs have realized their dreams.

Now if you want to nit-pick and start off by assuming that most people didn't win and couldn't win, you also have to accept the fact that it really doesn't matter. What does matter is that a tremendous number of amateurs throughout the world had a great time and are looking forward to doing it again. Quite a large number of amateurs worked new countries and new zones, qualified for new awards, and carried out DXpeditions successfully. Every amateur who took part in the contest won something for himself by fulfilling a dream. That's what it's all about.

All of this operating activity is in many ways just as cerebral as divining state-of-the-art circuitry. It's thinking and imagining through various components of an activity before the event. It's as though you can "see" yourself work the rare one or "see" yourself build something new or accomplish something you've never done. Believe it or not, the pursuit of that kind of activity is called *fun*.

Apparently, among some amateurs there is also fun to be derived from "seeing" something as not working, someone not winning, and something not being the same as it was umpteen years ago. I guess there's fun in being negative, too. Maybe there's even a market for another magazine strictly for negative enjoyment. We could call it *Rotten Radio* and air everyone's gripes, complaints, petty feuds, and full-moon madness. Until that time, however, try to enjoy what you're doing and keep your amateur radio imagination working. 73, Alan, K2EEK



IsoLoop™ HF ANTENNA

REVOLUTIONARY COMPACT DESIGN



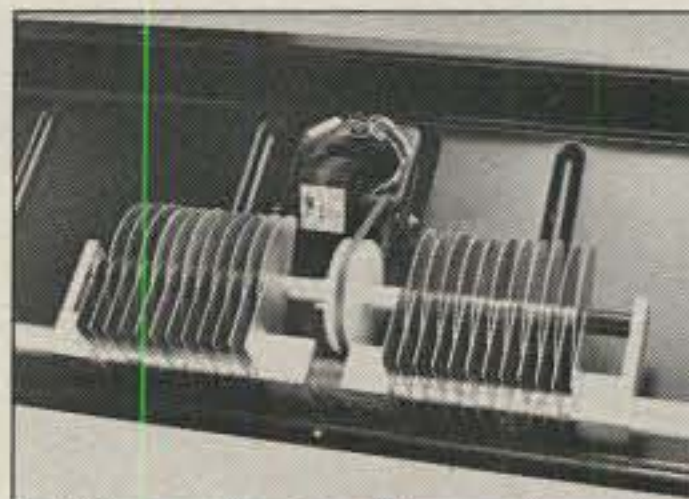
Once again AEA has achieved a significant engineering breakthrough with its high-performance, low profile HF IsoLoop antenna. Performance isn't compromised by its small size. Operate your favorite HF band (14 to 30 MHz frequency coverage) from areas with restrictive zoning ordinances or apartments and condos. Or take it with you on vacation. . . it's the ideal go-anywhere portable antenna. And it's the only antenna you need to cover 14 to 30 MHz. ONE antenna instead of numerous dipoles and without any traps!

150 Watts. Rated up to 150 watts, the IsoLoop transmits and receives on any frequency between 14 to 30 MHz. When mounted with the loop in the horizontal plane, the radiation pattern is omni-directional and horizontally polarized, with the gain of a dipole. Maximum radiation is at low angles which is ideal for DX operation. The IsoLoop may also be mounted with the loop in the vertical plane to provide a null in a desired direction. Tuning is provided by a precision stepper-motor and a small remote control box, the LC-1.

The IsoLoop does not need ground radials and its balanced, shielded feed-loop isolates the feedline from the antenna. The IsoLoop is well-isolated from the feedline. Like AEA's Isopole antennas, your signal is radiated by the antenna and not the feedline. With end-fed antennas, the outside of the coax becomes part of the antenna, resulting in noise and computer hash pickup and increased TVI problems.

High-Q Design. One of the unique features of the IsoLoop is its inherent High-Q. The IsoLoop can be considered a very sharp tunable filter that radiates. The narrow bandwidth suppresses harmonics from your transmitter reducing TVI problems. It also attenuates out-of-band signals from nearby transmitters that could overload your receiver.

Compact. The IsoLoop is square, with rounded corners, and measures 32 inches on a side and weighs only 12 pounds. Because of the IsoLoop's small size, it makes a perfect attic or balcony antenna. It's also excellent for portable operation, recreational vehicles or camp-site use. A rotator is not necessary when used in the



IsoLoop precision stepper motor provides accurate tuning.

omni-directional, horizontally polarized mode.

Revolutionary. The AEA IsoLoop antenna represents years of research and development. Others may try to imitate the IsoLoop, but none can match the patent-pending design.

AEA also provides technical support from the factory or through your personal computer and modem on CompuServe's HamNet. If you are already a CompuServe member, just type GO

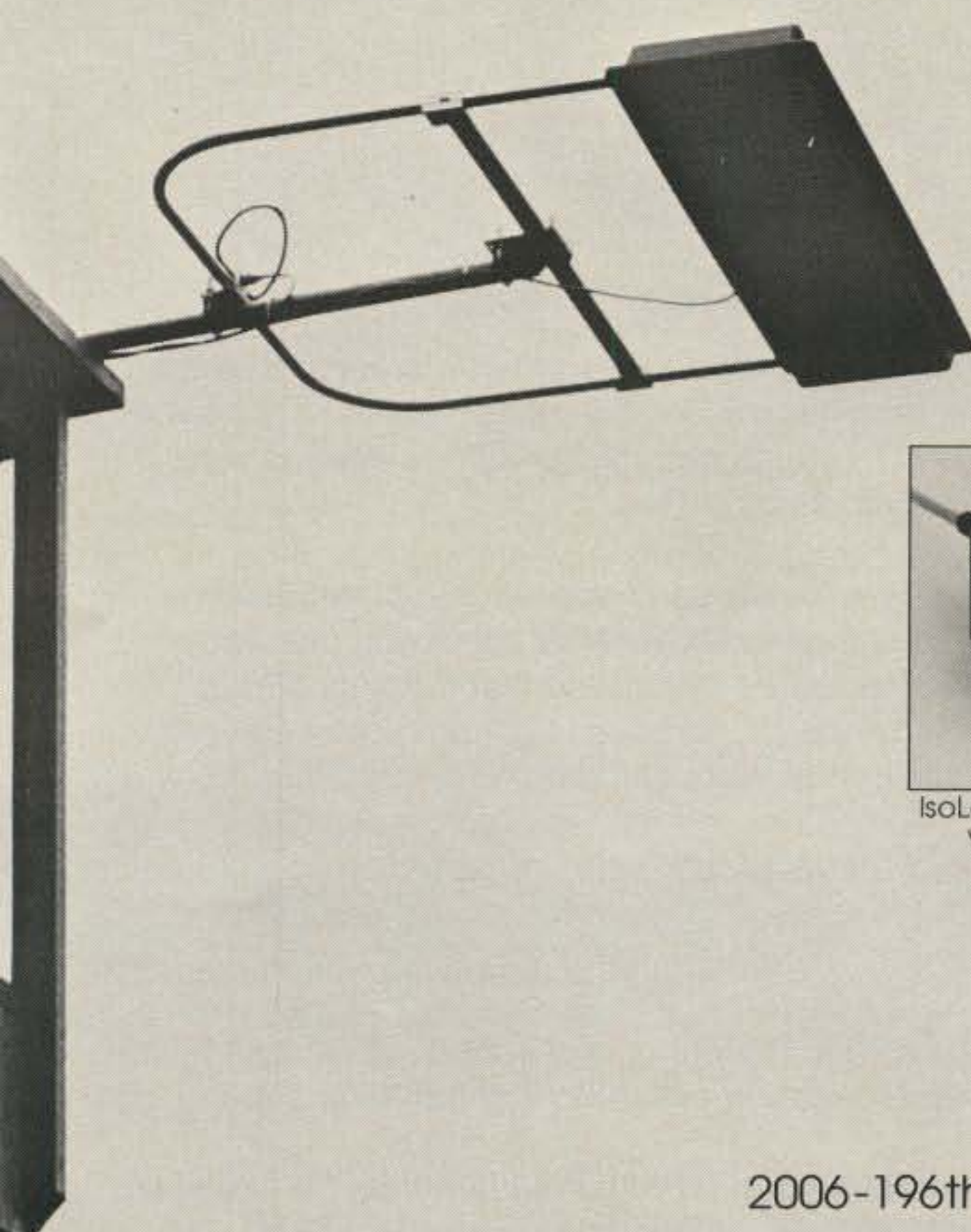
HAMNET at any CompuServe prompt. For a free introductory CompuServe membership, call 1-800-848-8199 and ask for representative #48.

AEA Brings You A Better Experience

Advanced Electronic Applications, Inc.

2006-196th St. SW/P.O. Box 2160 Lynnwood, WA 98036 206-775-7373

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IsoLoop LC-1 control box with variable speed tuning.



KTU remote data sensor

Designed for the growing number of new communication applications, the Kantronics Telemetry Unit (KTU), for the first time, brings remote data gathering and distribution within reach.

Accepting input from up to 7 sensors and working with special purpose EPROMS, the KTU can collect a range of environmental data and distribute it, through an external TNC, to all the users in a Local Area Network.

Included with the KTU is the Weathernode EPROM (the first in a series). This allows instant access to weather conditions for your LAN. It provides temperature sensing and, with the optional weather vane, it also supplies wind speed and wind direction information.

The KTU connects to the serial port of any TNC and may also be connected directly to a computer's serial

port. Front panel switches provide for local programming from a computer, connection of the KTU telemetry to a TNC or bypassing the KTU to inter-connect your computer and TNC.

The KTU is easily adapted to multi-site installations for gathering current weather conditions over larger areas. It also stores data so that histories of past readings may be maintained allowing computer plots of data trends over time to be produced.

The KTU may be remotely accessed, with password protection, and re-programmed for site specific requirements.

For a detailed technical specification sheet, call your Kantronics dealer or contact Kantronics direct.

The Kantronics KTU with Weathernode, the first of its kind to provide remote data sensing to a LAN.



Kantronics Telemetry Unit



Get Above the Crowds and Noise.

Yaesu Announces
One Year Limited Warranty
 on all Amateur Radio Products



100 Watts Power

Noisy, crowded frequencies are about as productive as freeways at rush hour. Now, you can skip the jams and head for the wide, open spaces with the FT-650 from Yaesu.

The three-frequency operation lets you win the battle of the bands and communicate clearly on 6m, 10m and 12m frequencies. These less crowded bands put your transmission high in the sky and above the noise.



The FT-650 packs substantial communications power in a stream-lined, compact case. A flip-out handle makes it the perfect portable, while a built-in power supply (AC or DC) lets it function as a

base station. Broadcast from anywhere—mountain tops, remote islands, boats, vehicles or just the suburbs—and hear the difference with the FT-650.

Jump on the FT-650 three-band wagon and get above the crowds and noise:

- 100 Watts on all modes.*
- DDS—Direct Digital Synthesis.
- Superior Receiver Performance
- Low noise (NF 1.2dB) RF preamp with switched 5MHz bandwidth BPF, veractor tuned.
- Extended receiver coverage—24.5 to 56MHz.
- Automatic seeking IF Notch Filter.
- 100% continuous operation duty cycle.
- 105 Memory channels: 99 channel memories, 4 programmable scan memories and 2 priority channels.
- All mode operation (SSB, CW, FM & AM).
- Optional accessories: DVS-2 Digital Voice Recording System module • MD-1B8 Desk top microphone • SP-5 External speaker with AF filter.

For complete information about these and other Yaesu products, call your local Yaesu dealer today.



The choice radio for the serious field operations enthusiast...

• All-mode 6 meter (690RII)/10 watt mobile...25 watts on 2 meter (290RII) and 70cm (790RII).

• Convenient FM performance: Three selectable FM scanning steps • Analog S/PO meter • One-touch reverse split button.

- Selectable SSB and CW tuning steps: 25/100/2500 Hz.
- Full-featured microprocessor operation: 10 memories—simplex or duplex • 2 independent VFOs • All-mode noise blanker • Optional CTCSS tone squelch (FTS-7) • Semi break-in CW keying and side tone.
- Includes MH-15C8 DTMF microphone and FL-6020 linear amp.

The FT-690RII is the only single band transportable 6 meter radio now available.

YAESU
 Performance without compromise.™

© 1990 Yaesu USA, 17210 Edwards Road Cerritos, CA 90701

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ANNOUNCEMENTS

• **AACS Alumni Roundup** - Amateurs who served in the Airways and Air Communications Service of the Air Force from November 1938 to July 1961 are encouraged to participate in an on-the-air "roundup" of alumni. This is not a contest, but is a day just to make contact. The roundup is Friday, September 14 from 1700-0500Z. Operate in a 10 kHz range around: CW 3561, 7061, 14061, 28061; SSB 3862, 7232, 14287, 21332, 28332. On CW call CQ AACS; on SSB call CQ AACS Alumni (frequent use of "AACS" in a QSO will help alumni locate each other). (Info via KA5TRX)

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

KA1BB, from "Safe Labor Day," Waterford, CT; Tri-City ARC; from 1700Z Sept. 1 to 2300Z Sept. 3; middle of 80, 40, 20, 15 meter General class phone and CW bands. QSL with business-size SASE to Tri-City ARC, P.O. Box 686, Groton, CT 06340.

K2BR, from Miss America Pageant, Atlantic City, NJ; Southern Counties ARA; Sept. 3-8; phone 25 kHz inside lower General class band edge, CW 65 kHz inside lower General class band edge, Novice 28.100-28.500 MHz. For QSL send No. 10 SASE to SCARA, P.O. Box 121, Linwood, NJ 08221.

W3UDX, from 50th anniversary of the "Jeep," Butler, PA; 1300-0400Z Sept. 22 and 1800-0000Z Sept. 23; lower portion of 80, 40, 20, 15 meter General phone bands and Novice 10 meters CW and phone, also 147.96/36 and 146.52. For certificate send 9 x 12 SASE to Butler County ARA, Box 1787, Butler, PA 16003.

3-land, from Fort Delaware DXpedition on Pea Patch Island, Delaware; Tristate IARC (ops. KA3PVT, KA3PFH, N3EMY, KA2RRK, W2BN); Sept. 28-30; SSB General portion of 40, 20, 15 meters and Novice 10 meters, also 2 and 6 meters. QSL direct to appropriate op by SASE.

AD4U, from Rayrode Daze Festival, Branchville, SC; Edisto ARS; 1000-2200 EDST Sept. 29 and 1300-1800 EDST Sept. 30; on 28.400, 14.285, 21.375 (plus or minus). For 8½ x 11 certificate send QSL and SASE to AD4U, P.O. Box 117, Branchville, SC 29432-0117.

K4HY, from International Bluegrass Music Festival, Ohio River, Owensboro, KY; Owensboro ARC; 1900Z Sept. 28 to 2200Z Sept. 30; lower portion of the General bands and Novice portion of 10 meters. For certificate send QSL and 9 x 12 SASE to Bob Hardin, N4PNG, 57 Colonial Ct., Owensboro, KY 42301.

KM4FO, from James Madison Days, Madisonville, KY; Hopkins Co. ARA; 1400-2400Z Sept. 29; on 40, 20, 15 meters plus 10 meter Novice. For certificate send SASE to Dwight Orten, KM4FO, 4785 Nebo Rd., Madisonville, KY 42431.

WD4DAT, from Bear Bryant College Football Museum, University of Alabama, Tuscaloosa, AL; West Alabama ARS and University of Alabama ARC; 1300-2300Z Sept. 22; on HF lower 25 kHz of General phone band 40 to 10 meters, packet 145.01 MHz via TCL1 digi in Tuscaloosa, 2 meters all area repeaters 147.300+, 146.820-, 145.350-. For 8½ x 11 certificate send QSL and SASE to WAARS Special Event, P.O. Box 1741, Tuscaloosa, AL 35403.

5-land, from Buddy Holly Special Event, Lubbock, TX; Lubbock ARC; 1300Z Sept. 8 to 1300Z Sept. 9; phone 28.454, 21.370, 14.270, 7.250; CW 28.140, 21.120, 14.040, 7.125. For QSL send SASE to Moody Forgey, KG5BL, 7603 Wayne Ave., Lubbock, TX 79424.

W6TKV, from Barney Oldfield Special Event, Corona, CA; Corona ARC; 1700Z Sept. 8 to 0500Z Sept. 9; on 3.875, 7.250, 14.250, 18.130, 21.375, 24.940, 28.450, 146.535. For QSL send SASE or 1 IRC and QSL to CNARC, P.O. Box 1783, Corona, CA 91718, Att: Barney Oldfield Special Event.

WA6YGA, from County Hunters' Special Event, Alpine County, CA; Calaveras ARS; 1700-0100Z Sept. 22-23; on 14.300, 21.300, 28.350. For QSL send SASE and QSL to CARS, P.O. Box 122, San Andreas, CA 95249.

WA7LAZ, from Andy Devine Days, Kingman, AZ; Hualapai ARC; 1500-2400Z Sept. 29-30; on 7.250, 14.325, 21.325, 28.325 MHz. For QSL send SASE and

QSL to Hualapai ARC, P.O. Box 4364, Kingman, AZ 86402.

WA7KYT, from ghost town of Paradise, AZ; Cochise ARA; Sept. 1-3; CW 7.040; phone 3.885, 7.285, 14.288, 18.150, 21.288, 28.385, 28.385, 6 meters. For certificate send 9 x 12 SASE to Cochise ARA, P.O. Box 1855, Sierra Vista, AZ 85636.

WM8E, from Preston County Buckwheat Festival, Kingwood, WV; Preston County hams; 1400Z Sept. 28 to 0200Z Sept. 30; phone or CW on 40, 20, 15, 10 meters approx. 25 kHz up from bottom of General phone or Novice CW bands. For certificate send QSL and SASE to John Wills, KE8NO, 104 Swartz Rd., Kingwood, WV 26537.

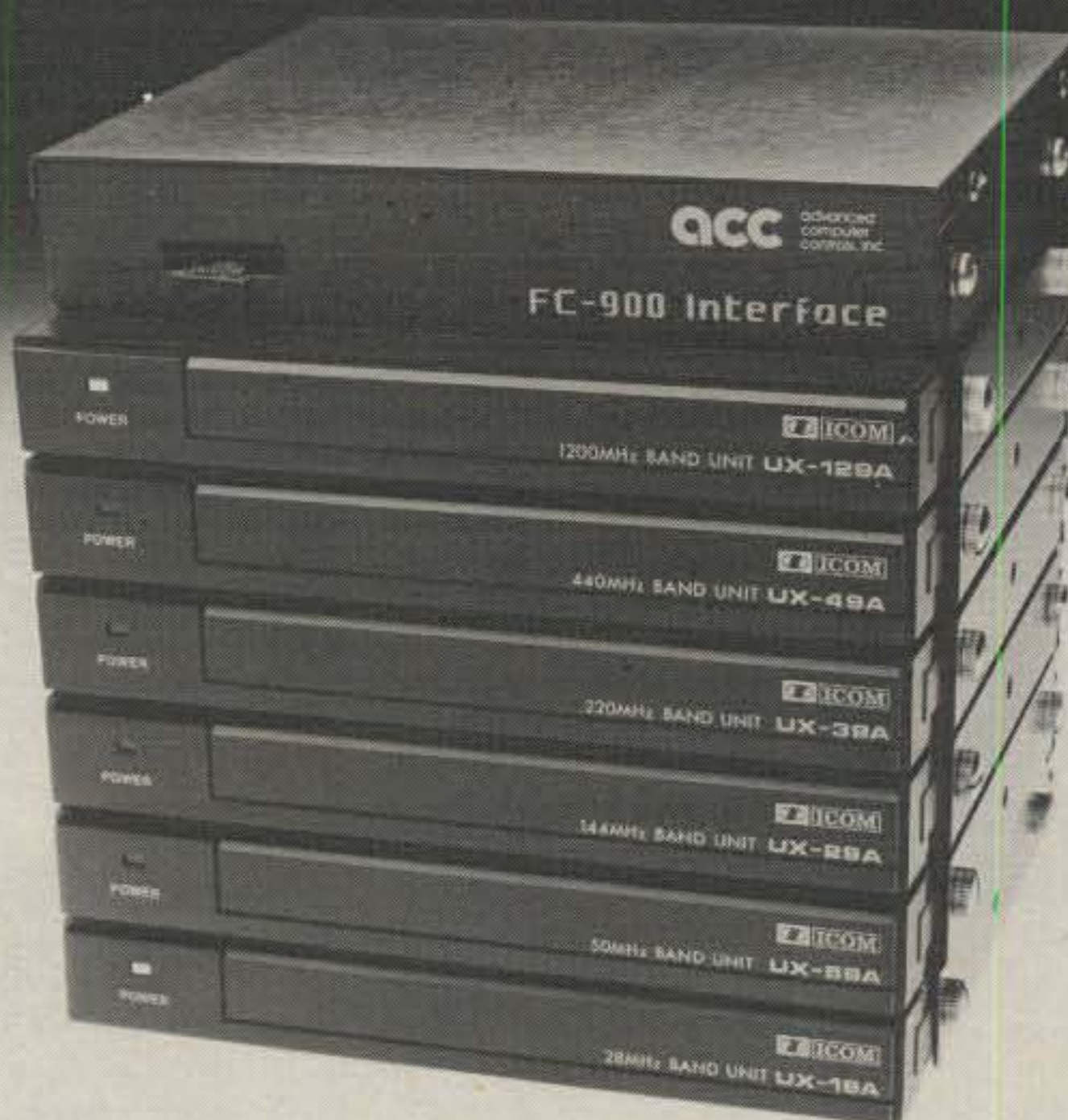
N9RD, from Heston Steam Show, Heston, IN; Porter County ARC; 1400-2400Z Sept. 1 and 1100-2400Z Sept. 2; on 7.275 and 21.375. For certificate send 8½ x 11 SASE to PCARC, P.O. Box 1782, Valparaiso, IN 46384.

WB9TXO, from Schaumburg Septemberfest, Schaumburg, IL; Schaumburg ARC; 1500-2100Z Sept. 2; on 7.290, 14.290, 21.290, 28.390. For certificate send QSL to SARC, P.O. Box 68251, Schaumburg, IL 60168-0251.

W9YB, from Homecoming Weekend, West Lafayette, IN; Purdue ARC; Sept. 15 and 22, Oct. 6, Nov. 3

(continued on p. 128)

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Results of the 1989 CQ World-Wide DX SSB Contest

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

For a couple of years now, your Director, N6AR, has been traveling to Italy on business, hoping to get permission to operate the contest from a rare European QTH. In 1989 I successfully applied for permission to operate Vatican station HV3SJ during the CQ WW SSB DX Contest, thanks to the very kind help of Pino, IØDUD, who made the necessary licensing arrangements with the Jesuit House where the Vatican station is located. This was a particularly exciting proposition, since it meant the first full-scale CQ WW Contest operation from the Vatican!

I arrived in Rome the week before the contest and had a full week of ordinary business to conduct. That kept me busy 12 hours a day, even on the Thursday and Friday before the contest. I was pretty tired at the beginning of the contest. However, when the action began, I forgot all about how tired I was as the excitement of the contest took over. In fact, I managed to stay awake about 36 hours of the 48 hours, with some of the dead time caused by the arrival of Mr. Murphy (of course). There was the interference to the FAX machine downstairs, the linear failure, and the high noise in the direction of the USA on 28 MHz—all normal Murphy visits. The location is only accessible during certain hours, so we had to leave for part of the time. Yet things went extremely well for a first-time operation. It was certainly a delight to give so many contesters a rare multiplier.

HV3SJ is blessed with a fantastic rooftop position high above Vatican City at the Jesuit House, which is located within the extraterritorial limits of the Vatican, as can be seen in the picture. You will note the two-element tri-band quad just to the right of St. Peter's, which was the mainstay antenna. That was complemented by full-size dipoles on 160, 80, and 40—a fine all band set of antennas in great working order! The shack is located in a small room right next to the antennas on the roof, a nice, quiet, secluded corner of the Jesuit House. During the contest the rig consisted of a TS-930 and KW linear.

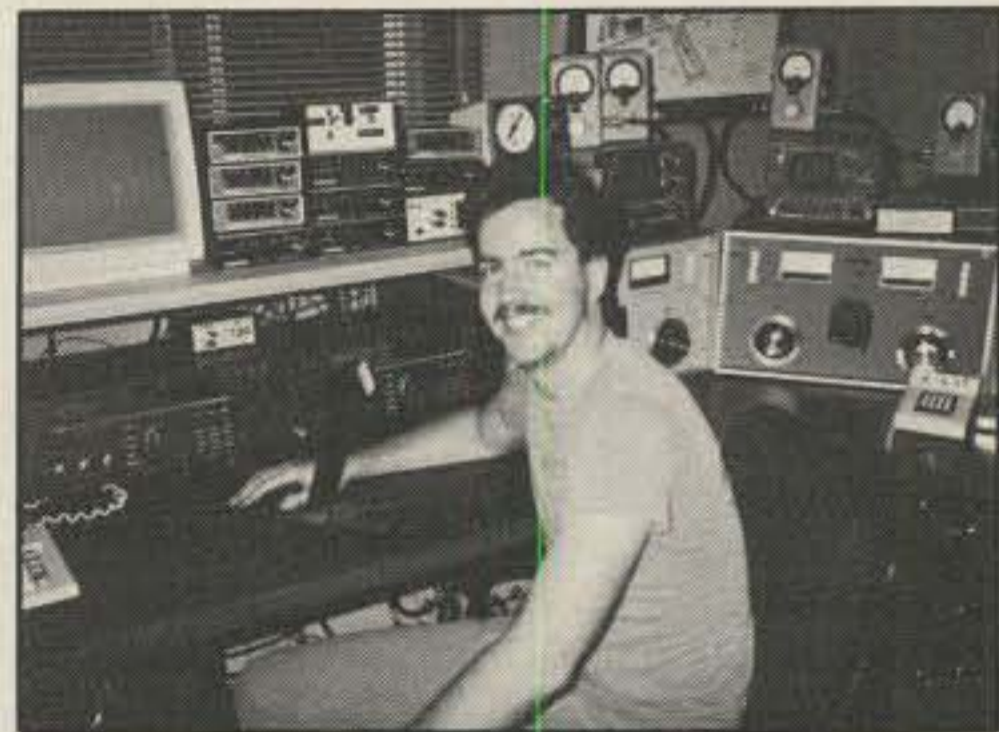
Since most of my operation has been State-side, it was a real eye-opener to participate from the other side of the pile-up as DX for a change. Naturally, I'd been hearing that for years from my co-director, K3EST, who has been active from the Caribbean often over the last 10 years. However, 3500 QSOs, 3.1 M points, and 48 hours later, I had pretty well gotten the message on the differences.



Your SSB WW DX Contest Director, Larry, N6AR, is shown here at the rooftop location of HV3SJ with the two-element quad shown in the background.

I know there are lots of you loyal contesters and readers who never heard HV3SJ in the contest. Well, I really tried to work the USA and Japan through the European pile-ups, but it was tough. It kind of reminds me of an incident a year or so ago in the States. I worked a BY just 10 minutes before the contest on 10 meters, yet never heard him in the contest at all. What a surprise it was when his contest log arrived with all those W's in it. When the curtain rises at 0 Z on the day of the contest, all sense of order just seems to be lost. I had a similar experience with the Far East and Japan, particularly on the low bands, where the European pile-ups on me were just incredible. The JA stations I heard were all nice copy, but boy, it was tough. We noticed similar comments from the European winner, Jorma, OH2KI, who had the same problem at ZB2X. Then too who can blame the Europeans, who were doing their best to work the multipliers. Clearly, the rare multiplier in the contest has a very strategic dilemma of determining just how much time to spend running a pile-up and how much time to balance the band-by-band score and multipliers. It's much more of a problem when the choice is between 3 and 1 point contacts, too, as is the case in the Far East and Europe.

Indeed, it is just amazing how sophisticated the WW contesting process has become. Location, equipment, multiplier status, propagation, and other environmental factors are certainly important ingredients of a successful



Phil, K3UA, manned K3TUP for this year's number 2 USA all band entry.

WW contest effort. But it is the strategic skills that really make the difference between the winners in the key categories. These strategic factors have been studied and the results put into practice by a keen group of serious contesters. These fellows have worked out a formula for where to go, when to run, when to hunt and peck, when to make band changes, etc. Even the brevity of the exchange has been fine honed to a science. If you are out to win in a major category, it is going to take several years to learn all these strategies, and to develop the skills with on-the-air practice in the heat of battle. The margin of a first-place ver-

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

**1816 Poplar Lane, Davis, CA 95616



Guest operator OH8SR is shown here (left) with station owner EA8BPW.

sus a second-place finish is extremely small in most cases, as some of the results from this year show. The sophistication is enough to scare away some of the newer operators. Yet what we need are a few more challengers who have the patience and endurance to develop those skills and strategies. They would certainly serve as better role models than list and net operators!

The fact is almost anyone can have a great time in today's contest. Whether you like to chase multipliers, conquer a band, run high rates, or just mess around for a little bit, the CQ WW will answer your mail. You can even pick a category where with just a little diligence a certificate is yours for the asking. The way the contest is structured today, there are so many categories from which to choose that there is probably one just right for you. For example, there were very few entries on the low bands this year. Everyone piled up on 15 and 10 and left the low bands alone! A good way to enter and have fun for the beginner is to challenge a buddy in a certain category and just compete between the two of you. Before you know it, you'll be ready for the serious categories. Just think—you might be the next N6AA or OH2BH.

The All Band Results

Rich Smith, N6KT, operating as EA8RCT, ran away with the Single Operator, All Band, World High honors with a whopping 9.7 M points, some three million points above his nearest competition. Jorma, OH2KI, finished second at 6.7 M from ZB2X, setting the only Single Operator All Band record of the year. Jorma edged out the 6.5 M 1988 European mark set by fellow countryman Ville, OH2MM, at OH0MM. Rich made excellent use of his 3 point advantage and a 500 QSO edge on 10 meters. VP5T and YJ0R, in that order, fought it out for third place with just over 1000 points separating them at the 6.1 M level. The top 10 was rounded out by VP2EXX, KN0E/KH3, N2NT, VE2ZP, K3TUP, and WR6R/KH6, all above 4.6 M. Curiously, this was the first time in years that a South American station has not been in the top ten. Note that three of the top ten efforts were from Oceania, a welcome breath of fresh air for the Pacific sector. By the way, the very fine effort by VE2ZP represents the first top ten participant from zone 2 in many years, and the highest ever single op score from that region.

How about those two USA scores in the top ten worldwide! The USA high score of 5.4 M was posted by Andy Blank, N2NT, followed by the fine 4.9 M score of K3TUP, with K3UA operating. This was the second year in a row at se-

cond place for K3TUP. Dean, N6BV/1, followed suit at 4.7 M. The W3's took five of the top ten this year, and as has been the case for several years now, the northeastern sector continues to completely dominate the USA results, with nary a 4 through 0 anywhere in sight. These scores are all consistently close to each other as well, with the third through tenth place finishers all within the 4.0 to 4.6 M region. Despite the fantastic conditions on all bands, this was the first year I can ever remember without any USA record of any kind being set.

European single operator scores went down somewhat this year, with the second through ninth scores finishing in the the 2.5 to 4 M range. ZB2X, GW4BLE, and OH6JW finished 1-2-3 in that order. All three finished in the top ten for the second year in a row and improved their positions compared to 1988.

We were able to run some key computer checks on the top single operator all band scores this year. In fact, we were extremely pleased with the results of those checks, which showed phenomenally low average unique rates (less than 4) among the US and worldwide contenders. Clearly the attention given to accuracy and log checking in the last couple of years has paid off, as the participants are proving.

Our new Single Operator Unlimited category enjoyed a surprisingly large following considering the late announcement. While most of the logs were from the USA, there were a few from Europe and Asia that were submitted as well. Tine, YT3AA, ran away with the World high with 5.6 M. K1ZM finished at the top Stateside with 4 M, followed by W0ZV at 3.5 M and K3WW at 3.1 M. We realize that this category name was chosen hastily because the "unlimited" term confused many and is ambiguous. We are therefore planning to change the name to "Single Operator Assisted," which carries a much clearer meaning. By the way, this category is open to single band as well as all band entrants, a fact which may not have come across clearly in the announcement.

The High Band Results

The 28 MHz category was extremely popular this year, with propagation open from before first light to well after dark in most places. Three new records were set. First, Bob Allphin, K4UEE, amassed new World and South American single band records with a fantastic 2.7 M score from P40R, the largest single band score ever recorded. He was followed by LR6ETB at 2.5 M, KP2A at 2.2 M, and 5H3TW at 2.0 M. Our congratulations to Tom Warren, 5H3TW, on a new African 28 MHz standard, as he bested the 10-year-old standard set by Ville, OH2MM, of OH2MM/CT3 fame. Two of your records fell this year, Ville.

The USA 28 MHz winner was Ralph, K5GA, who just missed the 1 M level. He was followed by KT4A (870 K) and KS1L (825 K) in that order. The European 28 MHz winner was 4N7ZZ at 1.37 M. YZ6A was second in a real scramble with four other stations; TX7A, DF0DX, UR2RE, and DF0SSB, in that order, all of whom ended up within 70K points of each other.

The 21 MHz competition was also fierce this year, with EL2CX (operated by Carl, K3RV) emerging as the victor at 2.2 M. Second and



PP5JR used ZZ5JR to good advantage as he piled up a fine 1.1M on 28 MHz.

third place went to Larry, N7DF/NH2 (1.78 M) and Frank, 9Y4VU (1.76 M). The USA 15 meter top gun was W7WA at 843 K. Fifteen meters was the only glory of any kind for the West Coasters this year, as three other W7's and a W6 finished in the top six. UB5WE snagged the European high with 980 K.

Twenty meters saw some strange propagation this year, with mid-day conditions somewhat subdued in many areas compared to other years. Despite the lull, South America's YW1A (1.50 M) and CE6EZ (1.23 M) took number one and two in the World. Third place went to EA9LZ, whose 1.2 M was enough to topple EL2AV's 1981 African record. YU1KQ finished fifth in the World and tops in Europe, well above his closest competition, 4N4I (672 K). W1RR's 706 K and K2HFX's 605 K dominated the USA contingent.

The Low Band Results

The low band results were way down this year, partly because of propagation and partly due to a lack of participation. After all, why struggle with static bursts and marginal signals when you can just keep running your 10 meter station! A flush of Europeans led by DJ4PT at 382 K, I2AOX at 360 K, and HA9RE at 359 K swept 1-2-3 in the World on 40 meters. WQ2M (83 K) and N6BFM/4 (72 K) dominated the USA arena.

On 80 meters HK3MAE ran away with all the cookies, posting a fabulous 414 K, almost three times higher than his closest competitor, YV3A (142K). UT4UZ led the Europeans with a fine 114 K score, while K4HJJ edged W6RJ with 32 K for USA fame.

Only one record of any kind was set on the low bands this year, and that was on 160 meters, as IV3PRK/IH9 journeyed south into the Italian African Islands to obliterate EA8AK's old 34 K African record with a fine 81 K effort. Otherwise, the 160 meter category was a battle between the Europeans for second place, with OK1DWX leading the pack at 23.5 K. Less than a handful of USA stations even entered on 160. Our congratulations to K5UR on his 5,000 point Stateside effort, a magnificent achievement considering conditions.

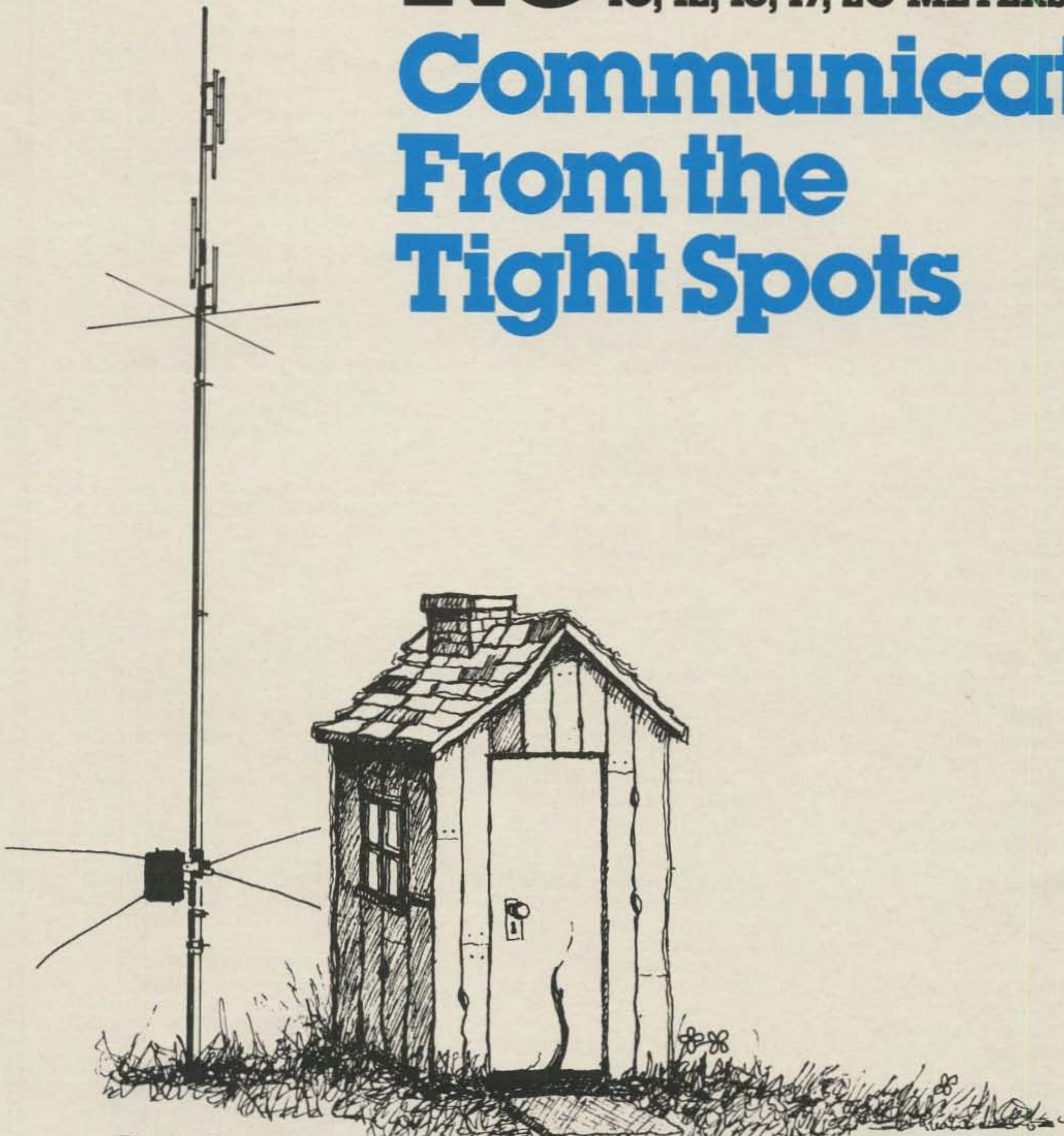
The QRPpers

With the fabulous propagation on the high bands, QRPp enjoyed a banner year in entrants, with about 130 entries submitted. Bosko Milankov, YU2TY, led all the competition with a fine 758 K all band entry. He was followed by EA3FBO at 461 K and KD2TT at 371

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Tom A. Tatomi, JA5OVU
Donor: DX Family Foundation

MULTI-OPERATOR, SINGLE TRANSMITTER

World

P48V (Oprs. AI6V, N6BT, VE7KNI, WA6VEF)
Donor: Southern California DX Club
W6AM Memorial

U.S.A.

KS9K (Oprs. KS9K, K9CJK, K9GS, N9AU, N9AW, N9GNQ, N9EJ, NI9U, NK9I, NO9F, W9RN)
Donor: Carolina DX Association

Europe

LZ9A (Oprs. SV3SJ, LZ2CC, LZ2PO, LZ2DF, LZ2HE, LZ2II, LZ2UA, LZ2SC, LZ2KK, LZ2PS, LZ2DD, LZ2BE, LZ2CT, LZ1NG, LZ2TT, LZ2XA, LZ2-E-41, LZ2-E-72)
Donor: Bob Cox, K3EST

Canada

VE6OU/XL3 (Oprs. VE2OZR, VE5DX, VE6OU)
Donor: CQ Magazine

MULTI-OPERATOR, MULTI-TRANSMITTER

World

PJ1B (Oprs. WA3LRO, PJ2MN, AI7B, W3UM, N7ZZ, N7ZR, K3EST, N4RV, W7EJ, K2SS, OH2MM, N6IG, AA6NT, K2SB, PJ9EE, KB2XZ)
Donor: CQ Magazine—W1WY Memorial

U.S.A.

W3LPL (Oprs. W3LPL, KA1GD, KC3EK, W3EKT, W3EMH, N3GB, WB3JRU, KX3Q, K3RA, NM3U, WD4AXM, NW5E, KN5H, N8II, WA8MAZ, KD9J)
Donor: Operators of K4VX/0

Europe

LX7A (Oprs. DL3LAB, DL4MCF, DL4MEH, DL5IC, DL5MAE, DL6FBL, DL6NCY, DL6RAI, DL7AV, DL7MAT, DL8OH, LX1II, LX1MK, LX1WW, PA3CEF, PA3DWD, DA1DW, DA1KM, DF2UU, DF3CB, DF3QL, DF7RX, DJ0IP, DJ1AT, DK1FW, DK2OY, DK3GI, DK5WL, DK6WL, DK8MZ, DK9IP, DL1SBR)
Donor: Finnish Amateur Radio League

Japan

JE2YRD (Oprs. JH1EAQ, JE1JKL, JA2IVK, JA2VWG, JA2PHO, JH2BNL, JR2SQU, JF2DQJ, JF2XJE, JI2KVV, JF2EOC, JG3LZG, JI3ERV, JI3JGJ, JR9OMD, JA9-10148, Noriko)
Donor: Nippon Television Network Corporation

CONTEST EXPEDITIONS

World—Single Operator

PJ7A (Opr. Bear Yasuchi Kumagai, JA7RHJ)
Donor: Stuart Meyer, W2GHK

World—Multi-Operator

V47K (Oprs. K3NZ, K3IPK, WB2P)
Donor: The German CDXG & SDXG
DJ3NG and DJ4EI Memorial

K. Congratulations on some super scores, fellows. The 10 meter QRP top dog was JR3RWB (227 K), while JA8RJE (105 K) led the pack on 21 MHz. We saw very few entrants on 20, 40, 80, and 160 in the QRPp categories this year.

Multi-Op Categories

The Multi-Single category thrived this year, even with the introduction of the new Single Operator Unlimited category. The Americas dominated the competition, with great scores in the tens of millions. It was the team led by

Carl, AI6V, at P48V that stole the show with a fantastic 18.5 M, new World and South American records. Well done, fellows. The teams at PJ9W (17.7 M), T11J (14.2 M), FY0P (13.1 M), and 8P9X (13.0 M) followed suit. European teams were led by the fellows at LZ9A with 12.7 M, who just barely squeaked by IQ4A. KS9K's 6.0 M won it for Stateside. It was a real shootout for second place, as N4RJ, K1YR, K1NG, and N3RS all finished within 300 K of each other in the 5 M range.

The Multi-Multi category was extremely well represented on three continents this year, with the Americas and Europe having about the

same relative position as in Multi-Single. WA3LRO's PJ1B team returned for another try at the World record and managed to just miss toppling P48V's mark from 1988 with a fine 48.9 M score. A team consisting largely of W6 contesters journeyed to ZW5B to finish second with 35 M, followed by a very fine 32 M point VP9AD score. Some of the Germans aided home-grown LX operators in their quest for a new European Multi-Multi record, as LX7A amassed a fantastic 26 M to unseat UP8A. Stateside, it was W3LPL all the way with 15 M, as N2RM, NB1H, K2TR, and N5AU fought it out for second place in the 11 millions.

Some Comments on the Rules

A few of you are going to be disappointed this year by the application of a few of our long-standing rules in a number of areas. To minimize the possibility of others failing to follow these rules in the future, we will outline a few no-nos that some of you appear to be toying with.

First, we do not allow the same call to be used in more than one category. Hence, the same call cannot be used for more than one single band entry. For example, we had three different single band logs submitted under the same call sign this year. That is not allowed. Refer to Rule VIII, which states: "A single band log is eligible for a *single* band award only. If a log contains more than one band, it will be judged as an all band entry unless otherwise specified." We interpret this to mean that a given call is entitled to only one single band entry.

Second, you cannot omit your sent and received exchanges from your log (see Rule XI, 2, where it states that "All sent and received exchanges are to be logged.") You can make an entry on the log which states that the exchange you sent was always the same (if that is the case). However, the received exchange must be logged, including the zone received.

Please note that for a station to be eligible for the reduced penalty structure associated with computerized logging submissions on disk, the complete log data must be submitted. Thus, submission of a disk containing a computerized list of all calls worked on a given band does not qualify for the reduced penalty. We need all of the log data, including times, multiplier and scoring, and exchanges on the disk in order for the submission to qualify as a computerized log. Additionally, even if you send us your log on a disk, be sure to send us a printout as well. Imagine the cost of paper for 3,000 CQ WW contest logs!

We hope that proper attention to these rules will avoid any further disappointments to entrants in the future. The rules for 1990 can be found elsewhere in this issue. We suggest you read them carefully, as a number of changes have been adopted by the CQ Contest Committee this year.

A Word of Appreciation

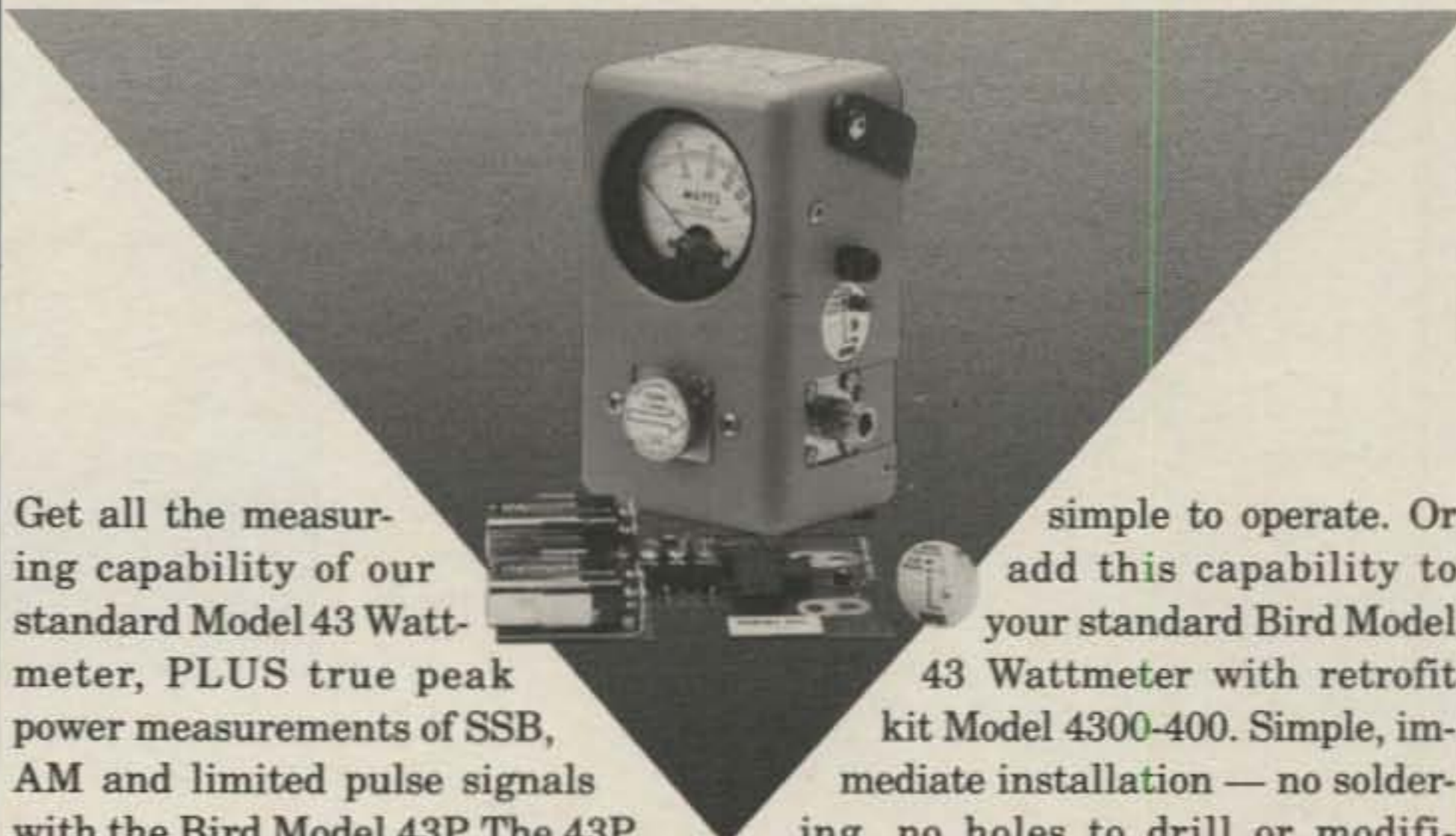
We received over 3,000 entries and check logs this year, and about 160 of them were accompanied with disks. These logs were put to the test by our hard-working, expanded WW Contest Committee, with some of our folks concentrating on building the computer data base and performing log checks with it, while others concentrated on our normal log-checking procedures.

This hard-working group deserves special recognition. They are Pat, WA8YVR; Dave, K2SS; Doug, K1DG; John, K1AR; Bill, W2RQ; John, KE7V; Richard, K5NA/2; Ed, N3ED; Fred, AD6C; Jan, N6AW; Glenn, K6NA; Homer, K7RA; Jim, W7EJ; Gene, N2AA; Mike, W9RE; John, K2VV; Doug, KR2Q; and newcomer Randy, K5ZD/3. A special word of thanks to these guys for the long hours they put in.

Now it's time to close up your magazines and fire up the old rig. It's time for the 1990 CQ WW SSB Contest! Good luck to you all for 1990.

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

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TOP SCORES

WORLD Single Operator All Band		UNITED STATES Single Operator All Band		EUROPE Single Operator All Band	
EA8RCT	9,668,988	N2NT	5,403,200	ZB2X	6,864,906
ZB2X	6,864,906	K3TUP	4,930,510	GW4BLE	4,058,880
VP5T	6,134,480	N6BV/1	4,564,755	OH6JW	3,891,888
YJ0R	6,133,036	K3OO	4,533,543	CT4NH	3,796,713
VP2EXX	5,574,680	K3ZO	4,163,018	LY3BA	3,621,936
N2NT	5,403,200	K1DG	4,153,380	HV3SJ	3,198,285
KN0E/KH3	5,147,070	K5ZD/3	4,147,902	OH6YF/OH0	2,723,970
VE2ZP	5,111,140	N2LT	4,014,080	SM5AQD	2,710,911
K3TUP	4,930,510	W3BGN	3,971,200	G3SNN	2,578,834
WR6R/KH6	4,796,512	K1RU	3,954,090	OH2PM	2,264,519

28 MHz		28 MHz		28 MHz	
P40R	2,669,580	K5GA	983,433	4N7ZZ	1,371,378
LR6ETB	2,486,304	KT4W	869,424	YU3VM	1,178,857
5H3TW	2,252,900	KS1L	825,727	YZ6A	1,174,817
KP2A	2,194,852	K3ZJ/8	806,140	TX7A	1,158,614
OH0XX/EA9	1,862,287	W0AIH/9	793,507	DF0DX	1,132,474
CW8B	1,545,460	KM2P	733,040	UR2RE	1,106,065

21 MHz		21 MHz		21 MHz	
EL2CX	2,242,968	W7WA	842,710	UB5WE	980,001
N7DF/NH2	1,780,016	WB7RFA	726,204	CS1BOP	929,176
9Y4VU	1,760,520	NG2X	697,463	YU3PV	894,075
HC1OT	1,713,762	W6QHS	622,909	OH1AD	872,784
EA8ACH	1,279,326	K7LR	600,300	4N3E	829,584
FM5EB	1,242,759	K7LXC	514,514	YU1AO	813,233

14 MHz		14 MHz		14 MHz	
YW1A	1,509,840	W1RR	706,986	YU1KQ	859,865
CE6EZ	1,232,242	K2HFX	604,945	4N4I	672,606
EA9LZ	1,213,215	NQ2D	535,068	F2EE	650,312
ZS6A00	962,676	KV4P	333,540	YT3E	643,656
YU1KQ	859,865	N9RD	283,500	DF8KC	624,102
W1RR	766,986	N8RA/1	266,850	SM0AJU	503,366

7 MHz		7 MHz		7 MHz	
DJ4PT	382,690	WQ2M	83,316	DJ4PT	382,690
I2AOX	360,149	N6BFM/4	71,688	I2AOX	360,149
HA9RE	354,162	W2SC	69,930	HA9RE	354,162
YY1C	253,053	KV0Q	61,635	DL8PC	197,208
JA8IXM	221,180	AD8C	44,778	OH2HE	182,520
YV5LIX	214,056	N6RJ	34,560	YO3JF	112,931

3.8 MHz		3.8 MHz		3.8 MHz	
HK3MAE	413,644	K4HJJ	32,882	UT4UZ	114,855
YV3A	141,993	W6RJ	30,848	HA8JV	105,468
IH9A	127,264	KG4W	20,160	DL2SAX	99,561
UT4UZ	114,855	W5EU	16,660	LY2ZA	91,200
HA8JV	105,468	W0CD/8	16,043	RB5DX	67,275
DL2SAX	99,561	N6UC	2,652	UR2RME	64,657
				DL8QS	60,965

1.8 MHz		1.8 MHz		1.8 MHz	
IH9/IV3PRK	81,344	K5UR	5,040	OK1DWX	23,562
OK1DWX	23,562	W2FCR	2,975	OZ7YY	20,608
OZ7YY	20,608	AA4MM	1,755	LZ1KWZ	20,295
LZ1KWZ	20,295			UQ2GHA	14,127
UQ2GHA	14,127			OZ3SK	12,384
4M4A	12,499			SP5INQ	11,613

Multi-Operator Single Transmitter		Multi-Operator Single Transmitter		Multi-Operator Single Transmitter	
P40V	18,520,488	KS9K	6,040,632	LZ9A	12,685,140
PJ9W	17,682,387	N4RJ	5,754,606	IQ4A	12,668,012
TI1J	14,224,848	K1YR	5,743,854	GJ6UW	10,995,216
FY0P	13,054,368	K1NG	5,651,265	OH0AM	10,492,220
8P9X	13,019,028	N3RS	5,474,560	OL8A	9,651,293
LZ9A	12,685,140	KA1GG	4,995,220	OK5R	9,548,293

Multi-Operator Multi-Transmitter		Multi-Operator Multi-Transmitter		Multi-Operator Multi-Transmitter	
PJ1B	48,985,200	W3LPL	15,026,970	LX7A	26,578,978
ZW5B	35,830,544	N2RM	11,681,488	RB8M	19,598,840
VP9AD	32,003,945	NB1H	11,623,745	IU3A	15,596,691
LX7A	26,578,978	K2TR	11,559,808	YT2A	15,514,674
RB8M	19,598,840	N5AU	11,029,846	OZ9EDR	9,446,073
LY2ZZ	18,272,552	K5NA/2	9,255,843	UP1BZO	7,256,860



The team at 8P9X used this fabulous location with a view of the Caribbean and Atlantic to finish in fifth place in the world in the Multi-Single category.

DX QRM

Only two operators and a broken rotator made it tough! ... 8P9X. Great to log on PC this year. Some great runs of JA's ... CF1DX. How about moving the magnetic pole further south for next contest? ... VE5GF. First contest. Couldn't believe after 36 hours a W6 worked JA and said Trx for new multiplier ... VE7GFC. Imagine the heartbreak of losing power for 12 hours Sunday ... 6Y5X. Suffered lightning strike of 300 foot radio tower, power went out, used car battery and TS-430 for one hour until AC came back. QRN on 160 was 50 over 9 most of time ... V47QQ. JT on 40 meters ... PJ8T. It is really fun and exciting ... BY5RA. We contacted Antarctica station for first time ... BY4AY.

DXers or Contesters? We don't know yet what we were! Viva CQ WW DX re koump'aroi!! ... 5B4ES. I Love Contest ... JA6YJS. ZM2A was first special contest call sign issued in New Zealand. We used broadcast antenna on low bands ... ZM2A. Having to deal with newcomers in the hobby. Club station operators having multiple contacts with us ... DX1CW. First experience of our team in multi/single contest. We were in deep Amazonian forest using a generator. Big mosquito pile-up!! ... FY0P. Condx had been expected good prior to the contest, but due to unexpected flare, it was not that good ... JA8SCD. What a shame! I slept two hours during good condx time ... JA8RUZ. Certainly enjoyed contesting with a good sleep on both days, but I wish I could not sleep for 48 hours ... JA8RWU.

Very nice contest ... JA6BIF. Forty meter condx is not so good; could not get a USA station ... JA6WW. I took part in WW test for the first time ... JG4DDN/5. Too much QRM because of good propagation ... JA3XOG. American phone band is very heavy QRM from JA recently. It's BC and jamming sigs ... JA2BAY. Condition was not so good, but I'm happy to meet many stations ... JR2AGL. I have not worked CN0A and V44QQ and conditions to EU and AF was not good in midnight time on CQ WW contest ... JA1USO. A lot of fun. Many thanks to US CQ ... JH1LBR. Thanks you very much for a nice contest. I really enjoyed it ... JR1JV. Thank you, I enjoyed this contest ... JH1NBN.

The condx is not so good as last year ... JF1SEK. A disaster from start to finish, but still good fun ... GU0JCI. Biggest thrill: watching the clouds and our beam sail over the QTH at 100 mph ... EI2VNO. A very fine contest, indeed. Condx better than usual ... LA3T. Bad propagation on Sunday ... IM8A. Propagation good, wx lousy; 100 mph winds damaged our LF antennas but fortunately we had some backup ... GJ6UW. Great signals from JA and USA. First day not very good on 10 meters but incredible the second!! See you next year ... IP4T. This is our first official participation in the WW DX. Betty, F6IOC, our YL operator, discovered HF contesting and had a lot of fun while managing pileups. We'll strike again next year ... F6BGC.

A contest team is a lot more than the sum of the operators; it is a lot of fun, joy, sensations, and astonishment you can share with friends having the same passion for contesting ... ON6NL. Liked the combination of nice DX and hotel by owner OE5NMM and crew ... OE5XGN. It was big fun to be on the air with a brand new call for the first time; each country worked was a new one ... OE2XEL. Antenna rotor didn't turn well. We had to turn 3-element 40 meter with a nylon wire. FB condx

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

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

WORLD TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
EA8RCT	21/7/21	99/14/52	388/18/64	1451/26/80	884/22/103	3060/30/112
ZB2X	79/6/31	296/18/61	433/24/68	1248/30/86	845/29/93	2570/33/99
VP5T	94/7/15	373/8/25	550/17/54	1024/21/74	1578/28/88	2067/22/81
YJ0R	3/2/3	34/5/10	224/20/32	908/31/72	2121/31/84	2171/32/84
VP2EXX	11/4/8	102/8/21	303/12/42	785/30/88	571/28/91	3342/31/107
N2NT	14/5/12	117/15/56	180/21/71	472/33/110	834/30/111	1457/33/117
KN0E/KH3	41/8/8	292/19/23	553/26/44	525/30/62	993/33/70	1450/29/62
VE2ZP	13/1/3	99/6/8	390/12/50	1032/29/92	1020/25/74	2195/24/91
K3TUP	15/6/10	67/12/40	99/16/56	677/34/122	553/34/107	1448/34/127
WR6R/KH6	7/2/3	98/9/10	592/21/40	443/26/60	797/30/69	2503/31/68

USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
N2NT	14/5/12	117/15/56	180/21/71	472/33/110	834/30/111	1457/33/117
K3TUP	15/6/10	67/12/40	99/16/56	677/34/122	553/34/107	1448/34/127
N6BV/1	10/5/8	102/13/49	110/17/58	528/34/108	524/33/109	1486/32/119
K300	15/5/10	117/13/58	100/14/48	361/30/94	671/35/109	1476/33/132
K3ZO	18/6/12	84/11/46	87/17/56	522/35/105	565/32/102	1375/31/104
K1DG	18/8/15	115/15/48	103/18/62	502/33/108	544/30/97	1209/29/117
K5ZD/3	16/7/12	57/12/38	111/17/61	430/36/106	754/32/117	1050/34/122
N2LT	7/4/5	58/8/36	96/18/56	590/35/116	499/28/95	1222/33/126
W3BGN	14/7/12	84/12/39	150/20/60	714/34/106	633/31/84	922/31/108
K1RU	11/4/8	46/10/33	111/21/63	527/34/106	646/31/105	1091/31/124

WORLD TOP MULTI-OPERATOR, SINGLE TRANSMITTER

P40V	39/9/21	227/13/48	668/23/83	2738/35/138	1996/32/129	3460/31/123
PJ9W	20/9/18	112/15/7	708/26/93	3227/37/132	1477/32/125	3104/31/122
TI1J	12/6/11	252/16/43	710/26/87	1862/35/131	2258/37/131	3181/35/138
FY0P	17/6/12	147/14/58	319/23/79	1365/32/121	1969/32/113	3026/35/121
8P9X	40/8/23	164/11/54	393/20/88	2455/32/115	2323/35/110	2776/32/110
LZ9A	110/11/51	92/19/77	671/35/117	1619/39/153	1355/38/140	2204/38/127

USA TOP MULTI-OPERATOR, SINGLE TRANSMITTER

KS9K	16/9/15	43/16/42	146/29/92	838/39/142	558/40/133	1282/34/150
N4RJ	20/7/14	54/15/45	85/24/77	828/36/133	714/36/139	1156/34/146
K1YR	10/5/9	69/14/52	99/24/82	845/38/154	467/36/138	1224/31/155
K1NG	12/7/9	86/17/60	123/26/83	963/39/159	498/37/136	928/34/146
N3RS	14/6/11	72/16/58	145/23/76	655/40/154	610/38/142	1098/34/154
KA1GG	10/4/9	124/12/59	111/22/75	430/37/121	679/31/125	1273/33/131

WORLD TOP MULTI-OPERATOR, MULTI-TRANSMITTER

PJ1B	457/12/37	973/19/75	2019/30/121	4707/40/186	4305/37/167	5714/37/178
ZW5B	65/14/27	156/22/44	1306/34/120	3362/40/172	4312/40/178	4463/39/169
VP9AD	486/14/31	1219/18/74	1749/29/100	5420/40/146	4260/37/149	3315/34/129
LX7A	655/7/57	1884/18/93	2409/34/121	3537/40/166	3190/39/157	3272/37/157
RB8M	1527/13/42	911/22/72	1507/34/120	2523/38/145	3013/39/145	2415/36/118
LY2ZZ	686/8/48	617/19/74	1140/33/117	3194/40/148	2324/39/143	2155/36/127

USA TOP MULTI-OPERATOR, MULTI-TRANSMITTER

W3LPL	72/10/21	353/19/77	425/29/100	1313/40/177	1572/38/161	2326/36/170
N2RM	62/9/19	234/17/71	207/21/75	1078/38/155	1494/39/149	2173/35/163
NB1H	13/6/9	216/16/66	254/24/88	1254/40/164	2142/39/149	1252/33/157
K2TR	50/7/13	286/15/73	285/26/91	1133/39/164	1503/37/159	1680/35/173
N5AU	27/9/20	108/19/56	254/29/97	1338/39/163	1417/39/159	1620/34/159
K5NA/2	56/5/11	320/17/78	200/23/82	1205/40/162	1008/34/138	1425/35/158

with USA on 10 meters... *HB9H*. Our first attempt in M-S category after our M-M EU record. It was harder this year... *OL8A*. It was really a great pleasure to operate the contest with dipoles and vertical antennas... *F6HLC*.

Only licensed since February '89. Our first contest and we loved it... *ON4AAQ*. Lost our 20 meter ant in 80 mph gale... *GW8GT*. Didn't know a score like this was possible with 100 watts and modest antennas... *IK0NWD*. Biggest thrill: Being called by BY and not realizing it, off back of the beam... *G0CCH*. Station nearly closed down due to telephone interference... *GM3PXK*. Much fun as always... *LY2WW*. Tnx nice contest... *UQ1GXJ*. QRP Multi-op station... *UB4VWA*. Computer crashed, voice crashed, but a great contest... *AL7FQ*. More aluminum, more power, more contacts next year... *8P6SH*. More fun when back home in zone 2... *VO2AC/1*. Had a blast after a ten year layoff with my old HW-101 and portable whip antenna... *WA6UJE/VE2*.

XL3 was my 25th different Canadian prefix in 25 years in radio... *XL3XN* (ex-*VE3GCO*). Still trying to figure out what I did wrong... *VE3RMM/2*. Glad to be back after 8 years... *VE6LB*. Started just to play around, but then got hooked... *TI2KX*. The best contest in the best hobby... *HI8LC*. Prepared for a month, but then I had a fever on Thursday, so didn't do as well as expected... *YS1MAE*. Used only low power, but feel good about my first contest... *6D2KB*. I hope more XE stations will participate... *XE2HWH*. Hurricane Hugo made me work using just a vertical... *KP4CZ*. Used battery power part of the contest... *WP4GQB*. The calypso band next door "jammed" all night, so being on the air didn't bother them... *J88/W9NSZ*.

Due to the hurricane, setting up at *KP2A* was just like field day... *KP2A* (Opr. *KW8N*). Enjoyed the contest very much. Hope to be in the multi-band category next year... *UB5WE*. Super contest again, but no new countries for me... *UA2EC*. Nice to work with the new Lithuanian prefix. LY was used before 1940... *LY2ZA*. I am 15, and have been in radio since 1986... *UA0OGS*. Great fun! Except from when the quad fell down, when the power supply failed, when the transmitter went on strike, and when my newly developed Macintosh computer system didn't work—but I'll be back next year... *OZ1ADL/P*. Again a lot of new DXCC countries and a lot of fun... *PA3ELD*. First time I used a beam, worked quite nice, now only need antenna for 40/80/160... *PA3EMN*.

My 41st CQ WW. Here's to next year... *GM3BCL*. Propagation—what's that?... *TF3CW*. My first contest... *SM3SJM*. CEPT rules make it impossible to get an LX call for foreigners. LX/—is not a competitive

call!... *LX/ON4AMT*. What about a class for those without big-power amplifiers? Too little power to get a QSO on 80-40 meters!... *LA4YW*. I can't work the Sunday 29 October—elections in Spain... *EA1BFZ*. Conditions fair despite disturbed conditions—shared time between contest and house redecoration... *EI9FK*. My first contest. I hope that this log was correct... *FD1NEP*. Top band must be quoted in megahertz and not any more in meters... *F6AOJ*.

First time I did 10 meters monoband. It was absolutely great! See you in 1990... *DF0DX*. Our only problem was to find right directions because we had forgotten our compass at home. We'll be back next year. See you then... *OH6YF/OH0*. 100 mph winds caused havoc throughout southern part of U.K. during whole weekend. My tower was no higher than 35 feet! Tree came down at back! Lost 80 meter sloper and 160 wire. Standby Butternut HF2V looked like a boomerang... *GW4BLE*. To be rare one in Europe makes it hard to work DX 3 point QSOs through EU pile-up! Great contest!... *ZB2X*. Fine contest, as usual, with good conditions and a full band... *OK1ABP*. A long time I call stations from the USA on 80 meters, but they did not copy me... *OK3IAG*.

Had a minor problem with the equipment... *OH1MD*. Well, everything was quite OK until the amplifier broke on Sunday morning... *OH1MDR*. You should give me some extra points due to the strong aurora... *OH6JW*. It was a fantastic although trying event... *SP2EWQ*. Murphy hit us hard and fast this year. I got stuck in a traffic jam on the highway, losing almost all Saturday... *YU1PQI*. 48 hours is too much for a single op!... *I4FYF*. First time up two nights calling like crazy. 40 meter band is terrible—too many kilowatts dancing on the air. But I am happy with the antenna, a full-size 40 meter vertical 5 meters above the ground... *IN3ZNR*. It was funny working W and VE stations on 80 meters using split without a second VFO... *OE4BKU*.

Heard my first BY since being licensed in 1971, but I couldn't turn my beam off of stateside... *SV0AB*. Need a "T" filter. My two-year-old son spilled tea on nearly completed check log!... *SV0GM/5*. Putting HV3SJ on the air in the contest was a tremendous thrill... *HV3SJ* (Opr. *N6AR*). Hard but enjoyable... *PT2TD*. Missed my trusty old 10 meter band... *CE6EZ*. Band openings around the clock allowed a fairly good score despite antenna shortcomings... *CW8B*. After 12 years of silence I'm back in the contest... *YV4YC*. I blew the house fuses and needed to buy some; unfortunately the police stopped me in my hurry... *YV5LIX*. Very few stations worked from NA, SA, and AF... *AP2NK*. A lot harder from East Africa than it was from OA8V in Peru... *5Z4FO*.

Twenty-five hours of operation on 160 meters for worst results ever ... *ZS6BCR*. Where were all the 75 meter big guns from the East Coast of the USA? ... *AH6JR*. With over 4000 QSOs, not a single VK or ZL ... *EL2CX* (Opr. *K3RV*). Just had a few minutes to make these QSOs before leaving New Caledonia ... *FK0AW*. DX conditions on 160 meters very poor, but the advantage of 3 point QSOs with Europe were worth the effort ... *IV3PRK/IH9*. Many could not copy signals from my 35 watts ... *AT0U*. Thunder, lightning, and power outages did not help the score ... *YB3ASQ*. (And just about everyone else from Indonesia had the same comment—ed.) Many thanks to *J37DX*, who was pleased to work me ... *ZS6HZ*.

USA QRM

Remote transmitters are *not* allowed, why are remote receivers (pkt, spot nets)? All operations should be self-contained ... *W2HPF*. Over 100 countries on one band in a contest for the first time ... *N2UN*. Ten meters was great! First try at using *K1EA*—Love it! ... *KQ2O*. First time *K1EA*. All that technology and no JA on 10 ... *WB3FIZ*. Police burst through shack door at 2 AM local in response to neighbor's report of unusual activity ... *AA4LH*. Too bad our professors didn't realize the significance of this weekend. We could have put a lot more time in ... *W5AC*. Propagation wasn't very good, couldn't run Europeans ... *N6MB*. Fun watching my 9-year-old son (*KC6CNV*) run 90 JAs in an hour in his first attempt at contesting ... *W6TMD*.

We aren't there yet! ... *W19L*. The bands were open all over the world—it was a lot of fun ... *KV5E*. Never called CQ—just joined in the pile-ups ... *WK5K*. Enjoyed the test ... *KG5EG*. First contest—much fun ... *AA5HR*. Sure miss my hilltop QTH in NM ... *K13L/5*. Quit early last year to upgrade and it helped this year ... *KG5SX*. Heard lots of folks talking about the great propagation, but it sure was not here ... *W5CWQ*. First and maybe last contest, as I woke up my wife at 3 AM saying 5904 over and over ... *N5NMX*. First time contest and can't wait till next contest ... *N5ERC*. Heard/missed 5 zones and 12 countries ... *KC5AC*. Was going to work all band but 10 was too hot to leave ... *N5HB*. Having *BY4AA* answer my CQ ... *NA4M/5*.

Another great test—keep it up ... *WB5UDX*. Be sure to sked fantastic propagation for next year ... *KG5VK*. Another good contest ... *W5FO*. Spent a lot of time listening and calling but 80 was wrong band ... *WB5YLT*. Hearing my friend *N6AR* from *HV3SJ* ... *W7CB/6*. Had to take down 80 meter dipole in wind before it wrecked tower ... *KE6ZE*. Thanks for a fun contest ... *W1FEA/6*. Conditions weren't as good as last year but still doubled my score ... *K16ZH*. After returning from a Halloween party, I operated for about an hour in a bunny suit but no help ... *KG6AO*. Working all those new countries ... *WX6G*. Really disappointing prop ... *KB6GV*. Never heard *BY* so loud on 80 ... *K6JG*. Licensed on July 5, 1989—great contest ... *N6VMS*.

Earthquake 7.1 plus S-9 noise tough conditions ... *WA6CTA*. Amp problems/computer program crapped out—lucky I have a sense of humor ... *KM4MF/6*. No thrills just fun ... *K6DMN*. Main rig 930 went out 6 minutes before test; lost day getting auxiliary set up ... *N6IBP*. Band condx were fair for this sunspot peak ... *W6OVO*. The ham in Hawaii arguing for 1 minute with a ham in Ohio about what zone Ohio is in ... *N6UGR*. Worked a few new band countries ... *WB6ITM*. Had a high SWR. Had to take antenna down during contest ... *KB6PIQ*. This was my first contest—lots of fun. I enjoyed beaming around the world ... *N6BFN*. Having Europeans tell me I sounded like east coast ... *K6SVL*. First station worked was *BY4SZ*. Had potato bug bite me in foot ... *KJ6GQ*.

A thrill to work over 100 countries on 10 ... *WX6M*. Prop not as good on 10 as last year ... *WB6MBF*. Was overwhelmed by the number of hams congratulating me for surviving the big San Francisco earthquake ... *W6BIP*. My first CQ WW contest ... *KC6ESL*. Still operating in the garage—very cold ... *WA6TKT*. Licensed on 10/3, on air 10/15, on contest 10/28, love it ... *N6WLF*. My first contest, got some nice DX ... *KC6BZO*. I didn't get to work the entire period as the XYL had other plans ... *N6TPT*. At 82 just making it through another contest is the challenge ... *W6OK*. Conditions were terrible 40 meters ... *N6RJ*. Conditions were again not good for the phone weekend ... *K5KT/6*. Band down this year (7 MHz) ... *K6HAM*.

Terrible conditions ... *W6RJ*. Software worked great! Had excellent time despite 20 over 9 QRN both nights on 160, 80, and 40. QSO totals too low ... *K7RI*. Kept waiting for the bands to open to EU, but the runs just weren't there ... *NN7L*. It was great seeing 10 meters open—both days! Thanks for another good contest ... *KC7UO*. Sure wish there was a rule that all stations must ID after each QSO! ... *KS7T*. QRM I can work. It's QRN I hate! ... *NY7T*. With help, got my two-element quad up about one hour before the contest began ... *WA7FAB*. Working a new

country on both 80 and 40 despite poor antenna for those bands ... *W7GUR*. Fabulous European opening and African openings to west coast—best in 30 years! ... *KC7DB*. Four China QSOs? Wow! ... *N7ENU*.

Good condx. As usual—fun! ... *KA6V/7*. Good contest. Band conditions were pretty good ... *W7QN*. My XYL, *N7KOV*, kept the rig all to herself Saturday to boost her country total ... *KR7L*. Working musician at night and a football fanatic during the weekends, but love this contest ... *N7LOX*. The most fun you can have without laughing! ... *W7WHY*. Great to be back after 6 years of inactivity ... *KD7C*. Working *J37DX* after a 4 hour chase ... *WA7TUX*. A solar flare a day keeps the good scores away—blah! ... *K7LZJ*. As usual, roaring pile-ups on double multipliers Sunday ... *W7TJ*. Computer logged for first time. Thank you, *K1EA*. It was a pleasure to have the logs done ½ hour after the contest. Condx over the pole stunk ... *K7LXC*.

Condx were great. Where were zones 34 and 39? ... *NQ7M*. Could sure use a good computer logging program! ... *NW7Q*. Exceptional band conditions. Never intended to enter contest, but condx remarkable ... *WY7U*. First contest submittal since winning for W7 all bands in 1959. Looking forward to next year ... *W7UPF*. Hurricane Hugo cancelled my *VP2MBA* operation ... *W7FP*. Rotor broken, spare broken, amp stuck in xmit, neighbor called about TVI, a great contest anyway! ... *AG7J*. Stayed home because of business at last moment. Look for me in 1990 from a DX spot ... *WB7RFA*. Watching OM Bill "twitch" when he knew I was calling in a pile-up ... *KB7IRF*.

Glad to finally have all equipment work all weekend. First time for computer logging—fantastic ... *WB3KKX/8*. Never heard the bands so crowded! Just couldn't get a decent run started ... *KC8JH*. Ten meter condx great, but 80 meters not so great ... *KD8KX*. Bad polar path propagation into USSR. Only worked six QSOs in zones 16–19 combined! ... *N8AGU*. Thrill was to break pileups with just 100 watts ... *W8MEM*. Finally nailed a JT1 in contest ... *W8YGR*. Just looking for new band countries and prefixes. Thanks to all for QSOs ... *WA8YTM*. Conditions way down from 1988. Score just 25% of previous year (3.5 MHz) ... *W0CD/8*. Did anybody work any VKs or TFs on 10? Ouch! ... *N8FEH*.

Do I get three extra multipliers for working the neighbor's three touch lights? ... *WG8M*. Footswitch failed 1800Z Sunday and mike not wired for VOX, touched two wires together to TX rest of contest ... *K3ZJ/8*. Had fun. Looking forward to next year ... *KA8VPL*. Looking forward to next year's contest. Had a ball this year ... *WA8NDE*. Many thanx to *WA8OSE* for letting me use his station—thanx, Dad! ... *N8JEC*. Murphy stayed away from my gear, but managed to strike me with a 20 over 9 toothache! ... *N8EXS*. My first ever CQ WW. I'm hooked! Thanks for a great weekend ... *KC8FS*. Too bad there is no Novice category. This score was accomplished using only 28.3 to 28.5 MHz! ... *KB8HZE*.

Who said verticals don't hear well? I heard lots of noise with the best of them! ... *WR8K*. Working 100 countries in a weekend was great ... *KF8K*. Ten meter DXCC in 9.5 hours! Was it worth it? You bet! ... *W0AIH/9* (Opr. *N0BSH*). First time using *K1EA* software but my computer outsmarted me. It reset UTC for Daylight Savings to Standard time on Sunday morning! ... *W0ZV*. 22K for my first test, look for more next year ... *KB0ENE*. Eight new countries, 600 points more than last year



The fellows at the youth club (average age of 17) in Shanghai, China put *BY4AY* on for the CQ WW for the first time. They say they will be back with higher power and better antennas next year.



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on a tougher band . . . **WB0YWO**. After 11 yrs a ham, worked my first KH8. Thanks for the new one . . . **KK9G**. Antenna stuck in south direction . . . **WD9FEN**. Bad band conditions . . . **KA9JOL**. Beating my last year's score . . . **KD9HT**.

Biggest thrill was on Saturday evening when TL8SC called on the back of my beam while I was working JAs! . . . **KD0ZR**. Completed WAZ by working Mongolia (zone 23)—**JT1KAI** . . . **K9YNF**. Contacts made. Probably highest score made in contest. Didn't use full time . . . **W9TNZ**. First contest for me (licensed 9/89). Should have separate awards for Novices. Surprised to get through pile-ups with 80 watts! . . . **W9YB** (Opr. **KA3VCJ**). First contest since being licensed this year. Great condx. Looking to break 100K next year . . . **N9ITX**. First contest that I ever worked 100-plus countries on 10 meters . . . **W19H**. First contest! . . . **WA9GON**. For 34 years I have always wondered what percentage operators tune up the band vs. tune down . . . **W9GXR**.

Good contest conditions on higher bands . . . **K0TLM**. Great contest! Ten meter condx to 9-land were super . . . **K9MDO**. Great idea—single op unlimited. Give us true single ops a chance! . . . **WE9R**. I forgot how great barefoot was on 10 meters! Best pile-up busted was calling **6W7OG** in French and getting right through! . . . **WB9JKI**. I was still putting up antennas after the contest started . . . **AD7G/0**. International communication creates fun and good will! . . . **NY0R**. Less than 10 hours of op time—still enjoyed . . . **W0OSK**. Line noise, bad amplifier problem, QRM! This may be my last contest—until next year . . . **N4CC/9**. Lost good op time to go to Packer game, but they won so that's OK . . . **N9ICH**.

Lousy band condx plus equipment trouble plus family emergency equals a poor contest in 89! . . . **W0BWJ**. Many stations identify their calls poorly and not often enough! . . . **W0ACT**. My first contest effort and it was very difficult to log any contacts until Saturday afternoon . . . **KA9HDN**. Never worked so hard only to be thwarted by the almighty solar monster! . . . **K4VX/0** (Opr. **W00G**). Nice country array . . . **W0LC**. Rain and lightning all weekend. Could only operate half the contest . . . **KB0G**. Should have put up that extra 10 foot section . . . **KK9L**. Terrible conditions on 80! . . . **AC0S**. Thanks to **W0AIH** for use of the aluminum! . . . **W0AIH/9** (Opr. **KB9S**). This is the greatest of all contests! . . . **WB0GFV**.

When 10 meters pops, it really pops. Sometimes I couldn't find anyone on 20 meters! . . . **N19C**. Where was Europe on 14 MHz on Sunday? . . . **K9CAN**. With all the openings on 10 and 15 we did not see as much this year on 40 . . . **KV0Q**. Worked 5 new countries . . . **K9BQL/0**. Worked TF3CW for new one . . . **N9ACD**. Worked zone 19 last for WAZ . . . **KB9AIT**. You know the band (10 meters) is in good shape when you work all continents in 1 1/2 hours barefoot to a vertical! . . . **W9LYN**. Fantastic conditions . . . **AK1A**. Was on my way to best score ever, when laryngitis stole my voice after 20 hours. Spent rest of contest in search and pounce mode, hitting voice keyer buttons . . . **K1VR**.

Happiness is being called out to work 45 minutes into contest. Darn it! . . . **KC8PE/1**. Great fun! 10 meters was hot! . . . **KC1EO**. Big decision which spot to work next . . . **K1GW**. Having packet really slows down the QSO rate, but oh what multipliers! . . . **AD1C**. Working over 100 countries on 10 meters . . . **KA1MDG**. Computer logging and packet make phone more fun! I nominate K1EA for CQ Contest Hall of Fame . . .

W2GD. Finally got my QSO-to-TVI complaint ratio to below 200 to 1. Broke 1 Meg for first time . . . **WB2K**. My personal all-time top score—twice more than I ever made! . . . **N2VW**. Kudos to the excellent YCCC PacketCluster. Single Op Unlimited is a great category . . . **WG2E**.

Ten meters fun. Be a lot more fun without unusual prefixes . . . **KB2XL**. Finding ZS8MI high up in the band on 20 meters and working him for a new country . . . **WM2D**. Hearing the DX packet callouts come out on the voice repeater with a synthesized voice. HI! . . . **K3RL**. Just one year after the heart transplant and my score increased by a multiplier of 17X! . . . **NU3Y**. First contest from home QTH. It was great fun and conditions were great! . . . **KA3PLS**. My wife putting up with me and fielding some TVI complaints from a neighbor . . . **KB4NJ**. Ten, 15, 20 were just wonderful, but 40 and 80 were disappointing here . . . **K4PR**. **XYL** (**KB4SSS**) has Quad on 20-15-10 so I used vertical . . . **K4DLI**.

Only 7.7 hours of operation. Worked 100 countries on 10 meters in 5.2 hours! . . . **WB4QNP**. The new Single Op. Unlimited mode has put a mega-dose of fun into contesting for the average ham. I love it! . . . **KD5GD**. Winds to 45 mph, all kinds of QRN. Winds quit at 0030—30 minutes after test over! . . . **K6EID**. K1EA software was a lifesaver . . . **N6SRT**. Although I wasn't serious, Murphy still came in the form of 60 mph wind blowing down 10 meter vertical. He sure knows how to spoil the smallest of efforts! . . . **N6TIB**. First DX contest ever! It helped that I upgraded from Tech to Advanced the previous weekend . . . **KC4IRP/6**. Beating N6RO in a pileup. Working 9M8XX in last 4 seconds of contest . . . **KA6ING**. Wow! Lots of fun with PacketCluster and K1EA software. Thanks for new category . . . **K13V/7**.

My Heathkit equipment of 21 years still getting me through my 21st CQ WW contest! . . . **K2MFY**. Lots of fun to work 46 countries on 10 meters with a dipole inside my apartment! . . . **WA2OJK**. Nothing blew up! . . . **K2SWZ**. My first contest; been ham 4 months! . . . **KB2HZI**. My first contest, age 14! . . . **KB2HNY**. First try with K1EA program. My fingers hurt for the first time in a phone contest! . . . **N2BA**. It's a completely different contest for the mobile op! . . . **N2KW**. CQ WW—What a contest!! (apologies to Yakov Smirnoff) . . . **KT2D**. Using K1EA and computer for the first time! . . . **W3BGN**. Having Y11BGD call me! . . . **W2AX/1**. Where did KP2A learn to talk so fast? . . . **W1HUE**. Murphy strikes! Blew two amps! . . . **KS1L**. My wife would like to request that the contest not be held the weekend prior to Halloween. It interferes with parties! . . . **N3GMG**.

STATION OPERATORS Multi-Op Single Transmitter

A35VB: OH2BGD, OH2VB. **AA4LH** & **WA4NAT**. **AA4NC** & **AA4GA**. **AH2BE/KH9**: AH2BE, N8BJQ. **AK1L** & **KA1FBY**, **KA1MI**, **KA1X**. **AZ4F**: LU1JH, LU1FOW, LU1JRL, LU2FID, LU2FYA, LU4FDV, LU6FN, LU7FIL, LU9FFU. **BY1PK**: BZ1AA, BZ1AB, BZ1AI, BZ1AJ, BZ1AL, BZ1FB, BZ1HAM. **BY1SK**: Gong Ke Ou, Chen-Wang, Li Yan (YL). **BY4AA**: BZ4AA, BZ4AYL, BZ4CQ, Tang Yin Chun, Chen Guo, Yonh Min, He Ping, Wang Xiao Wei. **BY4AY**: Gao Hong, Wu Li Jun, Chang Ling, Sun Wei, Qien Zhen. **BY4SZ**: Zhang Dong, Zhao-Jiren, Shen Qinh, Wang Xiao Ru, Lihua Xing, Cai Yan, Zhu Yan, Wu Zhi Yuan. **BY5HZ**: Li Hong, Liang Li, Feng Xin Shan, Han Ye, Xiu Xiao Yin. **BY5QA**: Lian Huan, Lin Oi-Hui, Lu-Min, Wu Xiao-Yi, Zhen-Yin, Tan-Zhang. **BY5RA**: Sail Bao, Zhonghan Cai, Huaqiang Cheng, Wei Hua Hou, Lan Lin, Shaowen Lin, Minghui Shi, Chaoping Wang, Zhixian Wang, Dawei Zhang, Ye Zhang. **C30EEA**: C31LDN, F6FNL, F61QA, FD1LMI, FD6ITD. **C53FW** & **C53FV**. **CE2AA**: CE2BMU, CE2ENJ, CE2EPB, CE2FTF, CE2HKX, CE2MH, CE2NHW, CE2WO, CE3BSV. **CE4MWK** & **CE4PBB**, **CE4PBG**. **CF1DX**: VE1ARW, VE1AWZ, VE1BIG, VE1BII, VE1BUN, VE1BZO, VE1CIT, VE1DX, VE1OFR, VE1UA. **CU3URA**: CU3AA, NM5M. **DF0CBG**: DB2IR, DB7UU, DB9UU, DF2AIQ, DF2AIQ, DH0IAY, DK9UV, DL1AIC.

DF0RN: DK1IT, DL3YCJ, DL5JQ. **DF0RR**: DJ0GK, DK6QI, DL4FT, DL7AEN, DL7AKC, DL7ALM, DL7ANR, DL7APU, DL7OD, DL7ON, DL7PV, DL7RT, DL7SI. **DJ1HT** & **DL1EFD**. **DK6NP** & **DF4RD**, **DL3NCI**. **DK0IN**: Club. **DK0MM** & **DJ7IK**, **DK9ZT**, **DL1FCT**. **DL1DAS** & **DK4DX**, **DK9DL**. **DL3NBL** & **DL6NAA**, **DL8NCG**. **DL0RL**: **DF8AN**, **DJ1YJ**, **DL2AAZ**. **DL0WH**: **DF6IH**, **DF7IT**, **DK8IT**. **DX1A**: DU1AHS, DU1AU, DU1SAN, DU1SW, DU1TDY. **DX1CW**: DU1COP, DU1CWJ, DU1CWO, DU1CWT, DU1CWY, DU1DSP, DU1EAA, DU1ECR, DU1EFS, 4F1AED, 4F1AOC, 4F1ARC, 4F1ASM, 4F1BYN, 4F1CJC, 4F1CRU, 4F1DMD, 4F1DWW, 4F1EBC, 4F1FZ. **EA1MC** & **EA1AX**, **EA1AGE**. **EA3EZO**: EA3TZ, EA3CCN, EA3EBN, EA3EZO. **EA6FO** & **EA6FB**, **EA6OB**. **ED1SML**: EA1EVQ, EA1EVR. **ED3IN**: EA3IN, EA3CCI, EA3DMN. **ED3QD**: EA3BOW, EA3BOX, EA3DGO. **ED5WDS**: EA5EEP, EA5EVC, EA5FYT. **ED7WV**: EA7DOV, EA7GTG, EA7GTF. **EI2VNO** & **NN5O**. **F6BGC** & **F6BNH**, **F6IOC**. **F6HLC** & **FD1HQY**. **FF10LQ**: FC1ONB, FD1OAZ. **FF2LY**: F1JFT, F1JPJ, F6CUD, F6DKJ, F6DQX. **FF5KK**: F6HHU, FD1LMW, FD1MWA. **FF6KPO**: F6CTS, F6DZD, F6ETI, F6IPW, FB1LWX, F11AEH, F11HMB, F11HME.

FV9NDX: EA9EO, F6BBJ, F6BEE, F6CTT, F6HSV, FJ5BL. **FY0P**: F1DUX, F1LGO, F6A0I, F6AUS, F6BFH, F6BUM, F6FVY, F9IE, FY5AN. **G3SZA** & **AA6MC**, **G8LKH**. **G0CCH** & **G0CDO**, **G1YIY**. **G00CSR**: G1CYB, G4XWK, G8GFF, GM1JPJ. **GJ6UW**: G3COJ, G3UML, G3XTT, G3ZAY, G4AZN, G4BUO, G4DSE, G4JVG, G6IBI, GJ3YHU, GJ4ICD, GM3YOR. **GM3PXX**: GM4LDU, GM4WQQ, GM4ZGU, GM0ARD, GM0EGI, GM0LIR, GM0LYM. **GM4AGG/P**: GM3CIX, GM4NUN, GM0EFH, GM0FHJ, GM0GMO, GM0HNV. **GM0IZS**: GM0FKP, GM0JFH, GM0KVI, GM0RJK. **GU0JCI** & **GU7CQ**. **GW8GT**: 5B4LP, 5B4MF, G3DAY, G0KVB, GW3KYA, GW3NWS, GW4IGR, GW4JBQ, GW4TTU, GW5NF, GW6ZUQ, GW0MAW. **HA3KGC**: HA3FT, HA3HV, HA3HA, HG3IW, HA3HK, HA3IB. **HA3KNA**: HA3NS, HA3NU, HA3OU, HA3OV. **HA5KDB**: HA5MY, HA5KQ, HA5BBC. **HA5KKB**: HA5DA, HA5KB, HA5NK, HA5NG, HA5BIE, JA7JBF. **HA6KNX**: Jozsef, Zsolt, Nandor. **HA8KCK**: HA8DT, HA8DZ, HA8EK, HA8FT, HA8FW, HA8KH. **HB9AGC** & **HB9AIB**, **HB9AJM**, **HB9ALM**. **HB9H**: HB9BLQ, HB9CAT, HB9CIP, HB9CXZ, HB9DDO, HB9STI, HB9STL, HB9YC, Emanuele. **HC2T**: HC2AGT, HC2BZ, HC2AI, Neza, HC2AS, HC2PC, HC2LZ. **HG1S**: HA1TJ, HA1DAE, HA1SV, HA1AL, HA1DAC, HA1AH, HA1TD. **HG4P**: HA4WQ, HA4XH, HA4XX, HA4ZD, HA4ZZ, HA8LKK, Tibi.

HG5A: HA5AWH, HA5BNL, HA5FM, HA5GF, HA5IW, HA5LN, HA5MK, HA5ML, HA5OM, HA5UA, HA5WE, HA7RY. **HG5C**: HA1AG, HA3OS, HA5MO, HA5OG, HA5WU, HA7AD, HA7SB, HA7XQ, HU8UB. **HG6N**: HA6ND, HA6NF, HA6NQ, HA6NY, HA6ON, HA6OQ, HA6PX. **HG0X**: HA0DU, HA0LC, HA0LO, HA0MK, HA0MM, HA0NN. **HI3UD**: HI3JMP, HI3LFE, HI3LRR, HI3MBO, HI3NIE, HI3NMU. **HI9UD**: HI3AMF, HI3ARQ. **HZ1AB**: DU1CSU, K1BVM, WB4CVH. **IK0NWD** & **IK0NWE**, IT9LGM. **IM8A**: I8BYG, I8EZW, I8IYW, I8KPV, I8QLS, I8ULL, I8UZA, IK8DOI, IK8DUB, IK8ETA, IK8HVH. **IO9JKY** & **IT9BCC**.



Here's the gang from multi-op HI3UD. Standing left to right are HI3LRR, HI3JMP, and HI3NIE. In front are HI3LFE and HI3MBO.

IT9FTN, IT9LCM, IT9MUO, IT9YXO. IP4T: I2EOW, I2TZK, I2VXJ, I4JHY, I4UFH, I4USC, I4YSS, IK2BKX, IK2FGL, IK4IEE, IK2CFH. IQ4A: I4VEQ, I4LCK, I4ZSQ, I4IND, I4IKW, I4TJE, I4EAT, I4RNL, I4YRW, I4LEC, IK4CFZ, IK4NPD, IK4EWK, IK4GKM, I4WANY. IV3JWR & IV3DXW, IV3HWT. IY4FGM: I4FGG, I4JEE, I4RXB, I4XNN, I4K4CT, I4K4JW, I4K4NO, I4K4NOT. JA1YKX: JA11ST, JA5SBN, JH4OWG, JH7JVR, J01VVT, J01VNM, JR4UPJ. JA1YXP: JG1TNX, JG2QHQ, J11UTP, J01J0Z, J01SBZ, JP1SMR, J01UXN, JS1DRL, JS1INN. JA2YDC: JE2EZO, Fushimi, S. Hirooka, Y. Kimata, Y. Mogi, A. Moroto, K. Torai, K. Uno. JA3YBF: JJ3IMX, JJ3KGS, J03VUZ, JF4FUF, JG4CLV. JA4YJA: JJ3LJU, JM3ILK, J03GPL, JF4BVU, JF6BPL, Genzo. JA5YAP: JL3UDU, JL3UUU, JF4XYI, JR5FHC, JR5RSQ, JR5VMR. JA6YBR: JE6WME, JF1DEA, JF1DHS, JG6GMR, JI6BRB, JI6ROX, JR6GKT.

JA6YCL: JE6EKC, JF4CZL. JA6YJS: JF4ETK, JG4SVN, JI6KYX, JM2RWM, JQ3BAM, JS1PWV. JA7YAA: JE7HLZ, JE7JZC, JEBAWL, JH0ORW, JJ3CNL. JA9YAA: JE0NSE, JH9WER, JK2OWL, JN3OCB, JR9DKJ, JR0HIX, Yutaka Kawakami. JABYAK: JE7GWO, JH0VYG, JR0DUM, JS1PTU, JI70ED, JH0RGJ, JR0HYT, JR0FQU, JE0FMT, JG7JMD, JK2PVL, JE0DUA, JR9EMM, JR9KPO, Yamakura. JABZRY: JP1OGO, JP1NOM, JR0TGT, JR0SXX, JH5XDD, JI2IAW, JN1JVA, JH0ILL. JE3ZFS: JK3HZH, JL3MCM, JQ3NZW. JH1YDT: J01IDL, Hidekazu Naguchi. JH1YHS: JF1MIA, JR7GG0, Yoshida. JH8YCT: JE8BFO, JE8RAH, JE8URM, JF7LGH, JR8GPT, JR8WLI, JR8XWU. JJ3YBB: JA3AHL, JA3FHL, JA3PJL, JE3TXA, JH3FQF, JH3UHG. JR7YCM/7: JA7TZT, JE7WQR, JF7KWM, JF7RQN, JG7LBD, JH7NPF, JR7JPC, JR7RXY, JR7WFC. JT1KAI: J. Ceden-Ish, B. Zaisan-Baror, J. Sukhe, S. Dortpalam. JT1T: JT1BV, JT1BX, JT1-183, JT1-210. K1IU & K2SX, NS1I. K1NG & K1UO, KB1EM, K1IG, Kim. K1TO & K1KI, K1XA, KA1CI, KA1JNR, KA1VC, NQ1K, NJ2L. K1YR & K1CC, KA1ION, KB1WH, N1GTK. K2OP & K8QDT, N2HBW, NV2Z, NW2K, WA2DKJ. K3ANS & K2BPP, K3YD. K3IVD: KA3SCY, K3YDX, KA4RHS, N2GAR, N3CBJ, NN3O, WA3KZR, WB6VGI, W3IP.

K5BDA & W5PWG, W5EP. K5RVK & K5GN, N5EA, NR5M, W5ASP, WA9VLI. K6USH & N6RSZ. K6ZM & CE3AQI. K8AZ & K8BL, K8NZ, K08M, N8ATR, N8DMM, WT8C, WT8F. K0CS & AB0I, KB0U, N0FVG, W8TN, WK0R. KA1GG & K1KJT, KC1QH, N1AVA, N1ZE, W1KM. KA1OFC & KM1P, KC1LN. KA1X & AK1L, KA1FBI, KA1MI. K3DI & NV3V, NG1W, N3FZB. KC5DX & WQ5W. KC0LX & K0ONS. KD9MF & KA9JAZ, KA9VPI, Crissara. KE4QL & N4NSL, WD4Z. KE6WL & KD6NT. KF0H & KZ0C, WD0EWD. K01F & K1PR, K1XM. KQ2O & K2BK. KR0B & AF9T, K0II, KJ0B, N0BIL, N0BKL, WJ0M. KS9K & K9CJ, K9GS, N9AU, N9AW, N9GNQ, N9EJ, N9IU, N9KI, N9OF, W9RN. KU2C & K2HZ, KE2HG, KY2O, N2GST, WA2MKM. KX6OI & KX6GL, KX6HE, KX6WS. LA1H: LA2MV, LA5NM, LA6EDA, LA6VDA, LA9NGA, LA9PEA. LA1T: LA3CX, LA4BQ, LA6OV. LA3T: LA5QFA, LA5SFA, LA5WBA, LA60EA, LA7SP. LT5F: LU5FCI, LU5FIC, LU5FNH. LU1KFR & LU1FTC, LU2F. LY1BYK: Club. LY1BZB: LY2BBF, LY2BKF, LY2BLA, LY2BNI, UP2-038-2518, UP2-038-1157, UP2-038-2528. LY1BZR: LY3BFL, Club. LY2WW: LY1BA, LY2BIJ, LY2BRP, LY2BPX.

LZ1KBB: Dimitar, Ivan, Rusan. LZ1KKR: LZ1-C-53, LZ1WL. LZ1KNP & LZ1-N-143, LZ1-N-151. LZ1KSP: Maria, LZ1-E-229, LZ1CI, LZ1ZP. LZ1KXA: LZ1BB, LZ1HA, LZ1HK, LZ1ZO, LZ3ZZ, LZ1-A-1154, LZ1-A-1159. LZ9A: SV3SJ, LZ2CC, LZ2PO, LZ2DF, LZ2HE, LZ2II, LZ2UA, LZ2SC, LZ2KK, LZ2PS, LZ2DD, LZ2BE, LZ2CT, LZ2NG, LZ2TT, LZ2XA, LZ2-E-41, LZ2-E-72. NL7KJ & NL7BJ, NL7KE. N2SS & W2GMA. N2UN & AA6RX. N3ARK & K3IE, K3MM. N3BNA & K3CN. N3RR & WA3VOX. N3RS & KQ2M, WB3KTX. N4QWL & AB4MG, K4HNS, K4LB, WA2GYM, WF2G. N4RJ & K3JT, KM9P, N4NX, W8ZF. N6MB & WA6IET. N6RO & K6TMB, W6RG, W6SZN, W6BOKK. N7RO & K7GX, N7MMH, W7EKM, WA7ZWG, WB7CLU. N8BNG & K8ET, K8JZV, K8BYFN, K8BLC, K8DFC, K8ST, VE3KRP, VE3MOE. N8ICI & K8JGH, N8ILS & N8IOS. N8ZA & NN8M. NC3C & N3DXY. NF6S & KF6VU, N6SKF. NK7U & KG6LF, KH6WZ, N7GPO, N7T. N07F & K7GWK, KF7DQ, N7HGJ. NU0P & K0VM, K0VZR, N0SM, N0BO, W0IZ, W0WP, W0EM. OE2XEL: OE2DYL, OE2EJN, OE2EN, OE2LCM, OE2MOM, OE2SCM, OE2VEL. OE5XGN: OE3GEA, OE5VBL. OH4AB & OH4EA, OH4YR, OH4NGW, OH4MLX, OH4TY.

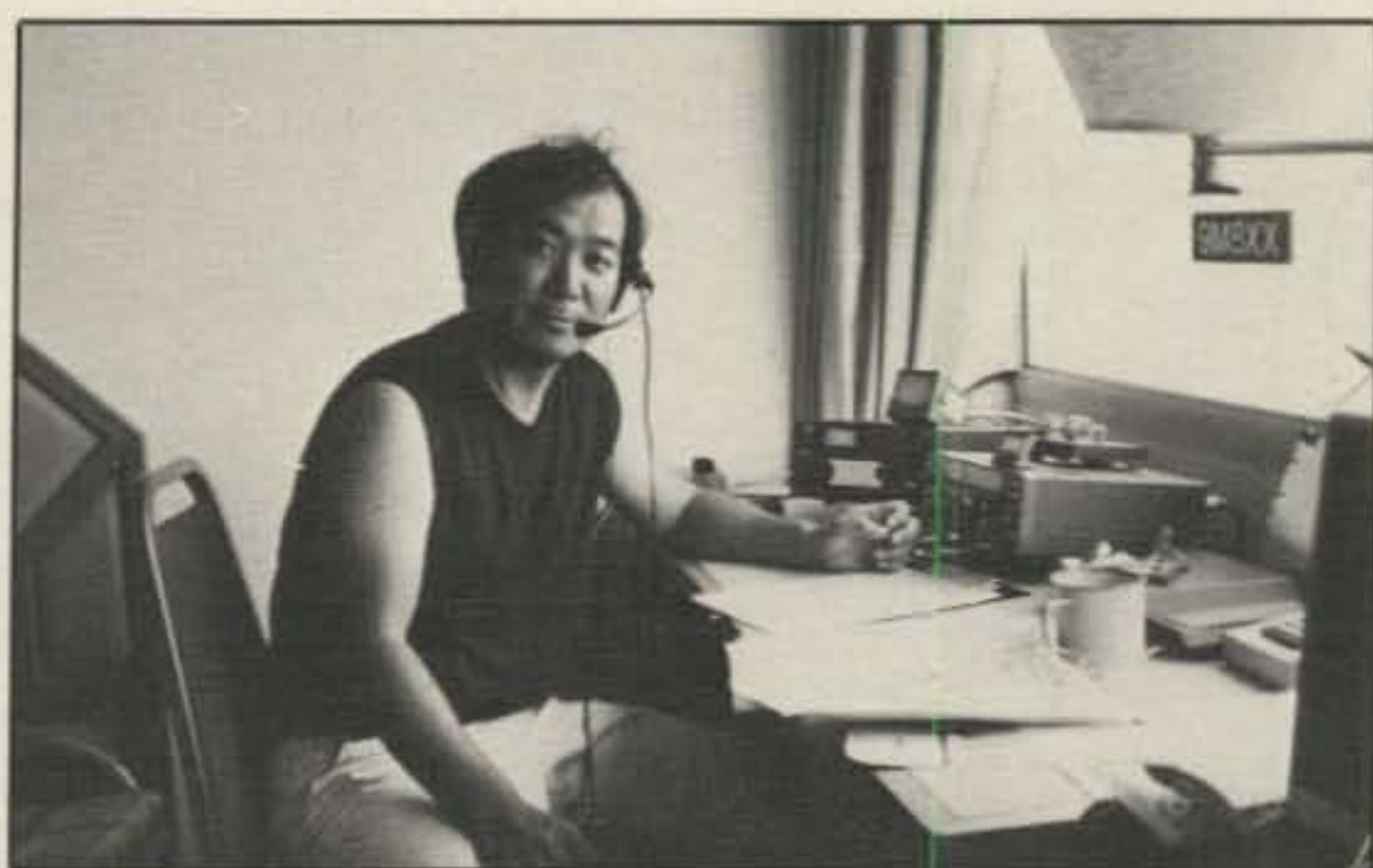
OH5NQ: OH5KS, OH5NW, OH5TS, OH5XL. OH9AR: OH9KK, OH9MBS, OH9MV, OH9RJ. OH0AM: OH1EH, OH1JT, OH1NOA, OH2BVI, OH2JA. OK1KJA: OK1AJN, OK1FGC. OK1KNC: OK1FWD, OL3BUF. OK1KNR: Club. OK1KOB: Club. OK1KPU: OK1DOY, OK1JDX, OK1JOE, OK1JPH. OK1KQJ: OK1AYP, OK1AZG, OK1BY, OK1DXS, OK1IMP, OK1RR. OK1OFM: Club. OK2KBA: Club. OK2KDS: Club. OK2KHD: Club. OK2KJU: Club. OK2KMR & OK2BQJ, OK2BQZ, OK2-30624. OK2KOD: OK2BHM, OK2WAZ. OK2KVI: Club. OK2KYC: Club. OK2RAB: OK2PDK, OK2PEM, OK2HBY. OK3KGX: Club. OK3KSK: Club. OK3KUN: Club. OK5R: OK1ADM, OK1ADS, OK1ALW, OK1AWZ, OK1DIM, OK1RI. OL4A: OK1AEZ, OK1CF, OK1JTB, OK1JKT, OK1TA, OK1TN, OK1WT, OK1ZED. OL8A: OK2PZW, OK3CBU, OK3CDV, OK3CZM, OK3EA, OK3GI, OK3JW, OK3LA, OK3LU, OK3LZ, OK3NA, OK3PC, OK3TAP, OK3TMM, OK3YEC, OL8CLU. ON4AAQ & ON4AFZ, ON4EJ, ON6UL, ON6VK. ON6AH/A & ON5AV, ON5IQ, ON6MH, ON6OR, ON6VL, ON7PC, ON7ZV. ON7UN & ON1CGX, ON6SK, ON7YU, ONL741, ONL2403. OQ7LR: Club. OR5EEC: CT4ND, DF3TF, ON4KRW, ON5GA. OX1O: OX3CS, OX3ZM. P40V: AI6V, N6BT, VE7KNI, WA6VEF. PA63DHR: NL10373, NL10594, NL10763, PA3AQL, PA3DHR.

PJ8T: K4PI, KN3B, W3BTX, WX4G. PJ9W: OH1TD, OH2BSS, OH4RH, OH4SE, OH4TH, OH4RW, OH4QN, OH5BM, OH6RM, OH6RI, OH6NU, OH6MW, OH6FT, OH6XY. R0C: UW0CA, UW0CN, UW0CW, RW0CA, UA0CDX, UA0CJ. RB4EXN: Vallo, D., Sheremet, I., Koloda, R. RB4IWM: Nick, Alexey, Alexander. RG8GWS: Soji, Viktor, Vartan. RL1P: UL7PAE, UL7PCZ, RL8PY, UL7PL, RL7PHL. RQ7W: UQ2-037-83, UQ2-037-116, UQ2GIG, UQ2GDW, UW2GP, Boris. SK2QG: SM2CFG, SM2LIY, SM2NNX, SM2ODB, SM2SUM. SM0BGM & SM0ATN. SP1PBW: SP1AMU, SP1BZZ, SP1MVZ. SP3KPN: Club. SP3PLD: SP3SBO, SP3IBM. SP4KTO: Club. SP8PFI: Club. SP9PEY: SP9CXX, SP9FKO, SP9HMC. SP9PEZ & SP9OHA, SP9MRM. SP9PRO: Club. SP9ZHR: SP9EMI, SP9-4315-KA. TI1J: K1AR, TI2KD, TI2LTA, TI2OY. UB2JWS: Constantin, Igor, Kirill. UB3GWR: Alexey, Mikhail, Igor. UB4IWI: UB5INT, UB5-073-4328, UB5-073-3793. UB4IZA: UB3IBZ, UB5ITC. UB4MWU: UB5MWM, RB5MAE, Venja, Oleg. UB4MIU. UB4QWW: RB5QW, UB4QW, UB5QLR, UB5-064-866. UB4TWL: RB5TN, UB5TBS, UB5-079-2. UB4VWA: Bessarab, B., Didenko, V., Romanyuk, R., Fomichenko, V. UB4WZA: UB5WCX, UB5-068-995, UB5-068-996, UB5-068-997. UZ4WZB: Alex, Andrej.

UB4XWK: Club. UC1AWC: UC2ABC, UC2OHU, UC2CFP. UF7FWC: Nazarov, T., Tewsadse, D., Kenia, A. UF7FWM: UF6FDU, UF6FID, UF6FJD. U19BWF: R1880, U18-053-2173, U18-053-2175. UJ9KWC: Olimov, Zhuchenko, Dunin, Ptuhin. UL8BWW: UL7BY, UL7BQ, UL7BB, UL7-016-389. UL8CWW: UL7-028-283, UL7-028-291. UL8LWA: UL7LEN, UL7LER, UL7-026-587, UL7-026-623, UL7-026-781, RL7LFW. UL8LYA: UL7LEZ, UWS9A, UL7LEG, ex-RA6XA, UL7-026-177, RA9AY, UWA9AK, UL7-026-796, RL7LGC. UL8RWE: RL7RCF, RL7RCL. UL8RWR: UL7RER, UL7-178-3. UO4OXA: Vlad, Vitali, Henry. UP1BZG: UP2BCO, UP2BCT, UP2BCW, UP2BTS. UO1GXJ: UO2-037-221, UO2GTF. UO8A: UO2GM, RO2GN, UO2GID, UO2GKL, Ingus. UR1RWQ: Aleksejev, S., Poldoja, P., Ignatejev, A. UR1RWX: UR2RRR, UR2RJ, UR2RDJ, UR2RHF, UR2RNX, UR2RNA, UR2RNT. UT4UWU: UT5UDI, UT5UGI, UB5-066-340. UT5UGR: Club. UZ1AWO: UA1-169-2391, UA1-169-848, UA1-169-900. UZ1AWQ: Timofeev, A., Onisshenko, E., Dolszenkov, S. UZ1TWB: RA1TE, UA1TFV, UA1UM. UZ3AWR: UV3AFG, RA3ARI, UV3AEV. UZ3DXS: Muchin, V., Titov, V., Golikov, A. UZ3QWM: UA3QLJ, UA3QPW, UV3QOI. UZ3QYA: UA3-121-1644, UA3-121-1506, Valchenko, A.

UZ3VXT: Pelovin, V., Akchurin, M., Zabelin, M. UZ4AXN: UA4ADG, UA4AMT, UA4AQD. UZ4HWS: Alex, Ven, Sergej, Al. UZ4HYR: Yuri, Slava. UZ4PWW: RA4PO, RA4PY, UA4-094-1210. UZ4SWQ: Club. UZ4WWB: Blinov, N., Saifullin, R., Nekrasov, A., Korotaev, A. UZ4WWY: RW4WR, RW4WZ, UA4WAM. UZ6AXS: UA6AQA, Bessarab, S., Kiselev, A. UZ6HXX: UA6-108-1838, UA6-108-70, UA6-108-71. UZ9CXP: UZ9CX, UA9-154-2105, UA9-154-2103. UZ9FZD: Izergin, E., Arsenok, A. UZ9QWA: UA9QFH, UA9-134-274. UZ9SWR: Porubajmekh, V., Ilkaev, R., Umanskiy, S., Blinov, S., Lisovoj, S. UZ9XWA: UA9-090-1053, UA9-090-1088, UA9XKU. UZ9XWV: UA9-090-747, UA9-090-1058, UA9XC. UZ9XXM: UA9-090-717, UA9XF, UA9-090-742. UZ9YXL: Club. UZ0SWX: Peter, Andrej, Konstantin. UZ0WWP: RW0WR, UA0W0, UA0WFA. V47QO: K2DOU, W9QQ, VE5GF & VE5AE0, VE5AGA, VE5BCT, VE5ELJ, VE5IC, VE6OU/XL3: VE2OZR, VE5DX, VE6OU. VE7GFC & VE7GAS, VE7GFS, VE7NS, VE7SZ & VE7CC, VE7IN, VE7ON. VK2MAG & VK2XKE, Peter. VK3VT & VK3CGH, VK3BMV, VK3GRA, VK3MZ, VK3CHR, VK3MCV, VK3BY, VK3MDB. VK9LV: K1JB, KD2EU. VP9LR & DK8FD, G4OSY, VP9ID, VP9NMA.

W1AF: KA1SSO, K3UOC, N1FME, N1GDA, WA3ZTW, WA7WFZ. W1AQ & K1AGA, KA1SFJ, KM1X, N01U, WA1VPC, WA2KFE. W1BK & WA1VAR. W2HPF & K2BSG, N2PP, WA2EKW, WA2LCC. W2OW: K1MEO, N2HR, NE2W, NK2H, W2MTA, WB8RAE, WE2K, WE2L, WF2A. W2RR: KA2DUG, N2DBI, NV2A,



Aki, JA5DQH, put rare East Malaysia on in a big way, as he racked up 3.2M at 9M8XX.

W2KKZ, W2WVC, WA2AOG, WA2MBM, WB2ABD, WB2CJL, WB2IVO, WB2YQH, WI2A. W2UI & N3KR. W3KWH: K3RYA, KA3JKS, KA3KSD, KC3MR, KC3YE, N3EQF, NW3C, W3SVJ, WA3DKJ, WA3VXJ. W3XU & N3FDL, OH5NQ. W5AC: KB5JPH, N5MOJ, NB9T, W05D. W5EHM: AA5BT, KA5WSS, KG5KI, N5OWJ, WR5J. W6TMD & AB6R, KB6UF, KC6CNF, KK6BB, NC6U, NN6U. W6XB & K4UVT, K16EZ, W0ZZ. W8FN & KU8E. W8SJV & WB8PHI. W9JZ & K9BIL, K9IMM, K9KVA, KQ9L, N9ADN, N9CHN, N9CPW, N9OM, NS9L, W8LA, WB9NOV. W0H8H & AA0A, KB0KK, KE0Y, WD0CHW, WD0FPY. WA3UDH/4 & N4VNF, N4VNG. WA4CUG & K2UFT, KC4EWK, KE7S, N4REC, N4REE, WA4PNY. WA4QQV & N4AOC, WA4QMU, WB4KLI, WD4MDY. WA5ZLI & KB5CWW, KG5TL, N5JDD, N5JWP, N5KCY, N5KT, N5KXR, N5NWQ, N5OPZ, WV5X. WB1DGV & KT1B. WB3FIZ & KA3GIK, WB3LFZ. WB8K & K8YSE, N8DCJ, W8CZN, WB8JGU, WB8UDN, WA8BIN, WA8RCN. WC6H & NU6S, NX6D. W66P & WJ6O. W67F & N7JXP, N7NHI. W19L & KC9JP, KC9LM, NB9C, NG9V. W7TD & K6XO, NZ7X.

XL3CPA: VE3CPA, VE3NJM. Y22YD & Y24YH. XU1SS/DU6 & DU6BG, W1RAN. Y32CN: Y32BN, Y32VN, Y32YN. Y37CB: Y37WB, Y37ZB. Y40DD: Y21XF, Y37EO, Y54NL, Y54TD. Y44CO: Y24AO, Y44NO. Y3T: Y3TEW, YU3BO, YU3HP, YU3HR. Y4D: YU4AR, YU4LA, 4N4EX, YU4NC, YU4RS-1045, YU4RS-1046, Dejan. YU3EO: YU3AI, YU3BM, YU3MM, YU3RN. ZM2A: ZL2AGY, ZL2ALP, ZL2AMT, ZL2AVF, ZL2BFG, ZL2BHS, ZL2BLC, ZL2BSW. ZS4K & ZS4Q. ZZ1AA: PP1BG, PP1CZ, PY1YT. 4J5FV: UB5I0K, UB5III, RB5IJ, RB5II, UB5-073-1151, RB5IUL, UB5IFN, UB5-073-322, UF6VZ. 4N2D: YT2TL, YT2VM, YU2DZ, YU2FK, Dado, Ivo, Luksa, Mato, Vido. 4N4C: YU4MA, Jana, Miha, Muki, Samir, Vachko. 4Z7M: 4X10M, 4X4YM, 4X6MI, 4X6UT, 4X6UU, 4Z4KM. 5B4ES: 5B4WN, 5B4WS, 5B4XF, 5B4XN, 5B4YS, Adonis Charalambides, Savvas Georgiou, Yiannos Toliass. 5J6CQ: HK6BDX, HK6BTC, HK6KKK, HK6LNO, HK6MKK. 6Y5X: KN5X, WB5N. 8P9X: K3KG, K4FJ.

Multi-Op Multi-Transmitter

C6A/N4FD: N4FD, WB4FLB, W1UA. DF2RG & DF7MV, DF9RB, DG2RCH, DG3DAW, DH5MBB, DJ1QJ, DL1MAJ, DL2AW, DL3MAA, DL5RBW, DL6MAO, DL7MAE, DL8AM, DL8RBR. DF3QG & DJ1FC. FS/KC1F: KC1F, N1AU. HB0/HB9A0N: DJ2YE, DH9EAW, DK5EZ, DL3EBX, DL6EAG, DL8EAG. IU3A: I3MAU, I3EVK, IN3DYO, I3JSS, I3ON, I3FIY, I3KVV, I3GJZ, I3BYT, I3TGE. J37DX: W8KKF, K8CV, WD8MGJ, WD8ATS, NY8E, J39AL. JA1YFG: JL1BLW, JN1JMO, JG1BMV, JG1RUR, JP1JFG, JP1OGL, JQ1BRW, JS1MVE3, JI3BKF, JE7WBI, JH0LFE. JA2YKA: JG2VTD, JE2VZB, JK2CZL, JL2KRD, JE4LTK, JE2HPN, JR0IRB, JM2FPQ, JK1GRT, JM2RBB, JM2RBB, JI2CKV, JJ2MGG. JA4YEV: JP1EVD, JK3VOC, JL30YO, JL3NAW, JH3LOU, JQ3GZT, JF4JXS, JG4JYN, JH5NAH, JH5FWA, JR5RCH, JF5AJQ. JA7YRR: JA7CEC, JA7FDY, JA7JUD, JA7LBY, JA7MQM, JA7OZW, JA7WSC, JA7VHZ, JH7MEV, JG7JTB, JF6NKV. JA9YBA: JA9LJ, JA9LJN, JA9NFO, JA9OTX, JA9PPC, JA9VBC, JA9VDA, JH9KIF, JH9VSF, JR0ELG, Hiroshi Fujita. JE2YD: JH1EAQ, JE1JKL, JA2IVK, JA2VWG, JA2PHO, JH2BNL, JR2SQU, JF2DQJ, JF2XJE, JI2KVV, JF2E0C, JG3LZG, JI3ERV, JI3JGJ, JR9OMD, JA9-10148, Noriko. K2TD & WB2YOF, WB2R, K3GYS. K2TR & K2EK, K2XA, K2RD, WB2KMY, WA2SPL, KM3T, N1CC. K3ZZ & WA3EKL, W3AOE, NM1Z, KN3P, W3HXI, KS3L.

K5NA/2 & KU2Q, WB2Q, W2JU, KR2J, KY2J, NA2N, KA2TIP, N2AA, K2TW, N2EK, W2RO, NX2X, N2GOS, KA2YMJ, KD2NE, Sherry King. K8CC & K8AQM, KB8ECG, K8GL, N8COA, W8LU, AC8W, K8DD, W8UA, WA8RRR, K5GO, WB8VMN. K9UWA & KA9A, KR9V, KE9AG, K9JHS, N9GH, WB9YBI, N9BW, NB9F, K9VFE, N09H, KR9U, WD9WGA, KE9NY. KC7OD & K7ABV, N7AGP. KL7AA: KL7BB, KL7HFQ. KL7RA & KL7XD, AL7CO, AL7IF, AL7HC, AL7AF, NL7V, NL7PH, AA6DX. KL7Y & JH4RHF, JK3GAD, KL7HFA, KL7U, NL7GP, NL7HP, NL7MW, NL7RT, WL7E, KL7HF, KL7PJ. K07N & N0XX, W7IL, W7JR, W7JS, W7N, K7DBV, WA7TD, WA7FXO, KC7EM, A17W, NS7P. KY1H & AA2Z, WA1ZAM, NT2X, AK4L, KR1R, KT1O, KA1RE, KB1W, NJ1F, NJ1M. LX7A: DL3LAB, DL4MCF, DL4MEH, DL5IC, DL5MAE, DL6FBL, DL6NCY, DL6RAI, DL7AV, DL7MAT, DL8OH, LX1H, LX1MK, LX1WW, PA3CEF, PA3DWD, DA1DW, DA1KM, DF2UU, DF3CB, DF3QL, DF7RX, DJ0IP, DJ1AT, DK1FW, DK2OY, DK3GI, DK5WL, DK6WL, DK8MZ, DK9IP, DL1SBR. LY2WW: LY2BAW, LY2BIG, LY2BIL, LY2BTA, LY2PAJ, RA3OK, N2RM & WM2H, KZ2S, N2NU, NF2L, KY2T, WA2IUO, N2MR. N3LR & NJ3A, NW3B, N3F0B. N5AU: W5XZ, K5TA, KM5X, N5CR, KS1G, N5TR, KY5N, WB5VZL, WN4KKN, AA5B, WC4E, WB2ULI, WD5N. N6DX & AD6C, AE6E, AD00, WA6OTU, KA6SAR, N6DLU, WA7ZTN, W6AE, N6IC, N6VR.

N6ND & K9VV, W6YA, N16W, K6JYO, NE6I, KT6V, WN6K, JR1CVV. NB1H & NX1H, NX1G, N1BL, W1RX, K1ST, K1FWE, K1MNS, N1ATN, W1IHN. NE3F & KS3F, K3WGR, W3AP, K3NW. NE90 & WB9CEP, N9AZD, WB9QPN, WB9LTY, W9SU, WA9NPM, KA9AND, KA9OIH, WB9NWF, KT9M. NQ4I & W14R, KM4HH. P14DEC: Club. PJ1B: WA3LRO, PJ2MN, A17B, W3UM, N7ZZ, N7ZR, K3EST, N4RV, W7EJ, K2SS, OH2MM, N6IG, AA6NT, K2SB, PJ9EE, K2XZ. PJ2U: K4EIH, WR4S, WA6VNR, W4VJN. RB8M: RB4MF, RB4MB, RB4MV, RB5MR, RB5MT, RB5MP, UB5MM, UB3MN, UB4MC, UB5MDA, UB5-059-12, UV6ARS. SK0UX: SM0HBV, SM0GZT, SM0NZB, SM0LCB, SM0MRQ, SM0NZQ. UZ6LWZ: UA6LV, UB5JW, UB5IBG, UA6-150-1070, UA6-150-1103, UA6-150-1336, UA6-150-1403, UA6-150-1410. V47K: K3NZ, K3IPK, WB2P. VE3XO: Club. VE6WP & VE6BBP, VE6BOS, VE6BRE. VE7ZZZ: VE7ARS, VE7AV, VE7DLM, VE7EME, VE7DRS, VE6EZ, VE5FN, VE7FZ, VE7NHN, VE7RK, VE7SK, VE7SSS, VE6UX, VE7XYL. VP9AD & G4CNY, N2ME, N3AD, N3RD, VP9IJ, W3MA. W3FW & N3EC, KA3ROF, WA3YOB. W3GM & K3ND, W3FV, N2EA, W2NM, KA3PIT, KY3W. W3LPL & KA1GD, KC3EK, W3EKT, W3EMH, N3GB, WB3JRU, KX3O, K3RA, NM3U, WD4AXM, NW5E, KN5H, N8II, WA8MAZ, KD9J. W3NX & N3NA. W0KEA & W1XE, K9MWM, KR0U, K10G, WB0ITG.

YT2A: YU2RA, YU2OG, YU2DQ, YU2MP, YU2QS, YU2EU, YU2MY, YU2AW, YU2WJ, YU2LJ, YU2AJ, YT2FI, YT2GW, YT2HG, YT2LL, YT2LA, Y2ZADM, YU4CW, Club Ops. ZM2K: ZL2BKM, ZL2BNJ, ZL40Y, ZL3IX, ZL2TIQ, ZL2TLC. ZW5B: N5FA, N6AA, N6TJ, N6VI, N6ZZ, OH2BH, PY4OY, PY5CC, PY5EG, W6MKB, W6NV, ZP5JCY, PY5TT, PY5CA, PY5ZBU, PY5VM, PY5PS. 3D2KH: W6QC, K6KH, W6MI, N6DMV, N6AXO. 4U1VIC: OE1ZZS, DF5BM, DF1BZ, DF6QC, DK7ZT, DK7ZH.

**WORLD TOP QRPp
(5W Input) All Band**

1. YU2TY	758,523	6. W0MHK/1	311,576
2. EA3FBO	461,472	7. HB9ADD	303,552
3. KD2TT	371,968	8. W0UO	297,591
4. 4M1G	336,384	9. UD6DFF	253,984
5. VE1CBF	331,261	10. N4IJ	244,651

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

**SSB RESULTS
SINGLE OPERATOR
NORTH AMERICA**

UNITED STATES

N6BV/1	A	4,564,755	2760	134	451
K1DG		4,153,380	2491	133	447
K1RU		3,954,090	2432	131	447
W1WEF		1,914,750	1475	106	344
W1GHI		1,566,226	1186	117	349
K1CLN		1,289,972	1155	94	310
K1VDF		960,360	1121	73	229
WE6G/1		799,645	839	81	260
KA1UC		688,905	620	99	306
K1TN		616,691	631	84	269
W2AX/1		584,415	611	80	253
W1PH		555,977	633	82	225
W1BIH		492,800	456	105	295
K1JUL		484,386	676	64	202
N1API		422,532	529	72	219
NK1I		420,579	464	87	246
W1CB		312,930	377	74	231
W1FJ		300,300	465	60	171
K1VSJ		247,020	384	63	167
NY1V		245,518	355	67	199
W1AX		244,024	363	56	180
KA1NDS		145,197	247	62	157
N4XR/1		139,644	241	68	164
W1MK		137,634	247	59	144
K1ZJH		135,014	261	51	136
K2MN/1		128,160	257	54	124
W1OP		118,800	237	49	127
NF1J		85,358	226	33	101
W1HUE		53,560	151	39	91
KA1NNI		46,320	139	36	84
KB1RB		30,975	117	32	73
K1SA		20,880	81	23	67
W1FV		20,592	94	22	56
KC1LM		15,688	81	22	52
K2SX/1		12,864	53	24	40
KS1L	28	825,727	1585	32	147
N1TZ		323,070	678	31	134
K1EFI		310,880	673	32	128
W1BWS		298,656	675	30	123
NX1P		211,211	518	29	114
KS1J		200,294	501	30	107
KA1RLI		116,112	345	26	92
KA1DED		66,309	252	24	69
WB2DND		63,308	226	21	77
KA2DJH		55,120	190	27	77
KA1UGO		42,622	167	23	78
K1JBS		29,580	146	15	53
KA1RRX		27,097	125	20	59
KC1QN		21,038	121	16	51
WB1EPO		14,874	84	17	50
K1ZZJ		11,550	76	19	36
N1GLE/M		8,673	67	13	36
N1GOE		3,528	37	11	25
WB1DXD	21	261,144	773	31	93
W1PLJ		6,216	50	13	29
KH6CP/1		4	1	1	1
W1RR	14	706,986	1383	39	142
N8RA/1		266,850	646	35	115
N1ENN		229,252	621	35	113
AA1M		12,786	80	17	40
N2NT	A	5,403,200	3074	137	477
N2LT		4,014,080	2482	126	434
K2DM		3,437,252	2268	121	401
N2BA		2,535,636	1703	123	401
W1GD/2		1,768,452	1219	116	402
K2PS		1,316,252	1135	101	305
K2PH		1,145,538	982	102	312
KF2O		952,632	867	91	302
K2JLA		763,656	732	98	278
K2FL		723,168	720	91	281
KD2YP		696,397	670	93	278
KB2EMU		640,710	833	68	202
K2BRF		615,020	678	83	239
N2WK		583,080	626	90	249
WA2C		551,922	568	96	261
WR2G		503,721	612	70	221
NA2Q		483,882	602	80	207
WA2UDT		430,900	545	77	201
W2JGR		397,215	523	61	212
NQ2O		378,084	478	81	213
KS2M		372,842	476	78	199
WA2VOW		358,848	509	67	185
KE2JO		356,827	527	61	178
NW2J		351,000	505	63	187
WK2H		319,744	464	61	195
NA2M		316,336	418	75	197
WB2ZMK		315,468	404	84	192
KD2BW		304,584	424	69	190
KB2DE		284,928	405	79	177
W2KHO		262,185	405	61	166
KT2D		245,700	383	62	172
W2TZ		205,615	359	53	152
K2RW		199,689	280	72	187
KN2Q		187,880	314	61	159
N2JYC		187,800	343	51	149
WE2T		183,890	338	52	133
W2MT		170,562	288	60	157
KD2NE		136,952	240	68	144
W2FUI		122,958	267	44	118
K2LE		121,844	259	45	121
AF2K		117,705	238	60	117
NG2P		108,558	236	42	121
K2ONP		102,992	251	52	105
W2SDO		92,910	203	50	113
K2SWZ		85,675	218	40	104
WM2Y		82,689	222	37	92
WM2U		77,550	201	39	102
N2KW/M		75,397	351	55	176
WT2F		56,144	274	31	90
KB2BF		53,250	154	46	96
N2GDD		52,394	160	42	92
NA2A		46,767	153	30	89
KS2I		31,824	100	44	73
WF2B		31,413	112	36	75
KB2UW		30,504	123	37	87
WB2RMX		29,637	116	26	63
WS2W		25,194	221	24	90
WB2LNR		24,310	82	37	73
WO2N		19,152	79	26	58
KA2HTU		17,670	81	35	60
N3AOT		15,308	71	25	61
/M2		9,648	51	24	48
WT2A		7,670	54	23	42
W2YY		7,670	54	23	42
WI2A		4,440	39	13	27
W2XM		3,198	31	17	24
N2KA		3,010	30	20	23
KA2IRO		748	15	8	
KM2P	28	733,040	1485	33	143
KD2RD		689,653	1442	32	131
NA2G		461,390	1090	31	114
W2HG		416,465	881	34	129
KA2AEV		317,282	878	30	101
KZ2I		265,221	660	27	114
K2MFY		251,304	595	30	118
N2JRJ		135,184	343	30	112
W2FXA		124,200	315	31	107
K2OLG		78,368	178	30	128
KA2AWE		69,000	263	23	69
WB2DND		63,308	226	21	77
KB2EIK		54,032	223	23	65
KB2HNY		51,976	212	22	67
KB2HUN		51,744	213	22	66
K2KTT		35,952	172	21	63
N2IZJ		34,936	174	23	65
KB2FDD		34,160	150	18	62
KA2CUF		27,068	147	20	47
N2JTW		23,800	135	17	53
KB2HZI		22,043	126	21	46
KA2WEI		20,130	117	16	45
KA2GS		16,956	113	20	34
N2IHO		15,066	105	17	37
KB2BBG		12,996	78	21	36
WA2QJK		12,870	80	19	46
W2KZE		7,826	62	11	34
KB2HXR		3,686	38	11	27
K2MK		3,286	36	8	23
WS2L		1,050	18	6	15
KE2OT		1,008	17	8	13
N2JNZ		507	13	3	10
NG2X	21	697,463	1412	36	133
NB2P		497,664	1059	35	127
W2IQI		101,152	324	26	83
WA2CYD		84,750	262	28	85
K2HFX	14	604,945	1151	39	148
NQ2D		535,068	1142	37	141
K2MGA		139,997	347	36	107
WA2ASQ		41,207	164	19	70
WG2R		16,380	102	21	39
KA2DUG		9,840	63	20	40
WQ2M	7	83,316	279	24	82
W2SC		69,930	225	24	87
KB2WN		6,600	75	14	41
W2XL		924	16	8	13
W2FCR	1.8	2,975	47	11	24
K3TUP	A	4,930,510	2859	136	462
					(Opr. K3UA)
K300		4,533,543	2740	130	451
K320		4,163,018	2651	132	425
K3ZD/3		4,147,902	2418	138	456
W3BGN		3,971,200	2517	135	409
ND3A		1,953,150	1581	114	335
K3WUW		1,815,981	1248	124	395
N3BJ		1,578,552	1353	89	319
K3ZA		1,561,144	1250	100	342
W3GG		1,382,270	1078	118	352
Ni3P		1,299,338	1087	102	320
AA3B		949,650	1015	78	247
K4JLD/3		794,592	769	99	273
K3II		445,788	621	67	185
K3FNW		419,176	491	86	216
W3KV		417,020	509	73</	

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WORLD SINGLE OPERATOR UNLIMITED
All Band

1. YT3AA	5,756,932	6. W2GD	2,522,290
2. K1ZM/2	4,043,592	7. KE3Q	2,335,325
3. AA1K/3	3,444,575	8. AG1C	2,026,500
4. K3WW	3,051,528	9. AD3V	1,909,321
5. AK1A	2,734,920	10. K1VR	1,867,621

W6OK	**	38,456	156	26	62	K3ZJ/8	28	806,140	1656	34	136
N6RJ	7	34,560	142	24	66	N8FEH	**	218,822	546	31	111
K5KT/6	**	9,760	63	19	42	KC8FS	**	128,628	419	23	85
K6HAM	**	7,900	63	17	33	KF8BT	**	112,190	303	29	101
W6RJ	3.8	30,848	253	21	43	N8MK	**	38,732	153	21	71
NGUC	**	2,652	32	14	20	KB8HZE	**	28,196	133	21	55
K7RI	A	2,302,005	1958	119	296	KABVPL	**	14,300	114	17	27
NN7L	**	1,955,764	1679	123	289	N8JS	**	6,864	50	17	31
N7TT	**	1,398,495	1257	121	278	N8JHG	**	2,550	29	14	20
W2ZJ	**	829,440	831	102	258	AF8C	**	455	15	6	7
KC7UD	**	585,090	623	98	232	N8JEC	21	299,094	681	34	124
WE7B	**	550,401	783	88	183	WGBM	**	239,294	583	33	113
WG7A	**	426,591	548	89	190	KFBK	**	127,140	344	30	100
KS7T	**	421,344	691	70	161	N8EXS	**	63,896	244	20	78
NY7T	**	342,771	568	80	141	K8RWL	**	44,462	161	26	68
WA7FAB	**	342,500	499	89	185	K8KUH	14	19,710	96	18	55
KA7MCX	**	335,616	526	62	166	WA8NDE	**	16,660	100	20	48
W7LGG	**	328,890	424	76	209	AD8C	7	44,778	162	25	77
NB7N	**	305,760	591	73	122	WB8SMS	/8	11,842	78	17	45
KC7UP	**	254,740	401	74	161	WB8D/8	3.8	16,043	130	17	44
KA7EQS	**	253,800	459	68	132			(Opr. WB8UVZ)			
W7HS	**	250,640	376	83	158	WR8K	**	1,474	30	9	13
NN7F	**	240,870	404	73	149	W9RE	A	3,215,696	1875	142	462
N7MJZ	**	214,564	469	61	133	K9CAN	**	948,703	782	115	318
W7GUR	**	214,011	326	78	159	WE9R	**	940,104	839	109	287
K7RA	**	210,987	378	63	134	WE9V	**	866,980	935	89	246
K7GEX	**	186,375	320	74	139	W9GXR	**	725,460	800	82	239
W7XN	**	178,976	273	79	159	WG9B	**	652,422	676	94	260
KC7DB	**	177,552	306	69	147	W9OP	**	594,088	685	69	245
KC7FV	**	173,505	293	66	149	AF9Y	**	583,176	559	109	267
W7CS	**	164,116	420	70	108	KA9YMV	**	543,576	560	96	252
N7ENU	**	154,440	303	70	110	K9UQN	**	505,404	601	85	218
KA7TGE	**	145,296	344	51	93	KA9JOL	**	359,805	510	64	185
N7IRR	**	136,396	297	53	119	W9NA	**	325,759	438	81	188
WK7Z	**	125,400	213	73	147	KD9HT	**	313,052	447	69	175
WB7NRC	**	115,731	241	68	99	NG9L	**	310,566	420	69	202
KA6V/7	**	104,940	235	55	104	W9CA	**	278,822	457	57	161
W7ON	**	92,757	228	46	101	NI9C	**	267,032	414	62	170
KR7L	**	89,224	211	55	97	N9NS	**	231,352	370	65	174
WA7BAY	**	84,384	212	52	92	KB9AIT	**	167,090	280	75	142
N7LOX	**	76,342	209	51	82	K9LJN	**	157,248	267	69	155
W7WHY	**	64,024	158	57	94	W9TNZ	**	109,705	222	55	130
KC7DD	**	60,192	167	48	84	N9CUL	**	72,068	159	68	104
W7HT	**	59,826	178	48	70	WD9GGY	**	62,338	150	51	91
N7ER	**	59,228	155	49	85	WD9FEN	**	47,880	139	44	89
N7JAM	**	54,560	163	46	78	W9WNO	**	39,380	128	37	73
K7WA	**	38,190	123	33	81	WA9ZSO	**	37,504	118	41	87
WA7IIM	**	29,216	118	32	56	N9ACD	**	29,505	104	34	71
WA7UVJ	**	24,642	118	29	45	KA9HDN	**	18,928	76	29	62
W7VIH	**	16,660	92	28	40	W9LYN	**	18,040	80	24	58
WC7Q	**	15,400	75	28	49	KA9NNI	**	16,235	78	33	52
KD7C	**	4,300	32	21	29	W9YCV	**	15,288	64	32	52
WA7TUX	**	4,240	56	17	23	WB9IH/9	28	5,828	34	28	34
N78G	28	628,075	1234	34	141			793,507	1532	33	146
K7IDX	**	444,467	1333	35	122			(Opr. N8BSB)			
NW7Q	**	318,096	815	31	113	KK9A	**	549,524	1191	34	124
K7HBN	**	247,142	654	31	108	K9MDO	**	313,678	764	31	111
N07M	**	132,360	379	32	88	WA9CDY	**	290,070	632	33	132
W7AYY	**	86,208	319	27	69	KK9G	**	240,660	597	34	106
KB7IRF	**	74,336	258	26	75	W19H	**	196,185	418	33	132
K7SE	**	70,902	246	27	74	W9YYG	**	160,962	408	34	105
W7KKR	**	64,952	257	28	64	WB9JKI	**	140,622	356	29	109
N7CTY	**	59,280	259	21	59	N9HMZ	**	58,480	231	26	60
KE7GL	**	46,410	216	24	54	N9ICH	**	47,047	186	22	69
KQ7I	**	44,895	215	23	50	WD9HID	**	36,285	103	21	102
KX7J	**	42,210	196	25	65	W9YB	**	32,058	150	19	59
WB7VUB	**	34,124	162	26	50			(Opr. KA3VCJ)			
WY7U	**	33,943	139	27	64	W9NWY	**	18,957	94	19	52
NQ7Q	**	26,296	137	22	54	WA9GON	**	18,601	74	26	63
N7KSX	**	25,179	127	25	52	KB9CRY	**	11,960	107	16	36
N7MVX	**	17,836	127	15	37	WD9GRL	**	10,140	60	18	47
N7KOV	**	5,310	48	20	25	N4CC/9	21	322,410	716	36	129
W7WA	21	842,710	1760	36	127	KJ9D	**	107,950	301	27	100
WB7RFA	**	726,204	1731	33	113	N9ITX	**	70,278	245	27	75
K7LR	**	600,300	1420	35	115	WB9CXY	**	40,630	175	22	63
K7LXC	**	514,514	1167	35	119	N9RD	14	283,500	652	37	125
W7TJ	**	274,720	604	36	124	K9CLO	**	154,290	405	36	103
K7LZJ	**	179,426	482	33	101	K9YNF	**	91,125	257	30	95
W7FP	**	89,930	294	31	84	KB9L	**	89,798	265	30	88
W7UPF	**	89,784	315	29	87	W9GIL	**	78,988	228	34	90
AG7J	**	31,773	131	23	66	W9CH	7	21,904	110	20	54
KE7V	14	235,490	587	36	111	K4VX/8	A	3,115,200	1877	152	438
KM7E	**	225,060	689	33	99			(Opr. W08G)			
N7NKG	**	27,324	163	19	50	N2IC/8	**	3,061,852	2017	138	391
N7RK	7	6,783	53	18	33	K0RF	**	2,278,647	1828	140	301
N8AV	A	2,837,423	1981	124	379	N8AT	**	851,004	776	104	292
WB3KX/8	**	2,097,625	1527	115	370	KB8G	**	617,419	554	108	299
K8MR	**	1,887,918	1325	122	376	K9BQL/8	**	562,224	641	87	225
WB7WA	**	1,428,742	1189	111	316	KM8L	**	474,418	543	93	236
KC8JH	**	669,984	724	89	247	KC8UH	**	360,680	555	70	184
N8ESB	**	520,478	584	93	236	K8GT	**	345,100	357	111	239
KD8KX	**	514,485	603	90	219	NS8B	**	326,241	430	80	201
WBUPH	**	385,910	530	67	192	KJ8G	**	253,152	421	74	142
NR8Z	**	364,752	486	79	193	AD7G/8	**	246,568	397	71	167
WD8EOL	**	296,401	411	71	192	W0I2V	**	243,397	430	61	142
N8AGU	**	289,476	409	73	185	W0PPF	**	220,248	352	65	163
W8MEM	**	257,730	396	63	179	K8OAM	**	200,736	350	61	143
K8TMK	**	242,780	353	70	174	WJ8I	**	185,545	336	66	149
KABWAS	**	210,512	326	63	173	WB8IEL	**	164,600	303	66	134
KE8KG	**	145,147	299	50	123	KD8NB	**	125,160	329	44	96
N8AHA	**	116,056	249	48	115	WA8OUI	**	120,927	261	52	121
W8YGR	**	96,333	183	61	136	W8OSK	**	110,080	232	54	118
W8YTM	**	58,650	138	47	103	KA8ZPP	**	90,888	205	52	116
N8LCI	**	57,684	160	41	91	N88H	**	84,952	173	48	116
W8OK	**	19,995	83	39	54	WM8G	**	69,452	171	64	115
W8IDM	**										

JO1LDY	2,090	37	11	11	JA6JVY	8,528	60	23	29	HS8B	14	28,362	289	26	32	OE6WIG	21	110,656	547	25	79	OK1DWJ	4,329	115	6	31	
JA1AAV	1,980	24	11	19	JA6JXO	7,708	58	20	27							OE4BKU	3.8	23,595	383	10	45	OK1JDX	4,192	131	5	27	
JA2SAP/1	1,012	16	10	13	J160WY	7,650	57	21	29	TURKEY					AZORES					DENMARK							
JA1AAT	544	12	7	9	J161CJ	7,482	64	18	25	TA3						CU2AF	21	139,888	619	24	88	OZ4MD	702,396	757	122	314	
JH1WTH	450	17	5	5	J16CQW	7,172	61	20	24	/DL5YCO	A	342,432	800	35	109	BALEARIC ISLANDS					OZ2ACL	231,768	682	50	172		
JA1VW	276	9	6	6	JA6BIF	28	210,120	700	31	72	WEST MALAYSIA					EC6PG	A	45,368	275	27	79	OZ7DX	95,040	243	53	127	
JA1USO	21	671,652	1420	36	126	JA6EFT	95,580	375	29	61	9M2ZZ	A	576,225	1209	75	150	EA6WX	28	566,272	2300	27	85	OZ7AX	61,952	281	40	81
JK1OLT	492,936	1134	36	116	JA6WIF	62,190	242	27	63	U.S.S.R.					EA6WY	5,104	56	13	31	OZ6PI	50,799	321	26	97			
JG1TSF	349,076	896	36	101	JA6QDU	40,552	195	27	47	ARMENIA					EA6FO	21	581,348	1955	34	108	OZ1ZE/A	29,430	107	49	86		
JA1YAD	253,260	688	35	99	JA6RXA	26,455	144	23	42	UG6JJ	28	26,304	139	16	48	EC6NW	81,648	616	25	83	OZ1FNX	27,083	149	24	49		
					JJ6MYB/6	23,010	143	25	40	AZERBAIJAN					BELGIUM					OZ8AE	14,134	65	29	45			
JH1CMW	245,934	743	32	85	JR6KBY	21	151,970	432	34	96	UD7DZA	14	9,741	88	16	35	ON5CZ	A	24,120	180	25	65	OZ1DYI	11,186	84	26	68
JE1DXC	38,916	154	31	61	JA6DBS	8,648	108	23	24	GEORGIA					ON4AHG	19,647	98	36	75	OZ9BX	6,767	59	23	44			
JE1UFF	26,180	150	26	44	JH6MRA	8,316	71	18	26	UF6QAZ	A	291,473	1145	22	69	ON5EU	2,160	46	12	33	OZ7NB	29,925	188	42	91		
JA1DCO	15,478	83	26	45	JH6JTI	3,335	42	14	15	RF6FO	14	142,642	370	37	104	ON4ALL	28	178,600	659	26	68	OZ1HXQ	209,874	824	30	74	
JL1KUH	15,455	105	22	33	JG6QNY	1,850	30	10	15	UF6DG	31,752	120	27	71	ON4ZD	56,800	284	25	55	OZ5EV	190,848	523	35	107			
JH1XIT	6,627	53	18	29	JA6YFL	14	42,504	182	28	60	RF6FR	3.8	62,645	425	10	45	ON4KST	21	287,210	1052	26	84	OZ1INN	86,620	556	21	40
JO1VEI	4,590	67	14	16	JA7MAD	A	485,012	595	100	102	KAZAKHISTAN					ON4XG	96,096	442	24	88	OZ1JVN	82,782	335	39	123		
JA1JLP	4,104	42	18	20	JA7JHT	208,530	353	80	130	UL7LC	A	404,244	1773	59	169	ON5KI	836	36	6	13	OZ1ACB	19,557	157	15	38		
JA1XPU	3,944	62	13	16	JA7VSO	31,772	120	42	52	UL7DA	21	93,150	489	22	59	ON5KL	29,205	150	24	75	OZ2BM	6,336	45	19	45		
JA9BFA/1	2,492	31	13	15	J17RVJ	27,744	100	40	62	UL70BH	44,289	286	13	44	BULGARIA					OZ1CFV	525	18	7	14			
J11MAK	688	17	8	8	JA7YBB	15,504	105	31	37	UL7VV	14	65,016	285	26	60	LZ1KVF	A	227,475	394	80	255	OZ1ADL/P	21	133,056	580	25	87
JL1WZU	667	19	10	13	JH7DNO	28	741,520	2515	32	98	RL7AC	3.8	35,316	246	9	45	LZ1HY	57,660	242	47	77	OZ1LTB	99,485	458	26	75	
JR1GGB	30	3	5	6	JR1EEG/7	461,040	1383	34	79	KIRGHIZ					LZ1BJ	15,698	83	32	62	OZ5XT	2,241	62	8	19			
JH10JU	14	290,832	717	38	108	JE7HFL	326,370	670	55	110	UM8MAU	A	26,073	215	27	61	LZ1TS	14,476	114	19	58	OZ3ABE	14	40,868	430	19	49
JA1VBW	44,840	175	32	63	JA7XGN	310,970	881	35	86	UM8MAA	21	30,272	142	27	59	LZ1HJ	11,648	102	18	46	OZ7YY	1.8	20,608	354	7	49	
JA1GO	31,164	109	30	76	JE7DOT	251,180	477	71	119	UM8MDX	7	25,594	176	17	50	LZ1W	28	695,840	1877	37	123	OZ3SK	12,384	257	6	42	
JR2AGL	A	749,866	891	107	195	JA7WME	198,716	760	28	66	UM8MBA	3.8	1,357	33	7	16	LZ2KAD	462,560	1372	36	104	ENGLAND					
JM2QWQ	404,768	542	95	183	JH7CJM	30,960	126	26	60	UM8MTA	1.8	480	20	4	8	LZ2ES	419,520	1591	30	84	G3SNN	A	2,578,834	2411	114	347	
JA2THS	271,580	515	77	108	JR2LVK	24,304	155	19	37	RUSSIA ASIATIC					LZ2CW	158,816	781	26	86	G8HSD	464,427	944	83	226			
JA2DLM	245,504	337	101	173	JG7LBN	4,588	47	14	23	RZ9WA	A	160,480	376	42	128	LZ2UK	80,472	454	24	60	G4NXG/M	127,065	310	57	158		
JH2HFD	197,568	381	76	120	JG7JBZ	3,654	47	15	14	UA9YNC	104,690	312	37	108	LZ2HD	29,185	212	18	47	G3LNS	28	1,005,585	2473	35	122		
JJ2EEN	65,728	239	39	65	JA7AXP	3,388	43	8	20	UA9WNV	21	251,990	762	32	81	LZ1BJ	21	142,861	701	28	75	G4LJF	620,700	1663	35	115	
JA2YIL	61,740	213	40	65	JA7NVF	21	251,990	762	32	81	UA9UDR	27,774	112	30	64	LZ1B	142,861	701	28	75	G6QQ	12,900	129	16	34		
JH2WHS	14,553	101	30	33	JA7BEW	230,036	642	35	96	UA9UUD	3,794	62	22	47	LZ20Z	95,256	585	23	75	G4JQL	20,496	171	15	27			
JK2HDC	14,364	71	41	43	JE7JZT	69,064	285	27	62	UW9CW	28	686,633	1572	36	115	LZ2VP	89,726	610	20	71	G3TXF	21	154,632	544	31	105	
JH2XTV	1,380	29	11	12	JH7KTI	10,500	53	24	51	UA9LFI	28,274	149	13	54	LZ1VD	14	71,830	375	28	82	FEDERAL REP. OF GERMANY						
JH2BCN	28	294,764	872	33	85	JH7HJF	3,348	52	12	19	UA9CUA	24,255	163	17	45	LZ1GD	42,390	271	22	68	DK2XX	A	1,834,105	1735	341	114	
JH10AI/2	200,954	580	31	87	JR7HOD	1,272	25	12	12	UA9GCL	19,170	100	20	51	LZ2TF	11,934	186	11	43	DL3LU	1,114,308	1048	114	354			
JA2FJP	171,976	699	28	55	JS1DCZ/7	64	4	4	4	UW9CM	15,134	122	9	38	LZ2ZV	13,350	153	11	39	DJ5FT	1,081,897	1248	97	294			
JA2AXB	171,488	634	29	63	JA7SGV	14	491,400	1022	40	128	RW9AB	21	211,120	620	31	100	LZ2ZY	8,878	159	10	36	DJ8UV	1,067,664	1397	80	274	
JE2IFM	105,888	391	28	68	JH7QXJ	149,047	476	32	81	UW9CV	45,480	323	11	46	LZ1KWZ	1.8	20,295	344	7	48	DF1K/P	890,709	1061	96	271		
JA2ODS	80,295	278	31	70	JA7JH	45,288	150	33	78	UW9CL	19,170	100	20	51	CZECHOSLOVAKIA					DF2UQ	805,464	1208	84	255			
JR2MLV	71,085	319	28	50	JA7MY	496	11	8	8	UW9CM	15,134	122	9	38	OK2RU	A	817,238	1109	93	308	DJ3HJ	725,760	1081	80	190		
JA2DHL	43,878	214	27	44	JH7WKQ	7	33,480	210	21	39	RV9ZD	60,609	261	23	66	OK2KR	486,013	1243	93	298	DJ4AX	694,341	911	107	324		
JA2QJ	35,584	192	19	45	JA7UMT	3.8	5,661	73	16	21	RV9CDV	45,480	323	11	46	OK2DB	342,305	526	87	220	DL6DK	558,415	750	83	272		
JA2MFF	32,660	158	21	50	JA8RWU	A	2,202,159	1994	121	276	UA9XSJ	40,983	268	14	43	OK2BQL	341,864	518	89	213	DK8AX	348,300	420	115	272		
JA2ODV	24,440	135	23	42	JA8NFV	28	762,003	2015	33	96	UA9XEN	20,865	122	14	51	OK2PDT	293,168	597	67	184	DL1KJ	337,512	502	84	244		
JG2LGM	2,304	33	12	12	JH8QBY	55,224	267	25	47	UA9SR	A	905,972	1262	97	219	OK1KZ	262,056	745	59	185	DK5WJ	322,196	639	78	233		
JF2GYH	1,782	55	5	6	JR8FLY	37,310	213	23	42	UA9ZDD	347,991	761	93	126	OK2PCL	110,558	324	43	106	DJ5AV/A	311,480	575	65	195			
JA2BNN	21	149,041	516	31	72	JA8RUZ	21	717,320	1595	27	121	UW0CM	48,504	332	37	57	OK1YK	162,603	638	45	158	DL8AAE	296,700	593	73	203	
JA2EU	140,008	620	29	59	JH8DHV	10,166	89	19	27	RA0SK	3,293	43	11	26	OK3YK	143,206	304	57	136	DL9DBR	294,492	482	72	219			
JG2MLI	60,945	272	27	58	JH8JBX	14	62,748	212	32	76	RA1QQ	3,750	48	17	36	OK1EP	136,864	430	54	128	DK5DS	292,572	589	66	186		
JA2QOC	51,568	207	28	60	JH8DEH	16,175	218	14	11	UW0CM	48,504	332	37	57	OK1AJY	136,864	430	54	128	DL5ZBA	258,899	517	58	141			
JF2PXB	8,651	80	18	23	JA8IXM	7	221,180	749	32	83	RA0QO	3,750	48	17	36	OK3CDZ	129,980	508	50	144	DL9RDM	217,341	672	47	76		
JA2ONH	2,484	36	10	13	JH9CAV	A	154,054	303	67	130	UW0CM	48,504	332	37	57	OK1KZ	262,056	745	59	185	DJ4PI	203,566	395	69	140		
JH2WGI	1,782	35	9	13	JH9EPA	64,288	216	45	67	UW0CM	48,504	3															

MFJ gives you *all 9* digital modes and *keeps on* bringing you state-of-the-art advances . . . while others offer you *some* digital modes using 3 year old technology

MFJ-1278

\$279⁹⁵



No 3 year old technology at MFJ! Using the latest advances, MFJ brings you 9 exciting digital modes and *keeps on* bringing you state-of-the-art advances.

You get tons of features other multi-modes just don't have.

Only MFJ gives you *all 9* modes

Count 'em -- you get 9 fun modes -- Packet, AMTOR, RTTY, ASCII, CW, FAX, SSTV, Navtex and full featured Contest Memory Keyer.

You can't get all 9 modes in *any* other multi-mode at *any* price. Nobody gives you modes MFJ-1278 doesn't have.

The best modem you can get

Tests in *Packet Radio Magazine* prove the modem used in the MFJ-1278 copies HF packet more accurately than all other modems tested.

MFJ-1278 is the *only* multi-mode with a *true* DCD circuit. This dramatically reduces sensitivity to noise and dramatically increases completed QSOs.

Exclusive Built in Printer Port

Only the MFJ-1278 has a dedicated printer port that lets you plug in your Epson or IBM compatible printer.

You don't need to buy a silly \$40 cable just to plug in your printer.

20 LED Precision Tuning Indicator

MFJ's unequalled tuning indicator makes it really easy to work HF packet. Unlike others, you use it the same for all modes -- not different for each mode. Just tune your radio to center a single LED and *you're* precisely tuned in to within 10 Hz -- and it shows you which way to tune!

MFJ Packet Radio



MFJ-1274

\$159⁹⁵

MFJ-1270B

\$139⁹⁵

MFJ-1270B super clone of TAPR's TNC-2 gives you more features than *any* other packet controller -- for \$139.95

You can double your fun by operating VHF and HF because you get *high performance* switchable VHF/HF modems.

You get the Easy Mail™ Personal Mailbox with soft-partitioned memory so you and your buddies can leave messages 24 hours a day.

In MFJ's new WeFAX mode you can print full-fledged weather maps to screen or printer and save to disk using most computers.

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You also get 32K RAM and a free 110 VAC power supply (or use 12 VDC).

For dependable HF packet tuning, the MFJ-1274 gives you a high resolution tuning indicator -- and it's only \$20 more.

New 2400 baud Turbo models available: MFJ-1270BT, \$209.95; MFJ-1274T, \$229.95.

New Easy Mail™ Personal Mailbox

You get MFJ's new Easy Mail™ Personal Mailbox with soft-partitioned memory so you and your ham buddies can leave messages for each other 24 hours a day.

Multi-Gray Level FAX/SSTV Modem

You'll see tomorrow's news today when you copy outstanding FAX news photos with crisp clear details. MFJ-1278 is the *only* multi-mode with a built-in multi-gray level modem. It lets you transmit and/or receive multi-gray level pictures with an appropriate terminal program like MFJ-1289 MultiCom (see below) for IBM compatibles and MFJ-1282B for C-64/128.

a kiss interface or dumb modem, fast throughput anti-collision technology, independent transmit level for each radio port, random code generator, lithium battery backup, RS-232 and TTL serial ports, socketed ICs, tune up command, peripheral I/O port, automatic serial numbering, programmable message memories, dual radio ports (*each* HF or VHF), CW paddle jack, audio amplifier and speaker jack so you can monitor CW sidetone, transmit and receive audio and packet connect bell, *new* fully intergrated instruction manual with *Fast Start*™ booklet and more. 9½ x 9½ x 1½ inches.

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You get MFJ's one year No Matter What™ Guarantee.

That means we will repair or replace your MFJ multi-mode (at our option) *no matter what* happens to it for a year.

Others give you a *limited* warranty. What if *they* say, "Sorry, your *limited* warranty doesn't cover *that*?"

Get 9 new ways of having fun

Don't settle for 3 year old technology. Choose the *only* multi-mode that gives you the latest advances and all 9 modes.

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New MFJ-1278T Turbo with fast 2400 baud modem

MFJ-1278T

\$359⁹⁵



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The 2400 baud modem is also available separately. Order MFJ-2400, \$69.95, for any MFJ and most other TNCs.

One FREE Upgrade!

When you buy your MFJ-1278 *today*, you don't have to miss new modes and features that come out *tommorow*.

Why? Because your MFJ-1278 comes with a coupon good for one *free* eprom upgrade exchange that'll add new features.

Plus More . . .

Plus you get . . . 32K RAM, *free* AC power supply, Host mode that lets MFJ-1278 serve as

New MFJ MultiCom™ . . . exciting new 1278 software

High resolution AP news photo received on 20.738 MHz using MFJ MultiCom and MFJ-1278 with multi-gray modem.



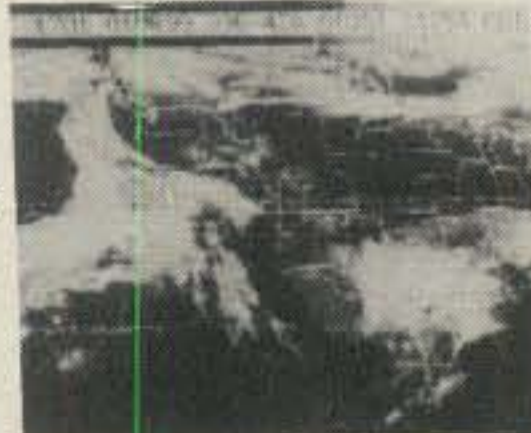
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Y08CIY	**	1,952	53	18	24	EA5ETP	**	14,374	155	15	38	WALE	A	4,058,880	3048	124	436	LY20U	**	331,160	1023	33	103	UB5MLP	**	206,870	430	74	200
Y02AIX	**	240	12	7	9	EA5FNE	**	14,235	85	24	49	GW4BLE	**	1,187,724	1739	80	268	LY20M	**	256,566	861	30	92	UB5JFV	**	173,400	573	52	148
Y05KLE	28	78,128	420	24	58	EA3RCL	**	12,100	122	18	37	GW8ARK	**	1,187,724	1739	80	268	LY2SA	**	64,170	287	27	63	R85IQ	**	167,739	381	72	181
Y02LBN	**	39,468	180	26	66	EA7EBL	**	11,275	105	16	39	YUGOSLAVIA	A	889,258	1232	98	296	LY3PEJ	**	30,636	232	23	46	UB5EPV	**	36,448	235	60	76
Y09HP	**	30,345	358	14	37	EA1YW	**	2,739	32	8	25	YU3QI	**	777,444	679	88	356	LY2BAT	**	12,474	149	14	30	R85ICY	**	34,300	271	33	77
Y04BEX	**	21,835	222	16	39	EA3FRJ	21	381,160	1299	34	96	YU7FT	**	259,120	604	55	150	LY2BIS	21	180,402	815	27	80	UT5UBN	**	25,990	237	22	75
Y09AGI	**	21,204	200	18	39	EA3ESZ	**	86,112	310	21	75	YU7LS	**	184,170	514	61	149	LY2BHT	**	133,096	581	31	96	R85IUU	**	12,546	61	27	55
Y06BZL	**	14,664	134	14	33	EA7PS	**	84,456	358	23	85	YU7YM	**	13,464	70	26	70	LY1BXB	**	96,031	831	23	60	UB5QJN	**	8,784	70	16	58
Y08AII	**	5,244	80	10	13	EA3ELM	**	68,250	353	26	79	YU1PQI	**	7,502	45	27	35	UB5IAE	**	6,888	108	10	31						
Y03AGW	**	495	14	6	9	EA1DHB	**	53,599	331	20	71	YU1PJ	**	4,662	69	13	29	UT5UHF	**	4,806	75	14	40						
Y03AIL	21	54,126	296	24	73	EA1EVV	**	35,568	292	17	55	4N7ZZ	28	1,371,378	2890	36	150	R85IM	28	673,760	1781	37	123						
Y04JQ	**	41,888	200	32	80	EA1EYV	**	29,304	230	17	57	YU3VM	**	1,178,857	2847	35	116	UT5UGR	**	600,138	1499	35	119						
Y02GZ	**	5,376	58	16	32	EA7CDS	**	22,792	152	18	56	Y26A	**	1,174,817	2910	37	124	R85FO	**	157,986	1179	30	104						
Y06JN	14	50,399	257	26	75	EA5GIG	**	20,315	164	21	64	4N4A	**	956,736	2374	37	114	RT5UD	**	93,639	450	27	64						
Y09BSF	**	33,538	292	22	60	EA1CND	**	10,974	80	15	47	YU3AY	**	716,280	1910	31	110	R84JF	**	60,137	474	16	61						
Y02BMA	**	10,918	142	14	39	EA7DMU	**	7,392	71	15	41	Y22S	**	606,250	1922	32	93	R85UCY	**	32,782	228	21	53						
Y08MF	**	10,260	137	11	46	EA1CTH	**	6,292	73	14	38	Y21U	**	526,680	1552	35	97	R85EKW	**	19,656	168	18	45						
Y04PN	**	9,955	154	12	43	EA7AQY	**	5,985	126	10	35	YU40K	**	259,623	998	24	93	UB5VNF	**	12,920	186	17	43						
Y08CRU	**	9,954	109	14	49	EA3VM	14	44,268	268	27	75	YU4MV	**	24,462	209	19	35	UB5VCK	**	9,366	137	9	33						
Y03DAD	**	8,960	90	15	41	EA5DVL	**	17,608	141	18	44	YU7SF	**	14,840	129	14	39	UB5QVC	**	8,568	169	8	34						
Y03JF	7	112,931	759	10	81	EA4EHQ	**	13,968	147	14	34	YU3PV	21	894,075	2058	37	138	UB5XCU	**	4,080	67	10	20						
Y06AJI	**	35,763	296	18	73	EA3CVI	**	11,950	138	6	28	4N3E	**	829,584	2093	37	131	UB5WE	21	980,001	2308	38	133						
Y05OAG	**	5,412	124	8	33	EA3EYO	**	2,244	45	6	28	YU1A0	**	813,233	1811	38	143	UB5IFZ	**	517,864	1485	37	115						
Y05CTY	**	4,342	92	8	34	EA5AW	**	522	11	10	8	YU7AV	**	740,088	1861	37	134	UB5IUH	**	408,800	1290	36	110						
Y04AAC	**	540	23	5	15	EA3NA	7	14,210	130	15	55	Y7W	**	548,520	1740	35	140	R84MAM	**	132,096	595	33	95						
Y06KVZ	3.8	14,392	254	7	49	EA3DEE	**	9,734	124	14	48	YU1NR	**	191,653	704	30	101	UB5JKC	**	50,049	382	19	64						
Y05BPE	**	9,236	179	7	44	EA4DDE	**	451	29	5	14	YU7KW	**	19,530	209	14	48	UB4LCB	**	47,808	382	20	63						
SCOTLAND						SVALDBARD ISLAND						MOLDAVIA						RUSSIA EUROPEAN											
GM3BCL	A	765,080	1207	68	198	JW1VW	A	277,344	681	50	94	U050NA	A	454,800	897	83	217	UA3RAR	A	1,371,270	1361	111	319						
GM40BK	**	55,874	134	52	130	SM5A0D	A	2,710,911	2475	126	375	U050N	**	181,882	691	49	162	RA1AA	**	714,488	1317	83	261						
GM8ECO	21	354,472	1490	23	95	SK0LM	**	1,166,102	1784	79	247	R040C	**	24,900	180	29	71	UA3DRB	**	423,956	555	100	303						
SICILY						SWEDEN						U.S.S.R.						BYELO RUSSIA											
IT9ZVW	A	37,539	263	30	67	SM3BIZ	**	859,026	1069	95	267	UR2RNG	A	245,769	741	59	278	UC2AB	A	39,870	175	27	63						
I9BLB	28	949,960	2410	35	115	SM5IMO	**	201,411	493	53	108	UR2RE	28	1,106,065	2741	36	121	UC20T	**	13,275	89	29	46						
IT9HBT	**	637,806	1655	37	132	SM6DER	**	90,207	310	35	82	UR2RER	**	119,253	455	29	98	UC20L	28	60,590	298	23	60						
IT9RYJ	**	302,309	1230	33	100	SM4GTB	**	48,732	283	33	98	UR2RHF	**	1,768	24	11	15	UC20M	**	38,416	339	19	37						
IT9WNV	21	42,696	482	18	54	SM8BDS	**	30,072	156	27	57	UR2RIY	14	6,042	75	15	38	UC2W0	**	34,240	233	23	57						
IT9NTT	14	254,508	1146	32	95	SM6LJF	**	19,671	166	22	57	UR2RME	3.8	64,657	678	15	68	UC2AJM	**	16,709	169	14	35						
I9TQH	3.8	32,452	334	14	62	SM3CER	**	7,550	55	22	28	UR3RA	**	49,600	727	10	52	RC2AZ	14	107,416	526	29	88						
SPAIN						SWITZERLAND						ESTONIA						FRANZ JOZEF LAND											
EA4KK	A	866,892	1065	74	208	HB9DLE	A	955,962	1124	102	276	UR2RNG	A	245,769	741	59	278	UA10T	28	9,196	51	11	27						
EA3GBU	**	781,509	1335	73	194	HB9DCQ	**	620,880	874	93	305	UR2RE	28	1,106,065	2741	36	121	UA10IL	14	2,030	26	14	15						
EA1CON	**	515,075	818	73	202	HB9AAA	**	426,673	620	82	217	UR2RER	**	119,253	455	29	98	UA2FX	28	175,908	1284	30	107						
EA4DPK	**	200,196	351	72	177	HB9NN	**	44,368	168	38	80	UR2RHF	**	1,768	24	11	15	UA2EC	21	89,355	777	25	90						
EA3DNC	**	154,137	423	50	141	HB9KC	**	27,674	121	32	69	UR2RIY	14	6,042	75	15	38	UA2FAG	1.8	171	29	4	15						
EA3CZR	**	147,420	348	52	130	HB9ATM	28	199,168	631	29	99	UR2RME	3.8	64,657	678	15	68	UA3DNC	**	52,460	404	19	67						
EA4DXP	**	136,032	430	47	109	HB9LBM	**	11,368	94	18	40	UR3RA	**	49,600	727	10	52	U1BA	**	21,289	230	14	47						
EA1CYV	**	134,030	442	37	93	HB9DX	21	21,090	91	25	86	UR3RA	**	49,600	727	10	52	UA3LEG	**	17,780	254	16	54						
EA7EYX	**	131,720	645	38	110	HB9IQ8	7	56,672	547	17	71	UR3RA	**	49,600	727	10	52	UA3DPX	**	14,022	181	13	44						
EA5CPH	**	126,252	354	48	141	VATICAN CITY						LATVIA						INDONESIA											
EA5JC	**	123,981	288	56	131	HV3SJ	A	3,198,285	3489	118	359	UQ2GA	28	143,716	495	30	92	YB3ASQ	A	1,654,670	1715	112	225						
EA1JO	**	107,508	319	48	138	SWITZERLAND						LITHUANIA						YB5QZ											
EA1AK	**	106,301	220	65	156	HB9DLE	A	955,962	1124	102	276	LY38A	A	3,621,936	3364	121	367	YB5QZ	**	471,144	616	90	178						
EA7DXR	**	96,280	315	45	121	HB9DCQ	**	620,880	874	93	305	LY38B	**	1,255,780	1580	98	264	YB5QZ	**	471,144	616	90	178						
EA7GFG	**	91,184	296	33	106	HB9AAA	**	426,673	620	82	217	LY38P	**	718,092	940	101	226	YB5QZ	**	471,144	616	90	178						
EA1BQR	**	81,528	224	57	115	HB9NN	**	44,368	168	38	80	LY2CY	**	675,657	1051	87	246	YB5QZ	**	471,144	616	90	178						
EA3GCI	**	78,698	298	36	74	HB9KC	**	27,674	121	32	69	LY38Q	**	575,460	1247	75	203	YB5QZ	**	471,144	616	90	178						
EA7CA	**	77,158	230	49	124	HB9ATM	28	199,168	631	29	99	LY38S	**	372,508	775	61	195	YB5QZ	**	471,144	616	90	178						
EA2YC	**	65,436	242	38	85	HB9LBM	**	11,368	94	18	40	LY2BNC	**	281,158	772	61	196	YB5QZ	**	471,144	616	90	178						
EA7BYM	**	64,125	242	41	94	HB9DX	21	21,090	91	25	86	LY380	**	272,020	539	75	215	YB5QZ	**	471,144	616	90	178						
EA3DRE	**	60,564	260	39	59	HB9IQ8	7	56,672	547	17	71	LY2BGG	**	138,885	509	58	139	YB5QZ	**	471,144	616	90	178						
EA2CR	**	59,898	236	39	110	VATICAN CITY						UKRAINE						YB5QZ											
EA5AEN	**	56,544																											

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The MFJ-989C is not for everyone.

However, if you do make the investment you get the finest 3 KW PEP tuner money can buy - one that will give you a lifetime of use, one that takes the fear out of high power operation and one that lets you get your SWR down to absolute minimum.

The MFJ-989C is a compact 3 KW PEP roller inductor tuner with a new peak reading Cross-Needle SWR/Wattmeter. The roller inductor lets you get your SWR down to absolute minimum.

With three continuously variable components - two massive 6 KV capacitors and a high inductance roller inductor - you get precise control over



MFJ-989C \$349.95

SWR and the widest matching range possible from 1.8-30 MHz.

You get a new lighted peak and average reading Cross-Needle SWR/Wattmeter with a new more accurate directional coupler.

You get a giant two core balun wound with teflon wire for balanced lines and a 6-position antenna switch with extra heavy switch contacts.

Its compact 10 3/4 x 4 1/2 x 15 inch cabinet fits right into your station.

You get a 50 ohm 300 watt dummy load for tuning your exciter, a tilt stand for easy viewing and a 3-digit turns counter plus a spinner knob for exact inductance control. Add \$10 s/h.

2-knob Differential-T™ Tuner



MFJ-986 The new MFJ-986 Differential-T™ 2-knob Tuner uses a differential capacitor to make tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only one best setting. Covers 1.8-30 MHz.

The roller inductor lets you tune your SWR down to absolute minimum. 3-digits turns counter lets you quickly return to your favorite frequency.

You get MFJ's new peak and average reading Cross-Needle SWR/Wattmeter with a new directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

A new current balun for balanced lines reduces feedline radiation and forces equal currents into antenna halves that are not perfectly balanced for a more concentrated, stronger signal. Add \$10 s/h.

MFJ's Fastest Selling Tuner



MFJ-941D The MFJ-941D is MFJ's fastest selling 300 watt PEP antenna tuner. Why? Because it has more features than tuners costing much more and it matches everything continuously from 1.8-30 MHz.

It matches dipoles, vees, verticals, mobile whips, random wires, balanced and coax lines.

SWR/Wattmeter reads forward/reflected power in 30 and 300 watt ranges. Antenna switch selects 2 coax lines, direct or through tuner, random wire, balanced line or tuner bypass. Efficient airwound inductor gives lower losses and more watts out. Has 4:1 balun, 1000 V capacitors. 10x3x7 inches.

MFJ's Random Wire Tuner

MFJ-16010 \$39.95

You can operate all bands anywhere with any transceiver when you let the MFJ-16010 turn any random wire into a transmitting antenna. Great for apartment, motel, camping operation. Install a wire anywhere! Tunes 1.8-30 MHz. 200 watts PEP. Ultra small 2x3x4 in.



MFJ's Deluxe 300 Watt Tuner



MFJ-949D The MFJ-949D gives you lower SWR than any tuner that uses two tapped inductors. Why? Because you get two continuously variable capacitors that give you infinitely more positions than the limited number on switched coils.

This gives you the precise control you need to get your SWR down to a minimum. After all, isn't that why you need a tuner? Covers 1.8-30 MHz.

You get MFJ's new lighted 2-color peak and average reading Cross-Needle SWR/Wattmeter, dummy load, antenna switch, and 4:1 balun - all in a compact 10x3x7 inch cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

With MFJ's deluxe 300 watt PEP tuner you get an MFJ tuner that has earned a reputation for being able to match just about anything - one that is highly perfected and has years of proven reliability.

MFJ's Mobile Tuner



MFJ-945C \$89.95

Don't leave home without this mobile

tuner! Have an uninterrupted trip as the MFJ-945C extends your antenna bandwidth and eliminates the need to stop, go out and adjust your mobile whip.

You can operate anywhere in a band and get low SWR. You'll get maximum power out of your solid state or tube rig and it'll run cooler and last longer.

Small 8x2x6 inches uses little room. SWR/Wattmeter and convenient placement of controls make tuning fast and easy while in motion. 300 watts PEP output, efficient airwound inductor, 1000 volt capacitors. Mobile mount, MFJ-20, \$3.00.

144/220 MHz VHF Tuners

MFJ-921 \$69.95

MFJ's new VHF tuners cover both

2 Meters and the 220 MHz bands. They handle 300 watts PEP and match a wide range of impedances for coax fed antennas. SWR/Wattmeter. 8x2 1/2 x 3 in. MFJ-920, \$49.95. No meter. 4 1/2 x 2 1/2 x 3 inches.



MFJ's Artificial RF Ground

\$79.95 MFJ-931

You can create an artificial RF ground and eliminate RF "bites",

feedback, TVI and RFI when you let the MFJ-931 resonate a random length of wire and turn it into a tuned counterpoise. The MFJ-931 also lets you electrically place a far away RF ground directly at your rig -- no matter how far away it is -- by tuning out the reactance of your ground connection wire.

Barefoot/1.5 KW Linear Tuner



MFJ-962C 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. Covers 1.8-30 MHz.

You get two husky continuously variable capacitors for maximum power and minimum SWR. And lots of inductance gives you a wide matching range.

You get MFJ's new peak and average reading Cross-Needle SWR/Wattmeter with a new directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Has 6-position antenna switch and a teflon wound balun with ceramic feedthru insulators for balanced lines. 10 3/4 x 4 1/2 x 14 7/8 inches. Add \$10.00 s/h.

MFJ's smallest Versa Tuner

MFJ-901B \$59.95

The MFJ-901B is our smallest --

5x2x6 inches -- (and most affordable) 200 watt PEP tuner -- when both space and your budget is limited. Good for matching solid state rigs to linears.

It matches whips, dipoles, vees, random wires, verticals, beams, balanced and coax lines from 1.8-30 MHz. Efficient airwound inductor. 4:1 balun.



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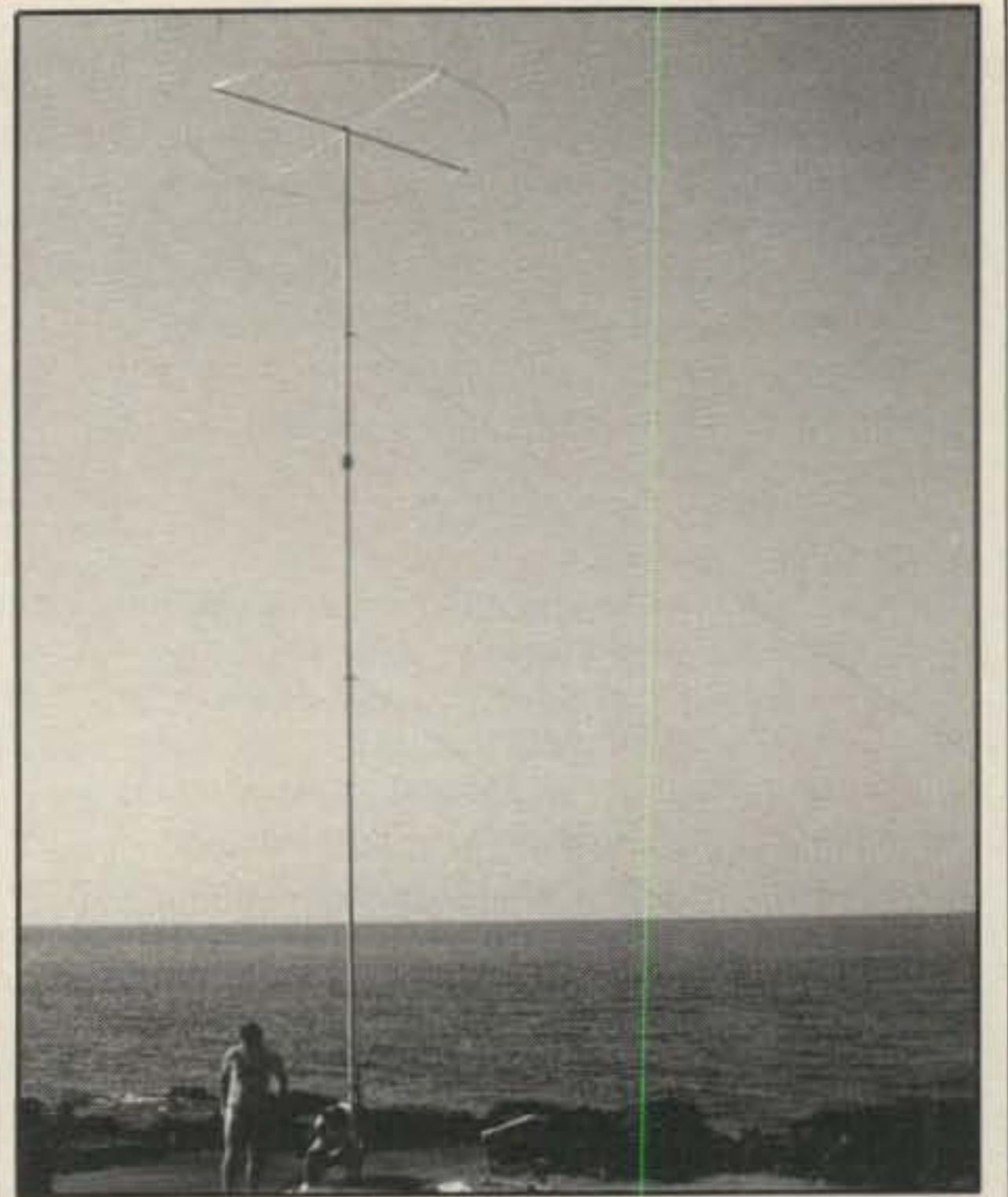
CIRCLE 3 ON READER SERVICE CARD

JOHNSTON ISLAND		PERU		W8FN 2,842,920 1694 138 458		BY5QA 895,950 1816 90 185		G0CCH 364,500 795 65 178												
KNRE /KH3	A 5,147,070 4702 118 252	OA4ZV A 1,172,080 1549 78 182	OA4AV ** 9,636 58 32 41	W18L 1,001,070 830 115 326	WBSJU 501,336 608 86 211	BY4AY 313,575 1127 70 115	BY5HZ 245,388 1249 58 85	GB0CSR 71,736 387 23 61	FEDERAL REP. OF GERMANY											
MARSHALL ISLANDS		TRINIDAD & TOBAGO		WD8DH 308,880 420 77 193	KS9K 6,040,632 2883 167 574	W19L 2,133,330 1523 124 386	W9JZ 790,585 808 91 264	W99MF 312,660 437 73 197	W0CS 2,192,070 1531 136 398	W0FH 1,755,116 1390 121 331	W0RB 1,519,128 1182 118 350	W0UP 1,410,216 1261 105 297	W0BNG 1,180,014 1028 107 311	W0HBH 965,568 839 111 317	N0ZA 698,560 752 92 228	N0ILS 330,990 520 72 183	K0BLX 295,798 422 76 186	N0ICI 153,211 726 85 217	K0BP 79,977 179 50 109	SAUDI ARABIA HZ1AB 1,650,384 1842 80 234 U.S.S.R. ARMENIA RG8GWS 292,875 613 20 145 ASIATIC RUSSIA UZ9SWR 1,731,940 1773 99 257 UZ9XXM 847,930 845 106 289 UZ9OWA 739,480 1019 77 203 UZ9CYP 405,900 667 67 158 UZ9XWA 111,795 287 38 107 UZ9FZD 26,019 162 19 40 UZ9YXL 8,892 95 13 25 UZ9XWV 4,472 37 23 29 R0C 4,894,398 4653 137 329 UZ0WWP 603,356 970 82 201 UZ0SWX 34,410 423 24 50 GEORGIA 4J5FV 10,333,336 5442 151 525 UF7FWM 689,720 1220 58 157 UF7FWC 76,096 356 24 58 KAZAKH RL1P 7,625,772 4326 168 525 UL8LYA 5,967,500 3514 146 474 UL8LWA 2,552,664 2118 111 327 UL8BWW 1,361,100 1292 101 289 UL8RWR 94,860 437 35 50 UL8CWW 63,525 224 31 75 UL8RWE 42,809 298 35 54 TADZIK UJ9KWC 123,574 385 42 95 UZBEK UI9BWF 386,464 735 60 148 EUROPE ALAND ISLANDS OH0AM 10,492,220 4931 168 620 ANDORRA C30EEA 1,937,640 3804 92 310 AUSTRIA OE2XEL 3,674,816 3132 118 418 OE5XGN 502,944 1016 77 235 AZORES CU3URA 2,742,215 3536 82 247 BALEARIC ISLANDS EA6FO 581,348 1955 34 108 BELGIUM ON6NL 5,364,644 3789 139 460 ON4AAQ 3,160,954 3053 104 327 OQ7LR 3,093,138 3776 104 374 ON7UN 2,522,586 2615 93 314 ON6AH/A 1,311,051 1672 104 315 OR5EEC 528,282 1046 60 183 BULGARIA LZ9A 12,685,140 6051 180 665 LZ1KXA 4,308,535 3515 143 446 LZ1KSP 1,452,521 2100 112 301 LZ1KNP 626,416 1265 77 252 LZ1KBB 130,754 327 71 214 LZ1KKR 34,860 208 24 81 CZECHOSLOVAKIA OL8A 9,651,300 5234 159 636 OK5R 9,548,293 5131 163 580 OL4A 9,049,004 5098 165 602 OK1KQJ 2,286,428 2170 118 391 OK1KPU 1,585,926 1560 94 293 OK2RAB 1,387,200 1845 102 298 OK1KNR 566,400 921 85 235 OK2KDS 348,435 754 62 199 OK2KMR 330,120 743 66 186 OK2KOD 265,113 577 65 178 OK1KJA 237,440 987 30 128 OK3KGX 223,958 596 54 183 OK2KYC 208,692 606 49 149 OK1KOB 129,216 390 51 141 OK2KJU 102,074 354 46 115 OK1OFM 98,230 306 56 134 OK2KHD 58,050 256 38 97 OK2KBA 56,896 340 26 86 OK2KVI 42,315 218 30 75 OK1KNC 6,435 74 20 35 OK3KUN 156,972 442 63 143 OK3KSK 5,856 66 19 42 ENGLAND G3MLY 4,102,560 3008 132 423 G3SZA 910,100 1155 90 290 FINLAND OH5NO 6,775,048 4125 156 518 OH9AR 784,220 1287 91 256 OH4AB 701,428 983 102 262 FRANCE FV9NDX 9,104,528 5734 140 512 F6HLC 2,074,644 2115 94 309 F6BGC 2,057,872 2696 83 245 FF6KPO 667,202 1382 68 203 FF2LY 302,931 649 60 231 FF10LQ 127,725 431 55 140 FF5KK 61,115 328 22 63 GERMAN DEMOCRATIC REP. 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LU6FAZ) LU7MAD ** 24,708 93 46 70 LR6ETB 28 2,486,304 4321 38 156 LU8A ** 535,316 1264 34 114 (Opr. LU8AJK) LU6EJP ** 191,595 720 27 74 LU5HN ** 149,776 558 29 63 LU1HPH ** 13,040 118 14 31 LU1ICX 21 626,255 1458 34 111 LU9FDG ** 263,541 840 30 77 L1Y 14 83,631 471 17 44 LU7ADN 7 880 26 9 11 LU2DKT 1.8 3,050 50 10 15 LU5EW ** 30 3 2 3 ARUBA P40R 28 2,669,580 4951 35 145 (Opr. K4UEE) BOLIVIA CP1BA A 22,275 106 30 51 BRAZIL PP2ZDD A 321,167 380 80 221 PT2TD ** 150,804 327 54 123 PY4BHB ** 148,824 364 53 106 PS8ET ** 47,841 159 29 82 Z28WHL ** 17,575 77 32 63 PP2JQ ** 4,142 40 14 24 PP2YY ** 2,046 25 12 19 ZZ5JR 28 1,127,584 2298 34 133 PP5JD ** 827,172 2036 33 105 ZY1ACV ** 240,464 642 30 103 PY3TD ** 207,800 755 29 71 PY30L ** 196,520 786 26 59 PY3BD 21 89,550 416 23 52 WY1J ** 21,774 143 18 39 PY1LI 14 63,525 287 26 51 PY2ELZ 7 9,500 73 15 35 CHILE CE38FZ A 3,000,492 2580 121 275 CE4FX 28 1,474,806 3600 34 104 CE5NCX 21 26,400 124 23 52 CE6EZ 14 1,232,242 2632 37 121 COLOMBIA HK3BED A 2,747,867 2236 113 308 HK3JH ** 2,669,501 2655 91 258 HK3NTI ** 59,998 165 46 85 HK3MKQ ** 16,575 72 30 55 HK4HHG 21 1,071,211 2296 35 122 HK7MOC ** 163,760 503 24 91 HJ1S 7 113,815 489 24 61 HK3MAE 3.8 413,644 1170 25 94 HK4DUM 1.8 7,336 95 8 20 ECUADOR HC5AN A 1,599,936 1790 93 219 HC10T 21 1,713,762 3389 36 135 HC1H 3.8 22,120 130 15 45 FALKLAND ISLANDS VP80N 28 1,302 26 8 21 PARAGUAY ZP5XHM 28 284,992 795 28 94 UNITED STATES K1YR 5,743,854 2714 148 590 K1NG 5,851,265 2510 160 593 KA1GG 4,995,220 2627 139 520 K1TO 3,917,100 2061 137 523 K1IU 3,309,306 1857 134 493 KA1X 1,542,088 1263 97 327 KQ1F 1,217,835 901 121 364 WB1DGV 822,120 747 98 305 W1AF 497,336 555 84 248 KA1QFC 424,700 554 70 204 W1BK 391,776 431 91 245 W1AQ 200,736 343 57 147 KU2C 3,608,478 2071 138 476 W2HPF 3,473,055 2226 134 431 W2RR 2,819,291 1727 135 434 N2SS 2,053,083 1329 119 424 W2OW 1,794,254 1515 106 321 KQ2O 1,381,125 1108 106 329 W2UI 587,590 630 83 252 K2OP 363,537 479 73 206 N2UN 254,184 509 44 134 N3RS 5,474,560 2595 157 595 W3XU 3,852,279 2346 133 440 K3IVO 1,278,648 1142 103 310 K3ANS 1,103,500 835 123 377 N3RR 1,081,856 777 128 384 WB3FIZ 1,061,208 852 112 347 N3BNA 864,780 707 111 324 N3ARK 806,656 768 85 283 NC3C 779,556 714 95 294 W3KWH 600,314 753 79 207 K3DI 494,845 552 91 240 N4RJ 5,754,606 2857 152 554 AA4NC 3,288,600 2179 124 416 WA4QQV 1,540,812 1107 127 371 N4QWL 1,212,552 1166 100 296 WA4CUG 617,540 566 106 295 WA3UDH/4 584,400 710 77 223 KE4QL 404,390 588 67 198 N4TL 229,724 362 64 163 AA4LH 144,609 423 29 100 KC5DX 2,180,844 1664 123 354 K5RVK 1,381,386 1106 113 354 W5AC 693,594 857 103 236 WA5ZLI 667,755 650 98 257 W5EHM 599,874 620 96 270 K5BDA 546,481 624 93 238 N6RD 2,856,546 1859 143 424 W6TMD 2,193,655 1687 133 352 WC6H 1,780,254 1621 107 291 W6XB 1,337,021 1179 116 293 NF6S 1,090,668 1010 112 276 N6MB 893,583 839 114 273 KE6WL 813,000 781 112 263 KD6WW 616,791 1424 34 127 WG6P 507,400 563 105 239 K6ZM 176,981 340 68 12 K6USH 101,760 239 55 105 NK7U 2,842,256 2228 130 342 N7RO 1,216,376 1100 115 277 ND7F 768,096 874 107 229 WG7F 335,874 590 77 154 WT7D 474,498 563 105 198 W8BK 4,055,142 2231 148 489 K8AZ 3,436,629 1857 145 506 N8CXX 3,291,777 1902 137 466 AFRICA THE GAMBIA CS3FW 938,956 1657 60 131 MOROCCO CN8A 10,075,059 5910 129 444 REP. 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SK20G	718,976	1401	81	247
SM0BGM	211,152	398	67	182
SWITZERLAND				
HB9H	4,845,681	3675	136	471
HB9AGC	1,436,910	1729	102	320
WALES				
GW8GT	6,171,984	4571	140	484
YUGOSLAVIA				
YT3T	4,130,719	3071	131	456
YU3EO	2,416,874	2363	117	329
4N2D	2,337,253	2983	112	237
YT4D	748,693	1089	81	238
4N4C	320,528	879	79	229
U.S.S.R. BYELORUSSIA				
UC1AWC	2,007,852	2491	106	386
ESTONIA				
UR1RWX	3,489,870	2920	135	428
UR1RWO	118,125	474	47	128
LATVIA				
RQ7W	8,388,076	5622	148	520
UQ0A	5,097,849	3995	144	487
UQ1GXJ	880,854	1605	68	231
LITHUANIA				
UP1BZG	4,838,070	3359	146	524
LY2WW	3,943,218	2920	135	428
LY1BYK	1,413,760	1721	125	348
LY1BZB	797,625	1244	88	287
LY1BZR	44,478	223	31	95
MOLDAVIA				
UO40XA	64,894	285	35	107
RUSSIA EUROPEAN				
UZ4HWS	1,710,536	2202	108	296
UZ4WVY	1,390,984	1554	106	307
UZ1TWB	927,472	1491	94	270
UZ1AWQ	923,843	1413	91	302
UZ4WWB	629,443	1115	86	227
UZ4PWW	609,861	984	93	246
UZ6AXS	538,684	852	77	197
UZ3DXS	180,992	544	55	147
UZ6HYK	128,568	620	41	187
UZ3AWR	79,818	368	36	123
UZ3QWM	68,952	324	48	108
UZ4PWY	65,056	428	38	114
UZ1AWO	56,211	302	31	92
UZ4AXN	15,853	148	19	64
UZ3QYA	15,827	139	16	33
UZ4SWQ	3,696	55	13	31
UZ3VXT	2,952	93	7	29
UZ4HYR	2,380	86	7	27
UKRAINE				
UB2JWS	2,573,980	2951	112	318
UB4QWW	2,475,576	2930	105	333
UB4WZA	1,167,810	1357	95	307
UB4IZA	621,481	1026	86	329
RB4IWM	589,677	1006	80	241
UB4MWW	285,348	734	69	189
UT4UWU	223,260	593	62	182
UB4VWW	216,435	669	60	175
UB4TWL	135,720	416	51	144
RB4EXN	135,675	484	46	155
UB3GWN	73,188	171	36	82
UB4IWI	49,140	256	33	93
UB4XWK	15,744	162	21	62
UB4WZB	7,982	88	26	52
OCEANIA				
AUSTRALIA				
VK3VT	2,262,415	2231	114	241
VK2MAG	379,800	1596	41	85
LORD HOWE ISLAND				
VK9LV	3,201,936	3380	103	225
MARSHALL ISLANDS				
KX6OI	6,062,364	4489	141	321
NEW ZEALAND				
ZM2A	139,018	370	52	90
PHILIPPINES				
DX1A	2,606,325	3130	97	188
XU1SS/DU6	2,267,916	3030	97	169
DX1CW	1,860,252	2762	73	155
TONGA				
A35VB	895,053	1468	83	221
WAKE ISLAND				
AH2BE/KH9	5,289,756	5339	112	227
SOUTH AMERICA				
ARGENTINA				
AZ4F	7,327,780	4701	145	386

LU1FKR	1,977,300	2222	88	237
LT5F	1,066,360	1686	78	134
ARUBA				
P40V	18,500,488	9128	143	542
BRAZIL				
ZZ1AA	3,322,150	3465	89	236
CHILE				
CE2AA	2,684,880	2813	99	246
CE4MVK	543,552	966	67	125
COLOMBIA				
5J6CQ	3,319,360	3924	90	238
ECUADOR				
HC2T	1,575,917	1897	92	197
FRENCH GUYANA				
FY8P	13,054,368	6856	142	504
NETHERLANDS ANTILLES				
PJ9W	17,682,387	9265	150	537
MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA				
UNITED STATES				
NB1H	11,623,745	5131	158	629
KY1H	9,076,782	4338	153	628
N2RM	11,681,488	5246	159	632
K2TR	11,559,808	4937	159	673
K5NA/2	9,255,843	4214	154	629
K2TD	2,224,152	1579	114	390
W3LPL	15,026,970	6061	172	706
NE3F	5,119,440	2771	142	522
W3GM	3,152,358	1749	140	498
N3LR	2,674,516	1954	121	373
K3ZZ	2,558,950	1511	148	462
W3FW	1,916,479	1408	118	361
W3NX	874,310	845	98	272
NQ4I	4,584,668	2595	148	490
N5AU	11,029,846	4764	169	654
N6ND	5,966,397	3375	156	487
N6DX	4,159,148	2568	153	470
KO7N	7,373,912	4066	161	476
KC7OD	351,900	631	68	136
K8CC	6,559,245	3506	158	535
NE9O	3,763,100	2299	145	460
K9UWA	2,701,650	1667	141	440
WB0KA	3,053,086	2055	144	398
ALASKA				
KL7Y	11,999,515	9005	143	392
KL7RA	8,491,392	7228	133	353
KL7AA	652,553	2240	34	87
BAHAMAS ISLANDS				
C6A/N4FD	1,664,280	2944	72	198
BERMUDA				
VP9AD	32,003,945	16449	171	628
CANADA				
VE3XO	1,869,056	1604	115	333
VE6WP	1,144,450	2266	83	152
VE7ZZZ	6,214,546	5420	135	364
GRENADA				
J37DX	9,786,634	8750	115	379
ST. KITTS				
V47K	17,543,514	11511	134	473
ST. MARTIN				
FS/KC1F	8,385,653	7457	117	370
AFRICA				
MADEIRA ISLANDS				
CR3M	6,817,680	4483	119	391
ASIA				
JAPAN				
JA1YFG	5,718,278	3657	151	400
JE2YRD	7,871,248	4510	159	457
JA2YKA	2,019,072	1914	126	258
JA4YEY	1,209	30	18	21
JA7YRR	4,499,145	3276	138	345
JA9YBA	7,378,590	4438	155	432
EUROPE				
FEDERAL REP. OF GERMANY				
DF2RG	7,066,920	4755	149	556
DF3QG	1,335,044	1364	115	378
ITALY				
IU3A	15,596,691	9799	159	600

LICHTENSTEIN				
HB0	/HB9AON	6,600,328	5462	123 479
LUXEMBOURG				
LX7A		26,578,978	14947	175 751
THE NETHERLANDS				
PI4DEC		5,567,302	5471	119 347
SWEDEN				
SK0UX		186,408	384	65 151
UNITED NATIONS (VIENNA)				
4U1VIC		5,565,680	5803	129 451
YUGOSLAVIA				
YT2A		15,514,674	9328	167 624
U.S.S.R.				
EUROPEAN RUSSIA				
UZ6LWZ		6,205,728	4791	154 522
LITHUANIA				
LY2ZZ		18,271,552	10196	175 657
UKRAINE				
RB8M		19,598,840	11896	182 642
OCEANIA				
FIJI ISLANDS				
3D2KH		679,135	1292	70 115
NEW ZEALAND				
ZM2K		5,500,782	4226	115 332
SOUTH AMERICA				
BRAZIL				
ZW5B		35,830,544	13644	189 710
NETHERLANDS ANTILLES				
PJ1B		48,985,200	18175	175 764
PJ2U		6,579,774	5811	105 282
QRP				
WORLD				
YU2TY	A	758,523	848	96 321
EA3FBO		461,472	700	79 225
KD2TT		371,968	508	62 194
4M1G		336,384	562	60 159
VE1CBF		331,261	510	70 89
W0MHK				
/1		311,576	476	60 172
HB9ADD		303,552	490	76 212
W0UO		297,591	428	79 180
UD6DFF		253,984	432	56 165
N4IJ		244,651	363	66 187
SM5CTT		196,409	593	48 149
Y05AVN/3		182,748	336	20 211
ON4AVG		175,000	520	51 124
EA1GT		159,996	470	50 149
I0KHP		155,200	431	47 47
JA1DXA		148,365	545	49 140
IS0LVN		80,772	255	42 117
KE0KB		66,304	166	48 100
UB3MP		65,943	292	38 115
OZ1GRS		62,272	351	31 108
UA9SG		58,812	318	24 63
RA3DQP		56,440	268	38 98
SM0BYD		55,132	203	40 114
UV3DCR		46,620	345	21 69
KA1CZF		36,562	130	27 84
RA3AAU		35,349	277	28 99
EA1CJJ		32,635	251	23 84
UB5AFJ		30,044	187	28 88
Y02CMI		24,735	145	25 60
G4ZMK		24,319	193	19 64
Y02DLE		21,037	151	26 83
WS7U		20,280	100	34 44
Y24HB		11,988	133	12 69
KB6ZNF		11,918	76	26 33
RB5WO		11,398	127	13 28
KB7M		10,780	62	30 40
JE7EWN		9,872	119	29 31
Y05CUU		8,820	145	10 50
Y05QDN		8,723	135	11 50
UA00IU		9,310	156	22 27
GM3RFR		8,528	100	15 37
RA3DFN		6,837	65	16 27
JH1RMH		6,789	51	22 26
UV3TD		6,741	83	19 44
W6VYK		5,610	44	25 30
Y23TL		5,184	89	10 42
LZ1OR		3,960	46	14 16
Y21XC		3,500	49	17 30
UQ2GRZ		2,022	49	16 30
Y06ADW		1,885	54	6 23
ON4AHG		1,872	28	11 15
Y24XH		1,720	40	8 32
Y21QE		1,488	51	5 26
Y25MD		1,364	46	6 25
Y25JA		912	41	4 20



Setting a new African 1.8 MHz record from Sicily (Africa), IH9/IV3PRK used this top-loaded vertical on Pantelleria Island.

UB0QZ	**	380	20	7	12
JR3RWB	28	227,799	694	31	86
EA1BIM	**	159,573	549	29	100
K65U	**	123,403	361	28	91
W5VGLX	**	117,990	368	26	89
JA1TLK	**	110,676	428	29	63
JA6WSL	**	103,222	373	29	72
AK5E	**	102,339	265	30	107
EA3EJ	**	93,462	378	27	84
LA5JX	**	64,904	367	23	53
GM4ELV	**	63,494	303	25	81
KA1UJ	**	60,297	215	25	76
KB4PTA	**	56,337	254	23	66
EA4EEK	**	52,560	298	23	57
KA8NRC	**	48,985	175	25	76
KB4IOS	**	43,498	169	27	64
LA9VDA	**	39,044	229	23	63
WB6JMS	**	36,500	180	24	49
G4RFE	**	23,800	145	21	54
N1AFC	**	22,644	119	22	46
VE3HX	**	22,010	116	20	51
XE2HWB	**	20,880	163	21	37
KC2TR	**	19,404	107	17	46
UA4PBX	**	16,440	134	14	46
UR2RIM	**	15,604	145	17	30
EA1KC	**	11,730	153	12	34
UA8JB	**	10,224	75	16	32
JR1OYL					

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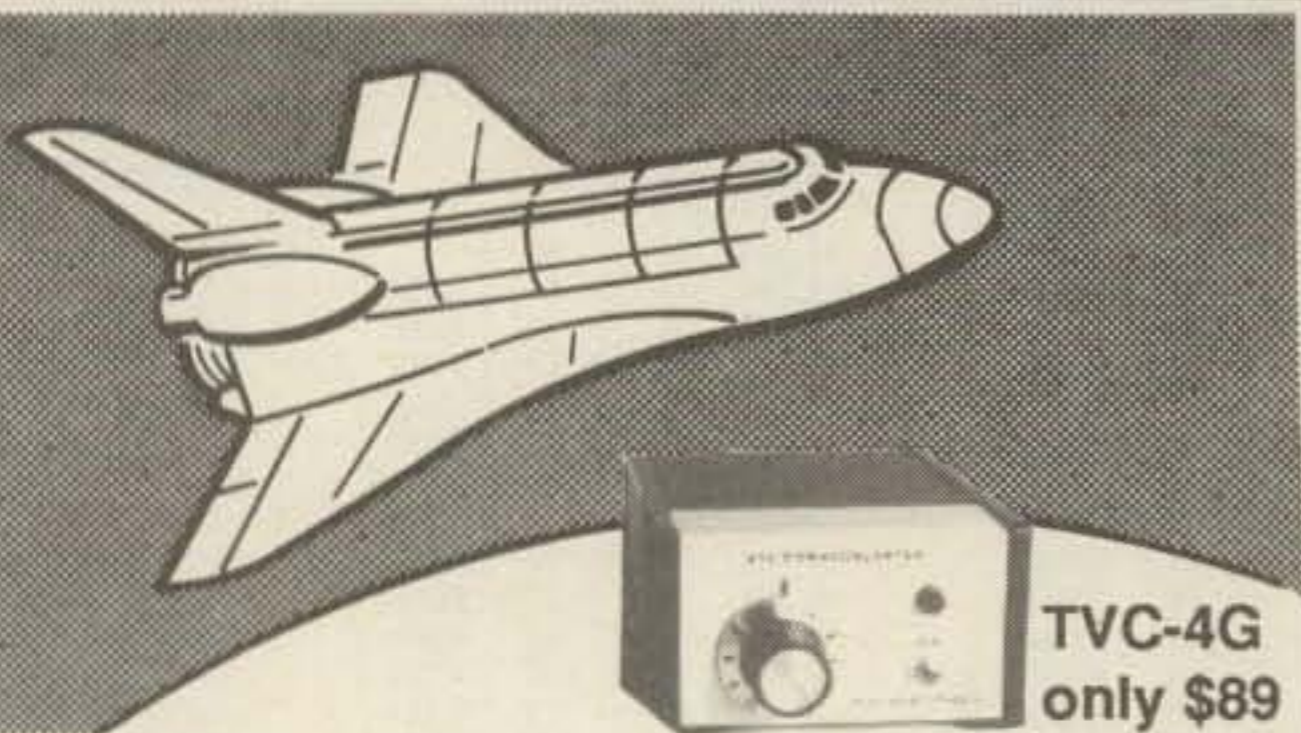
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Tom (W6ORG)

2522 S. Paxson Ln Arcadia CA 91007

Maryann (WB6YSS)

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AD3V	**	1,909,321	1297	115	412
NN3Q	**	1,557,920	1234	105	350
K3VW	**	1,475,040	1186	103	336
NW3Y	**	1,341,362	1156	101	317
N3H	**	1,323,972	1007	112	356
NX3A	**	1,134,915	928	105	330
KD3IY	**	507,636	511	96	258
K3YGU	**	484,932	539	83	239
NK3U	**	381,408	412	94	254
K3RL	**	356,352	377	96	252
KW3Z	**	325,471	432	71	200
NU3Y	**	259,740	329	69	201
KA3PLS	**	210,112	336	60	164
KQ3F	**	186,238	279	70	177
W3OV	**	162,864	262	79	155
K1ZZI/4	A	1,150,344	870	111	357
KB4NJ	**	437,276	502	81	241
WB4MAI	**	406,973	442	97	232
W4LVM	**	342,168	458	72	197
K4PR	**	291,316	483	75	193
N4MM	**	289,275	361	80	205
K8UNP/4	**	257,167	395	64	165
K2EWB/4	**	193,971	288	67	182
AA4DO	**	155,403	210	93	186
KB4SSS	**	152,544	249	68	156
K4DLI	**	120,450	195	75	144
K4KUZ	**	91,665	180	53	136
KQ4G	**	60,032	167	36	92
WB4QNP	28	101,280	223	35	125
NN4K	**	50,868	160	29	79
N4H0H	7	30,616	127	24	65

KA5W	A	1,768,600	1312	121	357
KW5P	**	1,302,189	1160	103	310
KD5GD	**	746,548	767	96	265
KG5ND	**	672,945	583	109	326
K5GOE	**	243,648	316	90	198
N3BB/5	**	130,870	212	81	149
WB8NSA/5	**	115,830	242	60	135

K6EID	A	742,352	790	95	237
N6CCL	**	349,650	534	88	171
KG6MY	**	299,440	372	80	224
W26Z	**	284,620	391	86	180
N6SYP	**	273,498	432	71	166
WA7G/6	**	268,005	387	75	180
N6SRT	**	197,583	374	70	131
W8LLY/6	**	124,758	261	58	116
N6TIB	**	117,124	251	59	119
KC4IRP/6	**	106,212	314	59	100
AJ6V	**	104,130	225	60	118
WB2CHO/6	**	14,442	92	24	34
KA6ING	28	57,750	194	29	76

KI3V/7	A	1,720,590	1248	130	368
NC7K	**	909,083	782	120	307
K7WK	**	228,160	354	68	162
N7KZN	**	185,458	371	64	118
KF7RU	**	60,051	196	44	67
NX7K	28	161,721	515	32	87

N8ATR	A	1,448,920	1159	113	327
W8CG	**	1,395,248	1270	91	297
WD8IXE	**	1,313,671	1004	114	353
N9AG/8	**	935,704	773	108	326
WB8VPA	**	881,216	807	95	297
KA8D	**	368,350	509	69	196
WD9INF/8	**	264,852	372	72	180
W8CAR	**	227,994	380	74	163
NG8D	**	127,575	207	69	156

W9NNE	A	1,021,650	766	129	361
WD9GIG	**	520,352	517	92	276
K8BFR/9	**	462,536	510	88	235
K9OSH	**	423,680	497	95	225
K9BTU	**	13,689	66	33	48
W9XT	28	603,598	1182	34	144

WBZV	A	3,521,032	2171	147	421
W8RLX	**	723,005	798	93	266
KC9AL/8	**	365,754	465	75	207
NI8G	**	175,950	258	80	175
N8IGP	**	12,012	71	29	55
NY8V	28	145,440	357	32	112
WB8ZRL/8	**	71,850	172	34	116
W8SR	**	64,800	163	34	110

ASIA

JAPAN

JA1YDU	A	1,776,652	1593	121	267
			(Opr. JH8NZN)		
JR1GSE	**	541,002	833	90	141
JH1AJT	28	1,097,235	2037	37	148
JR3NZC	**	248,193	774	33	76
JAT7QK	**	411,642	1173	32	89
JABSCD	21	765,567	1556	37	134

EUROPE

FEDERAL REP. OF GERMANY

DL40K	A	357,713	606	76	205
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NORWAY

LA9ML	A	23,883	150	18	39
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YUGOSLAVIA

YT3AA	A	5,756,932	3580	154	482
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U.S.S.R. EUROPEAN RUSSIA

UZ3AF	A	31,436	175	28	88
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OCEANIA

GUAM

NY6M/KH2	A	2,108,408	2466	90	206
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PHILIPPINES

4F3AAL	14	169,512	715	30	54
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A22RA, C6/AA5AU, CS0CDP, CS0DJE, DF5PP, DJ3VC, DJ7EE, DK0CT, EA1ATQ, EA1AW, EA1CNL, EA1DVF, EA1ECE, EA1EMO, EA1KW, EA2BOT, EA3BSE, EA3CTB, EA3CYM, EA3CZM, EA3DMP, EA3DXD, EA3FDR, EA3FYD, EA5BK, EA5DCL, EA5DIT, EA5EGT, EA5FFQ, EA5FWG, EA5GHH, EA5GJF, EA7AL, EA7BVI, EA7DGD, EA7DHF, EA7DLC, EA7DLD, EA7DUD, EA7FZR, EA8ACH, EC3CTB, F11COA, F11CW, F11DFI, HA7MY, HJ3MCM, HK3MAH, IK0JMS, IK7BPV, IT9ZGY, JAG6HF, JA6LDD, JF2KUU, JP1RYR, K2RXN, K4HJT, K7EFB, KB0CWV, KG5OV, KJ4VH, KK4RV, KK9A, KP4BJD, LA2LV, LA2PGA, LA3VP, LA4OGA, LA5MT, LA5TFA, LA6PB, LA9DFA, LA9FFA, LA9HF, LA9LO, LA9LS, LA9WBA, LA9XG, LU5EIC, LU5EW, LU6AJA, LZ1DM, LZ1HH, LZ10Q, LZ10S, LZ1SS, LZ1UK, LZ2A-321, LZ2DD, LZ2PS, N0GOS, N6OU, NP4Z, NW4Y, OH1AA, OH1MFX, OH1UN, OH1XX, OH3FW/6, OH3HS, OH3MIG, OH3NM, OH5MMG, OH6UC, OH6WI, OH7MFO, OH8MCE, OK1AMS, OK1DOW, OK1GS, OK2BBQ, OK2BGO, OK2BOQ, OK2SG, OK2SKU, OK2ZU, OKBAGN, ON5FV, OZ1CID, OZ1LRT, OZ2TH, OZ9SN, PA0LRK, PA3BUD, PA3DRZ, PP5JD, PY2APQ, PY3BD, PY3OL

RA1AG, RA1AI, RA3AGF, RA3ATM, RA3DDA, RA3DJA, RA3DKE, RA3DOX, RA3DR, RA3NC, RA3VV, RA3XC, RA4PKI, RA4PKL, RA6LOT, RB0HZ, RB5CW, RB5GI, RB5GJ, RB5IGN, RB5NT, RB5RA, RL7PEO, RV6LD, RV9CFP, RW3DF, RW6AH, RZ6AYU, SM0CSX, SM0MC, SM2NTU, SM3CYM, SM3MHD, SM4DLS, SM4JUV, SM4LEB, SM4RRD, SM4SET, SM5CVC, SM5EME, SM6BWQ, SM6CDN, SM6HRR, SM6LIF, SM7FJH, SP1DMD, SP2GCJ, SP3BVI, SP3CDQ, SP3GRQ, SP3GVX, SP3HZG, SP3JHY, SP3JIA, SP4AS, SP4BY, SP4GDC, SP4GFG, SP4KM, SP4LVG, SP5ATO, SP5DZE, SP5GNI, SP5NOG, SP6FIB, SP6SO, SP6TPM, SP7DBI, SP7LHZ, SP7ROJ, SP8BBK, SP8BWR, SP8GEY, SP8HXN, SP8JMA, SP8LZO, SP8UFO, SP9-4315-KA, SP9-4557-KA, SP9-4558-KA, SP9AZL, SP9DGO, SP9EML, SP9GDB, SP9JPA, SP9MRP, SP9REP, SP9TNZ, TH2X, U5FG, UA0FS, UA1CK, UA1NDI, UA1WBV, UA3ACT, UA3AGW, UA3AHA, UA3DUA, UA3EDH, UA3SBJ, UA3WCN, UA4CIN, UA4CKC, UA4FDD, UA4NCI, UA4PKN, UA4PNV, UA4QK, UA4QD, UA4YJ, UA6ED, UA6HHF, UA6HRZ, UA6LAX, UA6LQZ, UA6PAG, UA6WBF, UA9AKW, UA9JFR, UA9LFN, UA9MFN, UA9MGY, UA9OS, UA9TS, UA9TX, UA9UDC, UA9UY, UA9YND, UB4QZZ, UB4WWT, UB5066376, UB5IID, UB5QFJ, UB5QJA, UB5QMD, UB5WBX, UB5ZEG, UB5ZMW, UC1AWP, UC1CWR, UC2AFD, UC2LB, UC2LR, UF6VR, UI8BAA, UL7JV, UL7TZ, UM8DX, UM8MGM, UO500J, UP2BGP, UR1RYE, UR2QB, UR2RMC, UR2RNT, UT4UWL, UT4UXA, UV3DF, UV3DLB, UV6HC, UV6HSU, UV9CAF, UW3HY, UW3RR, UW3VA, UW9CD, UW9CH, UW9CWB, UW9UE, UW9YM, UY56G, UZ1AYX, UZ1NWA, UZ1ZWO, UZ2FWA, UZ3AWT, UZ3AXB, UZ3DZW, UZ3DXF, UZ3DYU, UZ3TZZ, UZ4AXQ, UZ4SWU, UZ6AZR, UZ6LWW, UZ9CXA, UZ9SWI, UZ9YXI, VE1ACK, VE7BSB, VK2DXI, VK2EKY, VU2IN, W4UW, W8RV, WA2HAL, WD5EHU, WA6HRK, WM7R, WW7M, XE3EB, Y21DG/A, Y21ML/P, Y22KI, Y2200, Y22TO, Y23FI, Y24EA, Y24HJ, Y24XD, Y25BL, Y25FI, Y25SA, Y25TO, Y26JD, Y26NL, Y31WI, Y36XC, Y37XJ, Y38YE, Y38YK, Y45RJ, Y53UL, Y53VL, Y54FL, Y54UI, Y55PG, Y62OH, Y75YL, Y78VL, Y87PL/P, YC50H, YO6CFB, YO6KNT, YO9HH, YU1KQ, YV38QS, ZS3UN/OH8DG, ZS6AXF, 9K2CS, 9K2RA.

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155BAS - 5 El., 15M Beam.
105BAS - 5 El., 10M Beam.
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100	1369	2199	2989
110	1449	2459	3209
120	1669	2619	3429

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TX455	22 Ft.	55 Ft.	18 Sq.'	1385
TX472	22 Ft.	72 Ft.	18 Sq.'	2279
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HDBX48	48 Ft.	18 Sq.'	363	689

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No matter how blase or jaded we may think we are, we all look forward to receiving QSL cards, especially from rare locations. How to send and receive QSL cards is a process that can be easily learned and can add amazing results to your confirmation total.

Effective and Efficient QSLing

BY MIKE THOMAS*, NA5U

Once that rare or needed contact is in your log, the process of getting that confirming QSL begins. This of course involves filling out your card, addressing a return envelope, including appropriate and adequate postage, and delivering this nice, neat package to your local post office for delivery.

These four simple steps if not done properly can cause a multitude of problems and headaches for all concerned. It is our intent to explore the process of QSLing with the idea of identifying some of these inherent pitfalls, as well as suggest some standards for QSLing which should (1) improve your QSL return rate, (2) save you some money, (3) ease the work load on DX stations and QSL managers filling your requests, and (4) make the overall process flow smoothly.

The QSL Card

The central point of this overall discussion is the QSL card—specifically, receiving the DX station's card. However, your own card plays a vital part in this process. There are three essential elements involved in your card: its structure, the information included in the card, and the method used to convey that information on your card.

The structure of the QSL card is one of great personal preference and runs the

gambit from extremely elaborate and expensive to the economical "buro flusher" style. Regardless, there are some fundamental ingredients which each card should have to ensure a reply to your request.

First and foremost, your card must be readable. A few print styles as well as color schemes can cause real problems in reading a card. So be careful with your choices. A good way to test your card is to ask a non-amateur to read all the information on your card and give you feedback on its clarity.

Single-sided cards are preferred by DX stations and QSL managers who handle a large number of cards. If you have a two-sided card style be sure your call is clearly shown on the same side as the QSO report information, even if you hand write it. A rubber stamp with your callsign on it is a good way to do this.

The report format is another area of the card structure which is important when handling many cards. The straight-line style (see fig. 1) is preferred over the text style (see fig. 2). Text styles vary in structure and are cumbersome to read. Some amateurs have chosen a design which interleaves the QSO information into a design such as the front panel of a radio or picture of some sort. Though being very creative and unique, this style card is very difficult and time consuming to read and adds greatly to the possibility of an error. This format is strongly discouraged in the DX arena, where large volumes of cards are often handled. These are things which can be avoided

and will reduce the possibility of receiving the dreaded "not in log" (NIL).

"Not in Log"

Time and date recording are the next areas which need careful attention. **Always** record *everything* in Universal Coordinated Time (UTC) only! Remember Central Daylight Time or Japan Standard Time means nothing to that DX station or manager halfway around the world.

Next the recording and format of the date information is vitally important. Nothing is more frustrating or time consuming than leafing through page after page of logs looking for a callsign. Most stations and managers are very good at doing this, but everything has a limit; don't forget the dreaded "NIL." The standard convention for date recording is Day, Month (Roman numerals), and Year (see figs. 3 and 4). What is the date of the QSO in example 1 (fig. 5)? Is it September 1, 1989 or January 9, 1989? What about example 2 (fig. 6)? Yes, cards sometimes are actually filled out this way! Any idea which file that card might end up in? The point is, follow convention. It helps ensure a response and saves time. Also, be careful with the date. Remember, the date changes at 0000 UTC. That is to say, sometime during *your* day, Friday for example, Saturday UTC will begin. Digital clocks which will operate in 24-hour format can be purchased for around \$10 to \$15 and will prove to be a wise investment to help you keep this straight.

*5717 Puerto Vallarta, No. Richland, TX 76180

Station	Day-Mo-Yr	UTC	MHz	RST	Mode
KZ5Z/DU1	7 II 90	0325	28	599	CW

Fig. 1—Straight-line style, preferred format for a QSL card.

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KENWOOD: TS-940, 440, 140, R-5000, 680, 711, 811

YAESU: FT-767, 757 GXII, 757 GX, 747, 9600, 736 212, 712

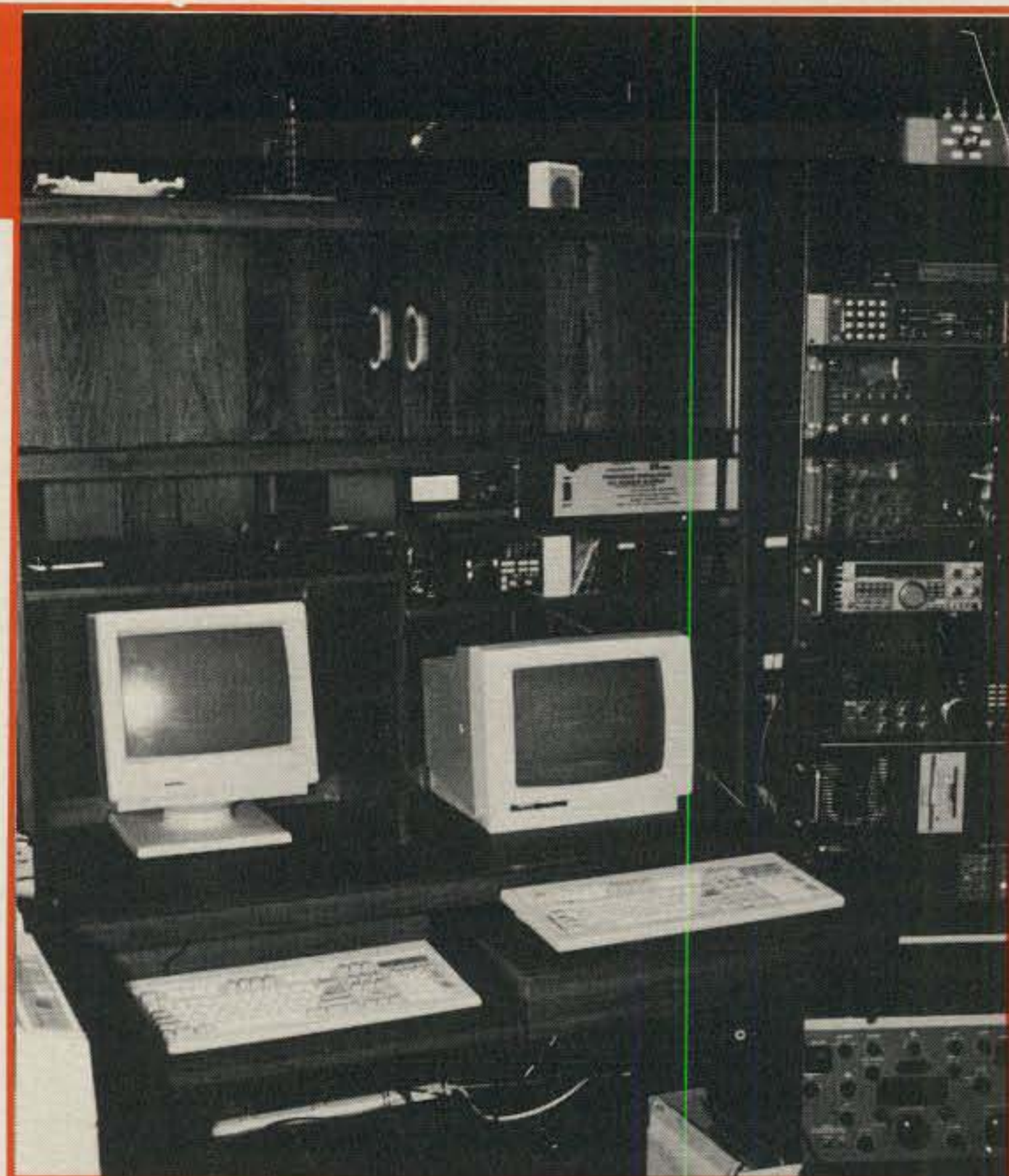
JRC: NRD 525

COLLINS: 651 S1

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CURRENT MENU	 MAIN MENU	VERSION 9.1
MEM 394 K STACK 1 K	DATE: 10-24-1989	SELECT FUNCTION	MODE= USB
1. READ MEMORY CHANNELS	2. INPUT DESIRED FREQUENCY	3. 500 KHZ. UP	4. 500 KHZ. DOWN
5. ACTIVATE/DEACTIVATE CLARIFIER	6. SWEEP BETWEEN 2 LIMITS	7. MEMORY CHANNEL DIAL	8. WRITE MEMORY TO VFO VFO A
A. AVIATION (VHF) COMMUNICATION	B. TELEVISION BROADCASTING	C. COASTAL MARINE FREQUENCIES	D. F.M. BROADCASTING
			E. AMATEUR FREQUENCIES (VHF)
			F. MISCELLANEOUS FREQUENCIES (VHF)
PORT= COM2	BAUD= 9600	CURRENT PARAMETERS	RDLY= 0.138
UPPER - BAND LIMIT - LOWER	FREQUENCY	MODE	FILTER
30.000 MHZ	0.100 MHZ	17.44300 MHZ	USB WIDE
			SQ. ACTIV. ADDR
			38

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Radio	Confirming
our fm-cv-sub-rHy QSO of	
_____ 19_____	
at _____	UTC
on _____	MHz RST _____
Transceiver _____	
Transmitter _____	
_____	input _____ write
Receiver _____	
Remarks _____	

75, _____	
_____	PSE QSL THX

Fig. 2—A text format which is not preferred.

Finally, you must transfer your log information to the QSL card. Most people hand write the information. Some use a typewriter, and computer-printed labels are becoming popular. If your handwriting isn't legible and clear . . . NIL. Also remember with typewritten and computer labels to use the conventions mentioned in the preceding paragraph. If Roman numerals aren't possible, use month abbreviations which are not preferred but are acceptable. Double-check your information; make sure it's right. Don't get a NIL over a typo or omission.

The Envelope

Two envelopes are required for the efficient exchange of a QSL via any direct route. These envelopes, though seemingly unimportant, can be a great help or very great annoyance to the DX station, QSL manager, or contest/DXpedition station. Both envelopes are equally important. The following points will be covered regarding the envelope:

- Always include a return envelope.
- Always address your return envelope.
- Always use standard QSL size envelopes.

- Always put your return envelope in properly.
- Never put your address on the return envelope for a return address.
- Remember, QSO info is a great help on the outside of the return envelope.

For the benefit of those who may not know, the term SASE means "Self-Addressed and Stamped Envelope." The **E** in this acronym refers to the envelope in which your prized DX QSL will be returned, so be considerate and always include one. It's not as much a matter of envelope cost as it is a big matter of additional time to write out the return address. Some will enclose an addressed adhesive label which is an acceptable solution to this situation, but bear in mind that DX stations may not have ready access to stationery supplies. The address-label method can be useful for those DX stations which have oversize QSL cards and provide no envelope. However, most cards will fit a standard U.S. envelope, and stations with large cards will generally let it be known.

As previously mentioned, always address your return envelope. Remember the **SA** in the SASE. In the case of DX stations and foreign managers, postal conventions—i.e., placement of the address, etc.—are not universal, not to

mention foreign alphabets. Therefore, avoid these potential "gotchas."

Never put your name and address as the return address for the envelope in which the DX card will travel. This space should be reserved for the station or manager. This provides the postal systems with two address to work with in case something goes wrong. Suppose the postage was mistakenly left off. Your much sought-after QSL could end up in a dead-letter file. Or suppose you change addresses and the logs for the DX station are delayed getting to the manager. Your mail forwarding could expire and your could miss a card. The point here is you'll increase your chances of receiving the card with two addresses on the outside of the envelope.

Proper envelope size is a great help to stations and managers who handle large quantities of cards. Envelopes will be sorted into some order, be it date, band, or mode, and having odd-size envelopes (i.e., legal size) can be a real annoyance. You can assist in this area of the process by using envelopes that are approximately the size of the QSL card. A slight oversize may be appropriate for DX cards, since some countries use a slightly larger card than the U.S. standard size (i.e., European size). The approximate size of this envelope is 4½" x 6¼", and they can be purchased at speciality office supply stores.

Most return envelopes are folded and placed in the outgoing envelope along with the QSL card. Always place the fold of the return envelope to the bottom of the outer envelope. This eliminates the possibility of the return envelope being cut in half when the outer envelope is opened.

It is worthwhile to mention security at this point. With world economics what they are, the contents of your envelope—i.e., the "green stamp"—should be safeguarded as best as possible. Therefore, place the contents in the outer envelope so that a bright light cannot be used to see through it. Also, in some cases it is best not place a callsign on the outside or return envelope. Be sensitive to the request of the DX station in this area. Remember, there is probably a very valid reason for any special instructions given by the DX station, so follow their directions.

Placing the QSO information on the outside of both envelopes is a great help

tion	Date	UTC
	12 XII 89	

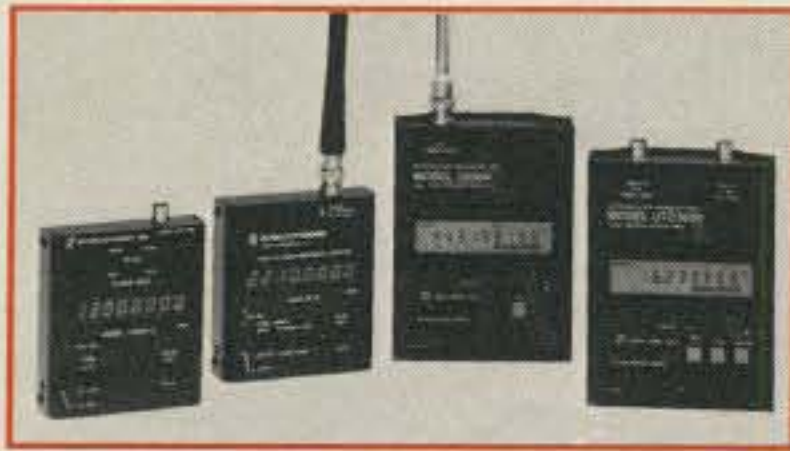
Fig. 3—The preferred international date format.

ion	Date	U
	12 Dec 89	

Fig. 4—An acceptable date format.

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Station	Date	UTC	MHz	RST	Mode
FK8FU	1-9-89	0630	7	599	CW

Fig. 5- Example 1, incorrect date example.

to QSL managers who handle multiple stations. Refer to figs. 7 and 8 for a suggested format for providing this information. This effort on your part helps a DX station or manager in indexing and processing cards. This can be a real time saver and allow more cards to be handled efficiently.

Method of Returning QSLs

As a general rule stations and managers will return QSLs via first-class mail or airmail, provided adequate postage provisions have been included with the request. Don't forget the second **S** in SASE. Please remember, most of the DX stations and QSL managers can't afford the cost nor should they be expected to "foot the bill" for the return postage.

This leads to a further discussion of SASEs. An SASE is appropriate for state-

side stations—i.e., one unit of postage on the envelope, etc. However, in the case of DX stations an SAE (self-addressed envelope) may be more appropriate. In the case of SAEs the requesting station must provide adequate funds for the purchase of return postage. This generally can be in the form of a U.S. dollar, referred to as a "green stamp," or a quantity of IRCs (more about that in a minute). One green stamp is usually adequate and acceptable in most but not all countries. Likewise, 2 IRCs are generally adequate and acceptable in most countries.

This is a general statement and not appropriate for all cases. Therefore, you need to follow the QSL instructions for a given station. Also, the *Callbook* has information on how many IRCs are required for member countries. It should be mentioned that foreign stamp services are available as well as QSL services which offer an alternative to a green stamp or IRCs.

IRC, which were mentioned earlier, refers to International Reply Coupons. IRCs are an international form of postage for participating countries of the Universal Postal Union. IRCs are available from most post offices. Unfortunately, there are a large number of post offices where postal workers don't know what an IRC is, let alone how to redeem one. In case you encounter this situation, refer your postal representative to *International Mail Manual (IMM)* paragraph 392—International Reply Coupons (issue 6, 05 X 88).

The selling price of an IRC in the United States is currently 95 cents. One coupon is exchanged in any other member country for a stamp or stamps representing the minimum postage on an unregistered surface letter. Therefore, one IRC won't purchase one unit of airmail postage. Additionally, IRCs issued prior to January 1, 1975 are no longer redeemable, and there are still a few in circulation.

The entire redemption process of IRCs

Station	Date	UTC	MHz	RST	Mode
3B8DB	Sept. 1st	1230	14	599	CW

Fig. 6- Incorrect date example 2 (the kiss of death!).

is cumbersome at best. Therefore, several managers as well as DX stations sell the IRCs they receive. As a general rule the going rate is 50 cents, which offers a significant savings to those needing the coupons as well as eliminating the redemption hassle for the station or manager.

Last, but certainly not least, are the QSL bureaus operated worldwide by radio leagues, organizations, and privately operated bureaus (not to be confused with QSL managers). QSL bureaus offer an economical way to exchange large numbers of QSL cards. Some stations and managers elect not to respond to cards received via the bureau, which is their prerogative. Fortunately, it seems that most do support this method and the economies it offers our fraternity.

Back to the SASE for a moment. When the **S** isn't provided, it's a safe bet that your card will be returned via the bureau. Please be advised that the bureau method is not permitted for stateside-to-stateside exchange of cards; however, there are stateside QSL services that work very nicely. Remember that the DX station most likely doesn't need your card, so the responsibility for the SASE/SAE is yours alone.

Verify the Route

It is a good practice to verify the QSL

route of a DX station as well as QSL managers. This means at the time of the QSO as well as double-checking your addressing of the outgoing envelope. If you are unable to get the route at the time of the QSO, there are many sources to which to go for help. These include the *Callbook*, DX bulletins, DX columns included in amateur magazines, and QSL managers lists. Use the most current source available; many smaller countries will reissue the same callsign more than once—i.e., C21NI and ZK1XI, for example.

Economies in QSLing

If you are actively pursuing your DXCC, WAZ, etc., the postage cost can add up to hundreds of dollars. A new goodie in the shack would look much better than trying to balance the national deficit through postage cost.

Far and away the most economical method to QSL is via the bureau. Contact the ARRL for information on how the bureau works or check *QST*'s DX column, which periodically prints this information. QSL bureaus have to use the least expensive means to ship cards in order to provide these economies. This of course means surface shipments, which are slow, but rest assured, you'll generally get the card. Therefore, most people like to send cards directly, especially for a "new one." However, there are a few

areas around the world that you'll get confirmed via the bureau without a sending direct. Most all of Europe, Japan, and a few others if given a little time will certainly be in your bureau envelope. So save that green stamp or IRC for those places which have to come direct.

IRC's are another area in which certain savings can be realized. As mentioned, the price of an IRC is currently 95 cents from the post office. There are usually many sources which have IRCs for sale at 50-55 cents. This is a substantial savings for the small amount of effort it takes to get them. Also, QSL managers who handle cards for multiple stations or a "rare one," as well as most large DXpeditions once they have concluded the operation, may be a good source of IRCs. Watch the DX bulletins and various DX publications for information on sources for these discounted IRCs. If you have to buy them from the post office, be sure the clerk validates them by placing a stamp in the lower left corner of the IRC.

Special QSLing Requirements

For the most part, the QSLing conventions that have been discussed are an acceptable norm for most DX stations, DXpeditions, and QSL managers. There are exceptions, however, and when you encounter them there isn't much to do except comply or find another station to work. Here are some of the requirements you may encounter.

No QSLing via the bureau. In the case of a single station located in a rare country, the cost of buying and mailing pounds of QSL cards without financial help can make it economically impossible for the DX station.

No more than one QSO per card. Especially in the case of a major DXpedition, logs are kept by band and sometimes by band and mode. Therefore, it can take considerably more time for the one filling out the cards. This argument has caused much discussion lately. However, when the logs were kept in this manner and different people (geographically separated) are filling the request, there seems to be validity to the requirement.

Only one QSL per envelope. The reason and arguments are the same as those just mentioned. There are situa-

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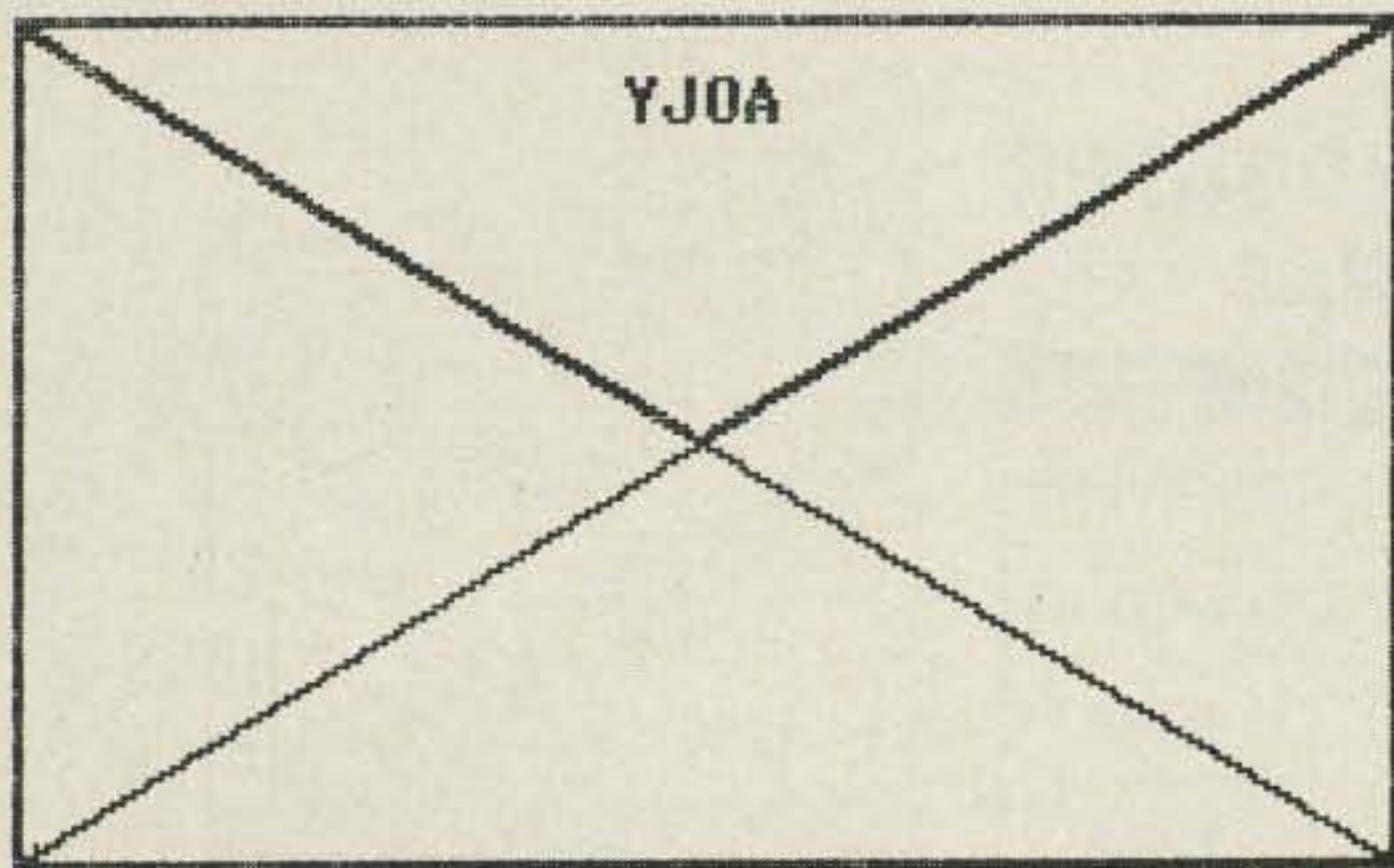


Fig. 7- Typical outer envelope information.

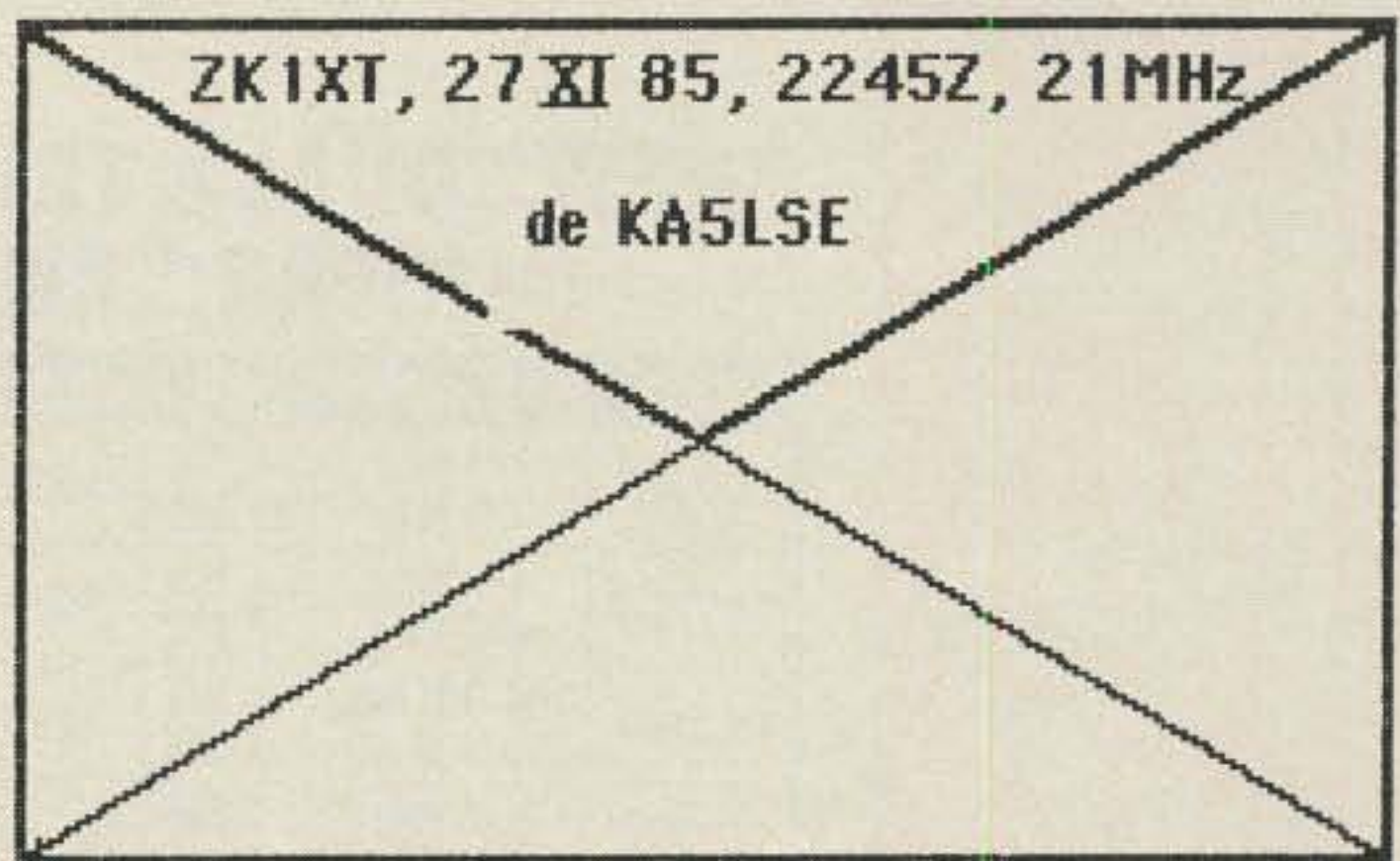


Fig. 8- Typical return envelope information.

tions when this is a valid requirement, and we all trust it's never used for financial gain.

Specific return postage requirements. In the case of DX stations, their country may not accept nor allow U.S. currency. Therefore, IRCs maybe the only way to offset their return postage cost. By the same token, IRCs may not be redeemable. Also, the generally accepted number of green stamps or IRCs may not be adequate in certain countries. Just remember you want the QSL not the DX station.

There are many reasons for these vari-

ous and sometimes unique requirements. Some have valid reasons, while others may be questionable in certain applications. The bottom line is "you gotta play the game" if you want the card.

Summary

In summary, it has been the intent of this article to offer ideas which will serve to improve your rate of response for QSLs, as well as help the receiving end of the request be more efficient.

One element which has not been men-

tioned and is probably most important and hardest to do is *be patient*. We all have made many trips to the mailbox only to find the cobwebs undisturbed. But don't give up hope. There are many factors which affect the response to a request. Being patient, however, will usually pay off with a card in hand.

I want to thank K5BDX the other members of the Lone Star DX Association for their help in developing this information. I also want to thank my family, who allows me to enjoy this fantastic hobby and public service. GUD DXing es CU in the pile-ups!





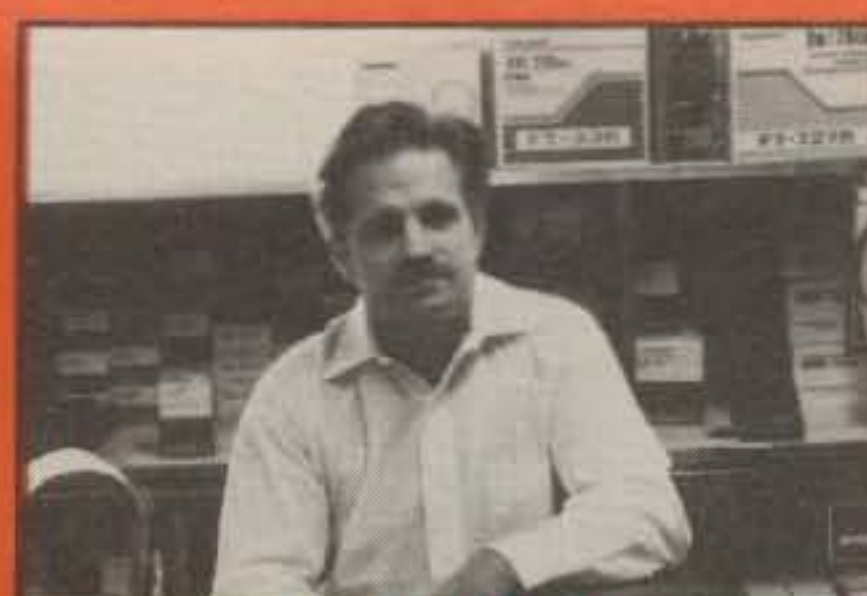
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CX-901	146 MHz 446 MHz 1.2 GHz	3.0dB 6.0dB 8.4dB	150W	3' 6"	BASE/REPEATER
CX-801	146 MHz 446 MHz 1.2 GHz	3.0dB 6.8dB 9.6dB	100W	3' 3"	MOBILE
CA-630TN	146 MHz 446 MHz 1.2 GHz	2.15dB 2.15dB 5.5dB	150W 50W	1' 5"	MOBILE

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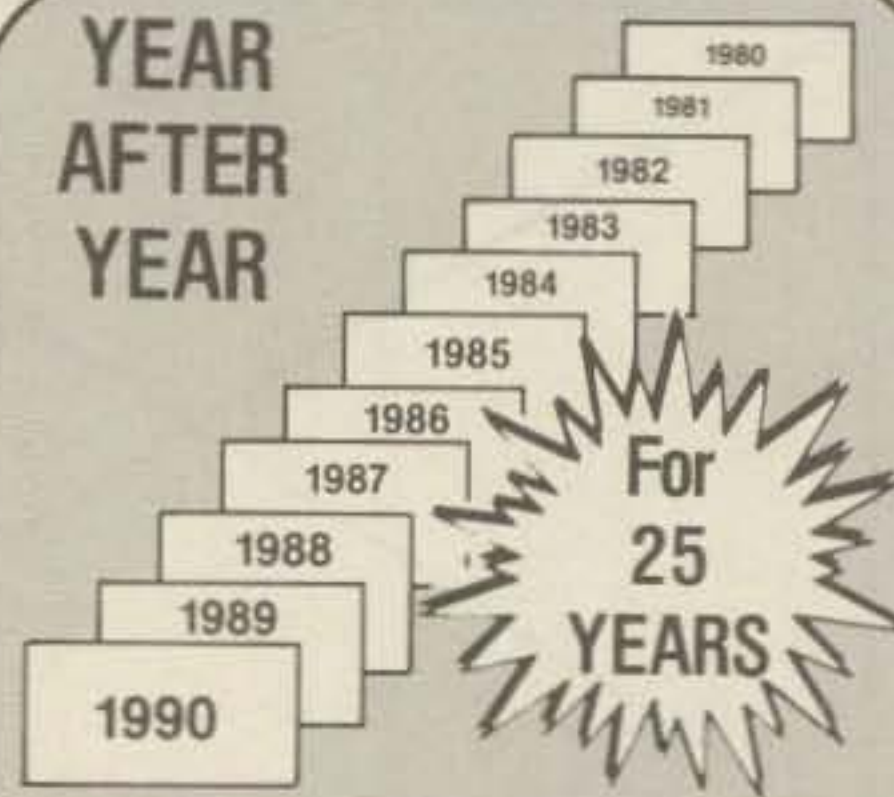
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Following up on his 20 meter QRP transceiver, K1BQT presents a 15 meter version with which to enjoy the sunspots.

The QRP-15 CW Transceiver

BY RICK LITTLEFIELD*, K1BQT

In January 1989 I published an article on a 20 meter NE602 QRP transceiver.** Since then I have received innumerable requests to present a 15 meter version. I've also received, compiled, and tested many suggested refinements for the original QRP-20. From this evolved the QRP-15, an updated mini-station for 21 MHz CW operation.

Circuit Updates And Modifications

To improve weak-signal performance I optimized the QRP-15 receiver for maximum overall gain (fig. 1). Balancing and tuning the output of RX-Mixer U1 boosted stage gain by 3 dB, and provided more efficient coupling to crystal filter FL1. Changing FL1 from a Cohn to a ladder design greatly improved skirt selectivity, eliminating the need for a second IF filter, and doing away with significant insertion loss. Finally, balancing the output of IF-amplifier U2 added 3 dB more, plus gain realized from an improved match to U3. The combination of these changes enhanced receiver performance by more than +10 dB.

In my original design combined pass-band through the crystal and audio filters was around 400 Hz—a bit narrow for searching out CQs or monitoring adjacent activity. To provide a "wide" option, I added a bypass switch to the audio filter. This broadened the passband to approximately 1.4 kHz.

I added two totally new operating features to the QRP-15 receiver strip. A simple RIT circuit provides a receive shift of ± 1.5 kHz, greatly improving operating flexibility. Also, an LED audio-peak detector functions as a CW pilot light to indicate when received signals are centered in the passband.



The QRP-15 is a full-featured radio in a very small box.

To maintain VFO stability at 21 MHz, I chose 5.000 to 5.150 MHz for a tuning range. This dictated using a 16 MHz IF. I used inexpensive 16 MHz series-resonant computer crystals in the ladder filter and LOs. Then I applied a limited-range VXO circuit to the Product Detector and

TX-Mixer LOs to ensure sufficient offset-tuning range with the 16.000 MHz crystals. This configuration also permits manipulation of capacitive-divider values for lower feedback, thus reducing spurious output.

On the transmitter side, I added a VFO



At 5 watts output, spectral display shows suppression of unwanted products on the order of -40 dB.

* Box 114, Barrington, NH 03825

**Rick Littlefield, K1BQT, "An NE602-based QRP Transceiver for 20-Meter CW," Ham Radio, January 1989, p. 9.

buffer, isolating the VFO tank from load changes that occur when TX-Mixer U6 is keyed. A trimpot allows precise control of VFO drive to the mixer, which is important for limiting the generation of mixer spurs. To ensure full power output at 21 MHz, I replaced the 2N2222A driver with a 2N5109. This change added several dB of stage gain and increased driver power dissipation.

Other changes included replacing decoupling resistors for mixers U1 and U6

with inexpensive 78LO-series regulators. I also provided +12 volts at the key jack to power an external keyer. Finally, I installed an optional 11 MHz series trap at the antenna jack. This "last-minute" change eliminated occasional interference from mega-power 11 MHz images (the downside of using a single tuned circuit at the front end). The trap also suppressed the 11 MHz transmitter mixer image (Fc-Fs).

Experienced builders should have little

difficulty modifying the QRP-15 design for 40 meters or the WARC bands. All tuned circuits are wound on toroid forms and are easily changed. Inexpensive computer crystals offer several IF options throughout the HF spectrum. Map your mixing scheme to confirm the locations of unwanted products. With this particular frequency plan the 2Fc-2Fs spur falls at 22 MHz—a potential problem if LO and VFO signals are allowed to overdrive the mixer.

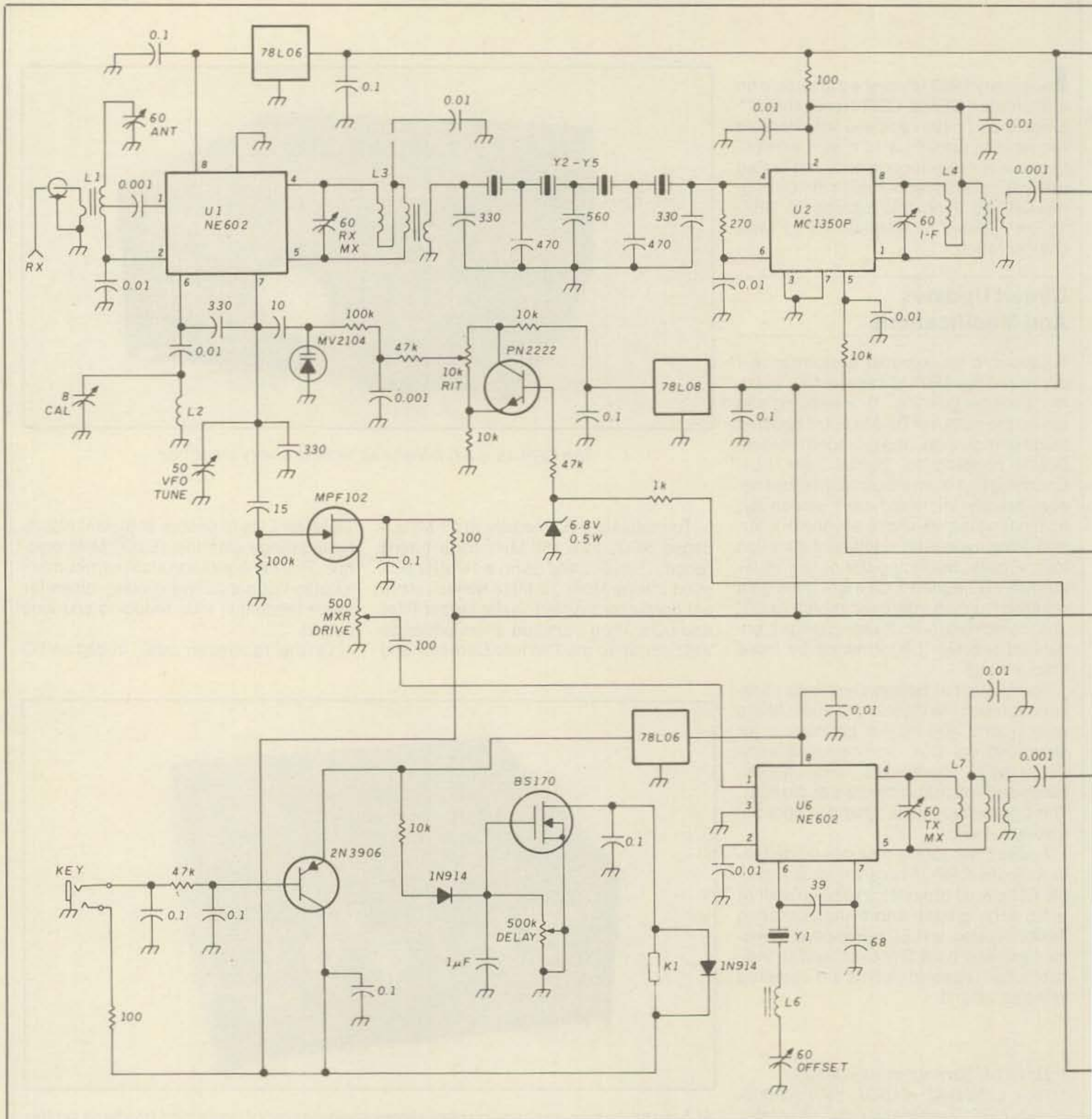


Fig. 1—Transceiver schematic.

Unlike the QRP-20, the QRP-15 is constructed on a single 3" x 4" PC board. A top-view parts-placement diagram is provided in fig. 2. A bottom view is shown in fig. 3. Most component-lead spacings are 0.1 inch, so you must use 50 volt monolithic capacitors and 1/4 watt resistors. Because you have nearly 140 parts to install in a small area, I suggest working slowly and inspecting often for solder bridges and placement errors.

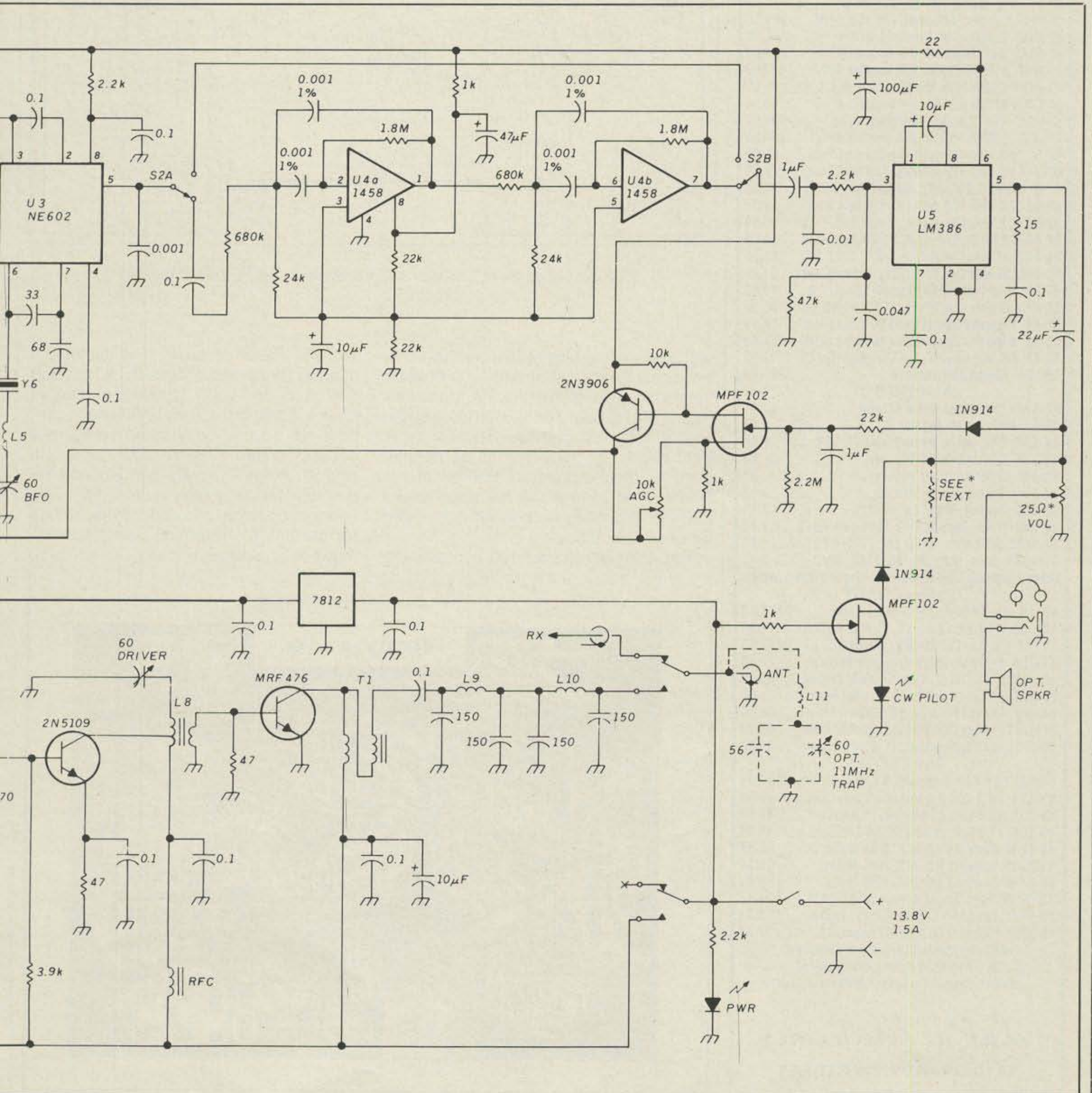
I've provided two options for VFO coil

L1. One specifies a T50-7 core (the new temperature-stable mix). This inductor is easy to wind and can be secured in place with glue or a nylon screw. The second option, a solenoid coil, requires a shield can. It may be a bit more difficult to wind and install. Nevertheless, I prefer this option in applications where temperature is in constant flux from transmitter heating.

You also have two volume-control options. One uses a 25 ohm wire-wound pot, which is perfect for this particular audio

circuit. The alternative is a less-expensive 500 ohm linear pot. You must add a 15 ohm resistor in parallel with the 500 ohm control to pad AGC input and "taper" the linear pot (see PC layout for location).

I've found that installing and routing leads to switches, jacks, and controls beneath the PC board makes board removal easier. However, avoid routing leads under the VFO, as they may couple to PC tracks and cause instability. Also, be sure to mount the PA transistor on the foil side





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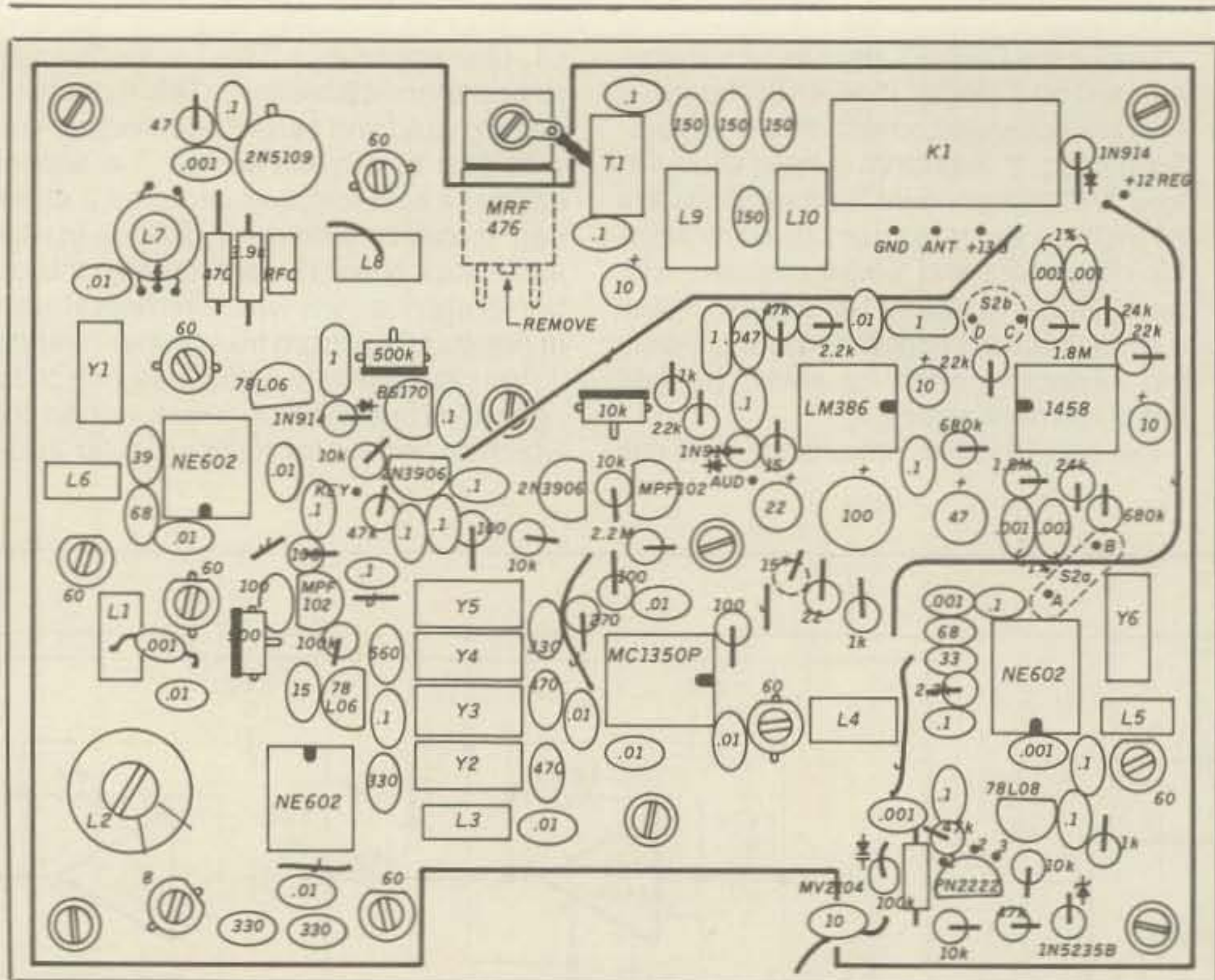


Fig. 2- Top view, component placement and PC board layout.

of the board (the MRF-476 uses the transceiver case as a heat sink). To provide proper clearance for the PA transistor mount the PC board on $\frac{1}{16}$ inch No. 4 spacers. When installing the Radiokit BC-4 VFO capacitor, note the small parallel trimmer mounted on the bottom of the frame. This trimmer is not used in the QRP-15 and must be carefully removed before installation.

Fig. 4 shows a suggested layout for the

Ten-Tec TG-24 cabinet. The aluminum used in these cabinets is thick, but soft and easy to work. Lacking a chassis punch, I drilled the $\frac{3}{8}$ inch VFO capacitor hole with a flat wood bit using a drill press set at 700 rpm. After drilling and deburring all holes, I lightly sanded and repainted the case with a flat finish. This covered up shop rash and provided a better surface for retaining transfer lettering. For a protective spray I used Data-

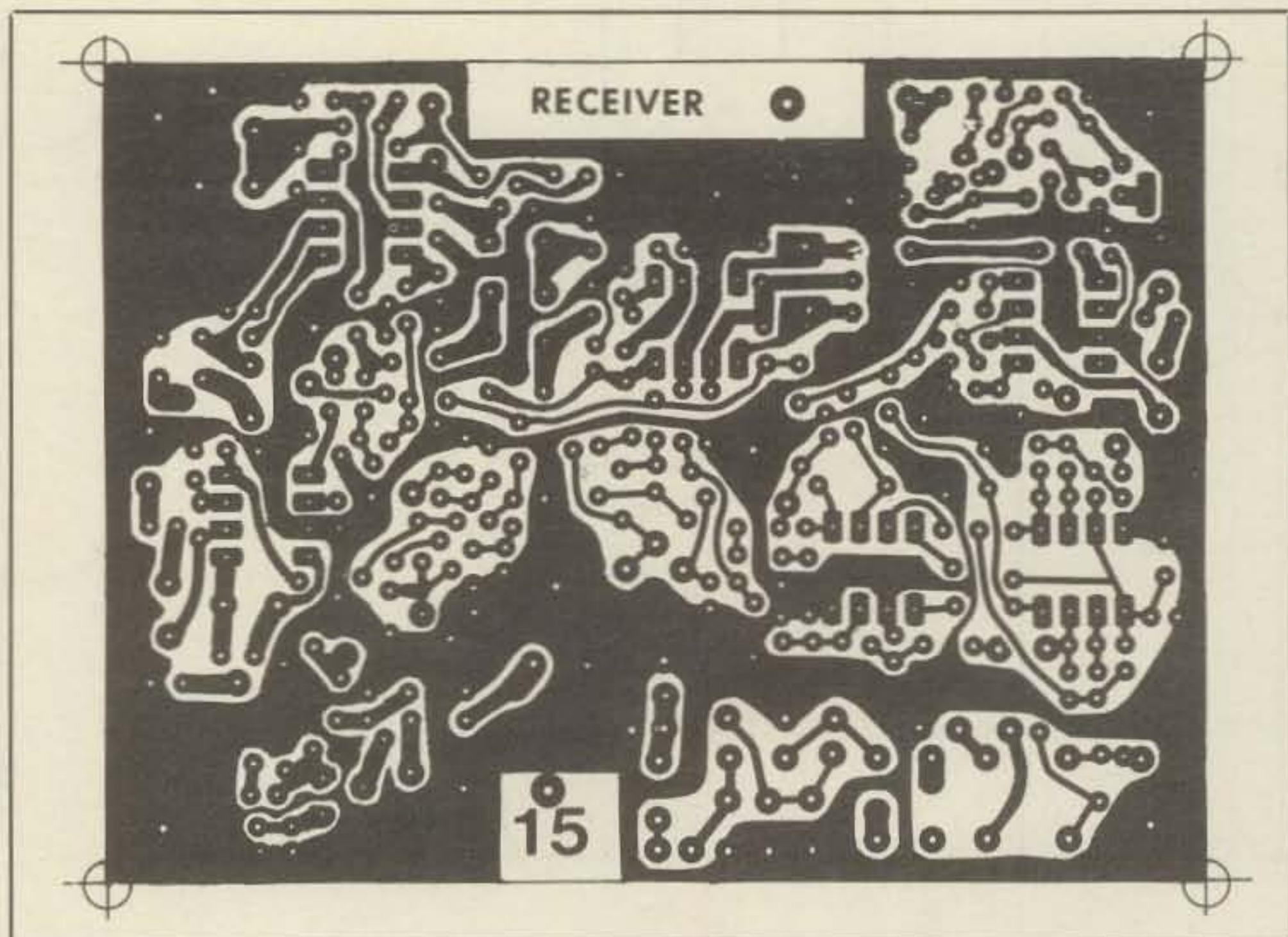
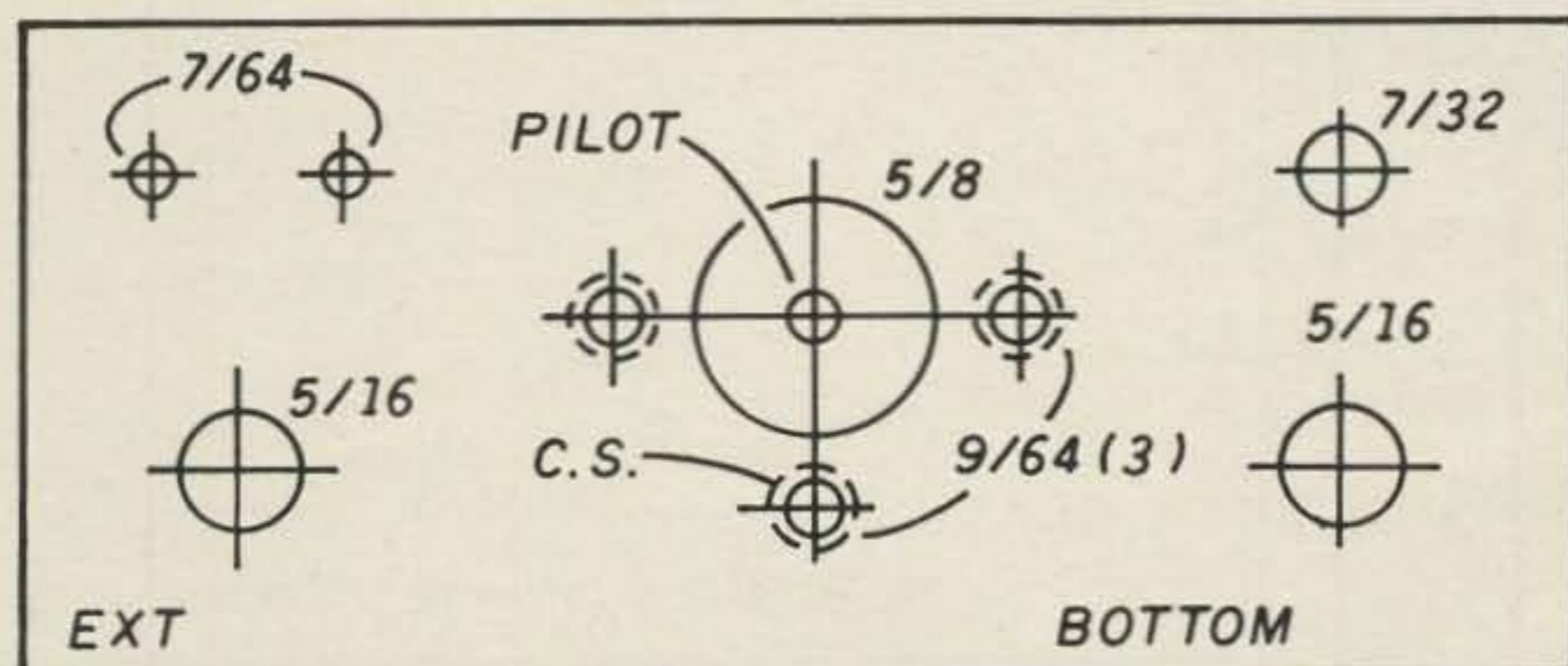
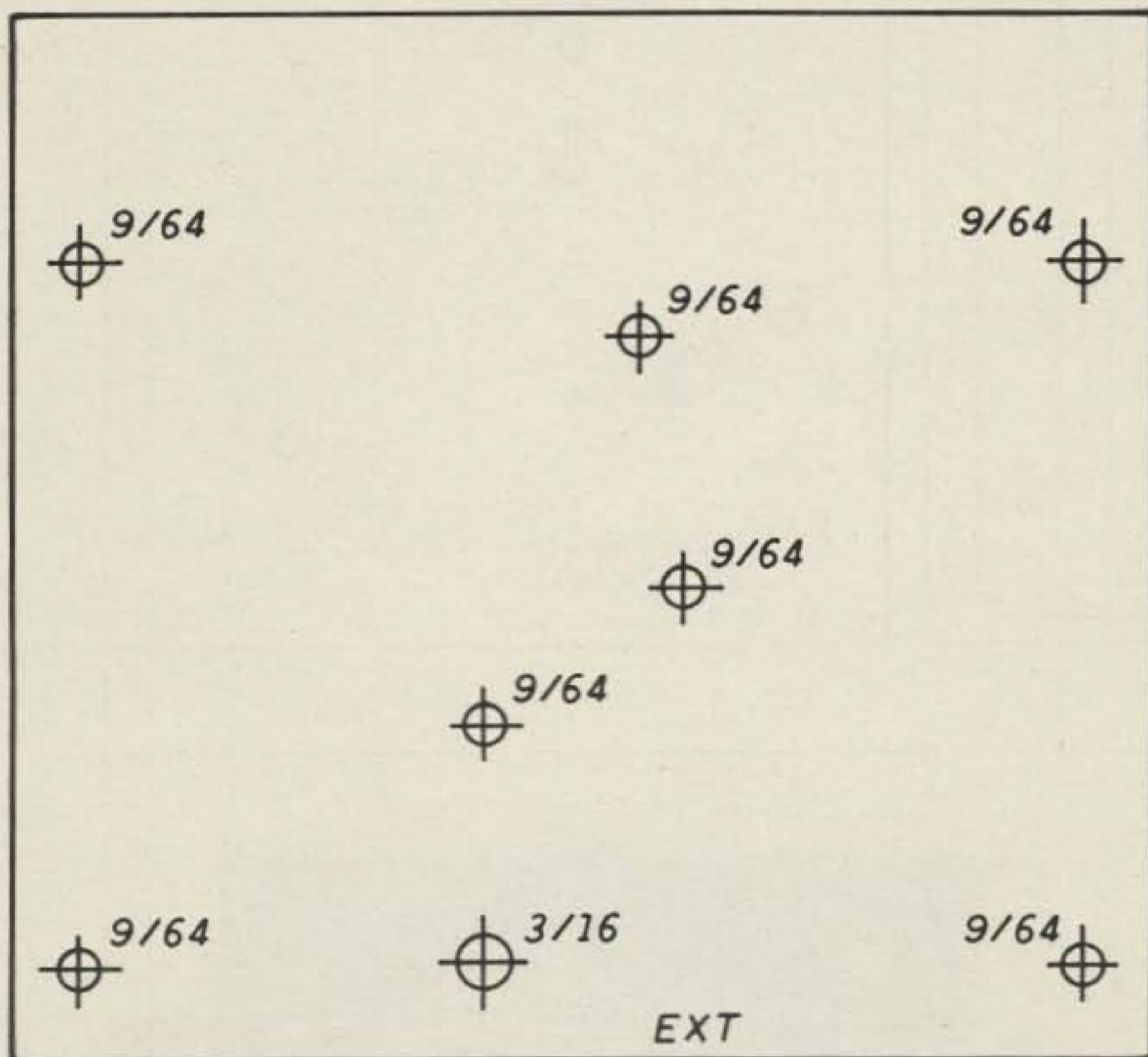


Fig. 3- Bottom view, component placement and PC board layout.

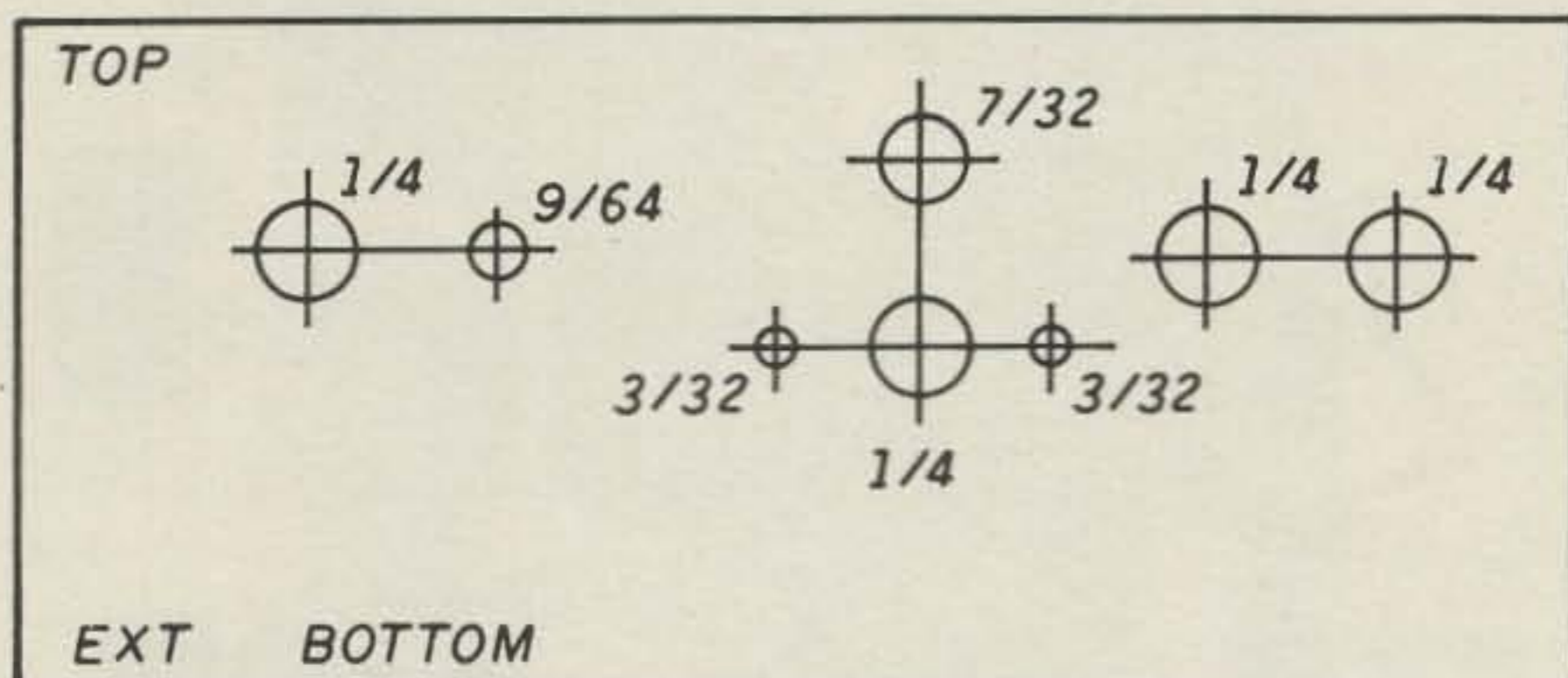
PANEL TEMPLATE



FRONT



EXT



EXT BOTTOM

REAR



Fig. 4- TG-24 cabinet layout and drilling data.

coat Matte (artist's fixatives don't protect well on painted surfaces).

Initial Testing

I recommend testing and aligning the receiver out of the case. To prepare for testing, install a 27 or 33 pF capacitor to simulate a mid-range setting of the VFO cap. RIT wires need not be connected. Temporarily twist CW-filter leads together to bypass the active filter (A to D). Clip-lead a 15 meter antenna to the ANT line. For initial testing connect a stable 12 volt source to the + 12 volt regulated lead (do not connect the 13.8 volt transmitter line). When power is applied, listen for background noise in the speaker. Use a nonconductive wand for all trim-cap adjustments.

Referring to fig. 6, tune-up procedure is as follows:

1. Connect a voltmeter from the center of the 10 K **AGC-Threshold** pot to ground and adjust for 4.7 volts.

2. With a counter, spectrum analyzer, or receiver confirm VFO and BFO operation. BFO output is present at pin 7 of Product Detector U3 (most probes load the VXO circuit, so the actual frequency you read may be misleading).

Sample VFO output on the high side of the **MX-Drive** pot. If the **VFO-Cal** trimmer won't set the VFO to around 21.100 kHz, add or subtract turns from L1 until it will. If VFO frequency is high, do not add parallel capacitance to pull it down. This pads the VFO cap, reducing tuning range to below 150 kHz.

3. Peak the **IF-Tune** trimmer cap for maximum background noise.

4. Adjust **BFO Freq** for a hollow sound—an indication the Product Detector is listening within the IF bandpass.

5. Peak **ANT** and **RX Mixer** trimmers for highest band noise (antenna connected). When properly aligned, connecting the antenna will produce a marked increase in background noise.

6. Adjust **BFO Freq** for LSB (the "wrong" sideband for normal SSB reception). Do this by ear. You want to hear low-frequency tones on the desired sideband, but have them disappear on the opposite side of zero beat.

7. Ground the **Key** line. Set the **MX-Drive** pot at mid-range and adjust mixer **Offset** for 700 Hz sidetone. Tune **TX-Mixer** output for a peak.

This completes the initial alignment. Do not attempt further tuning until the PC board is installed in the cabinet.

Finally Assembly and Tune-up

Before installing the board, coat the PA-transistor mica insulator with silicone grease, and position. Next carefully set the board in place and install mounting

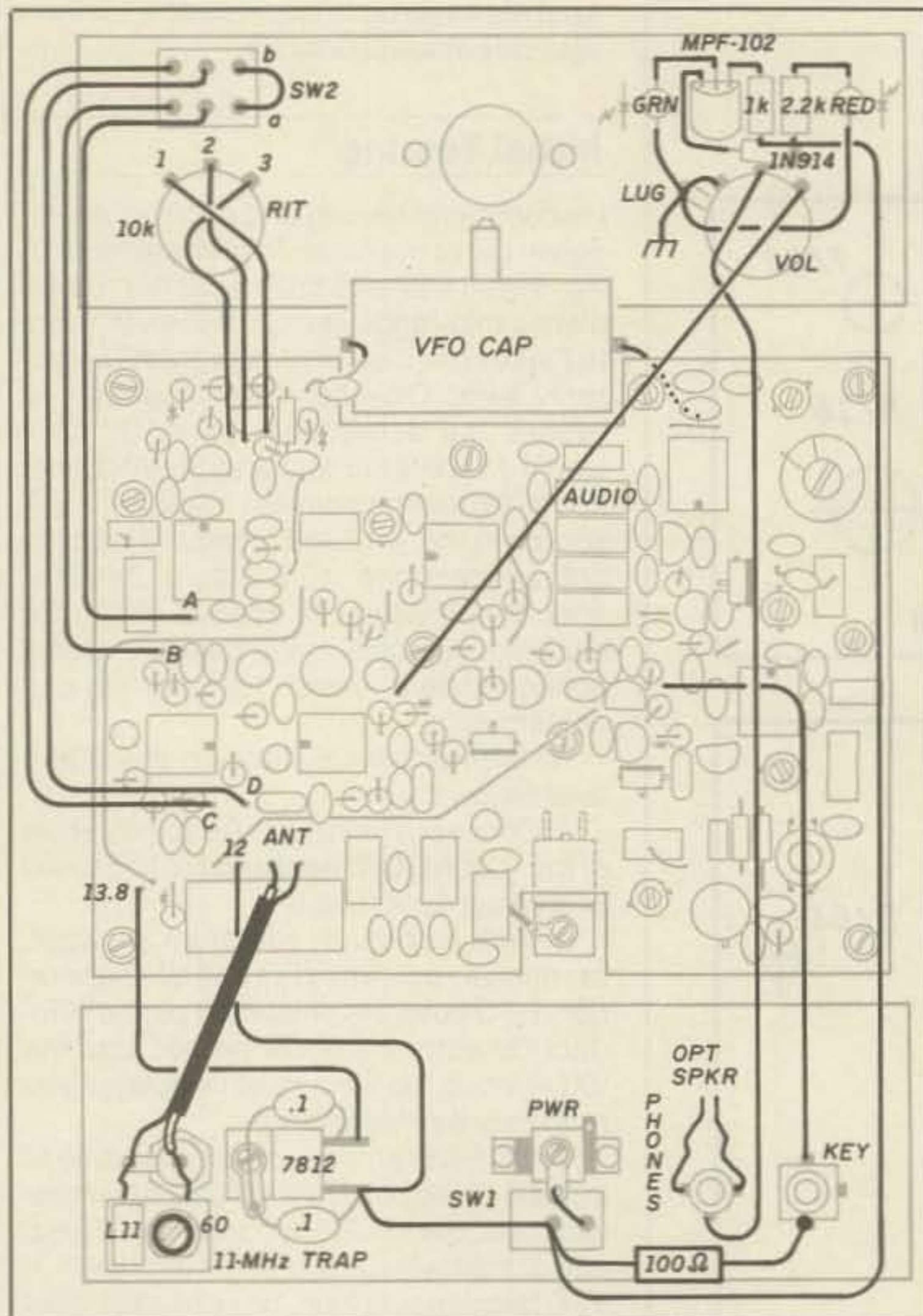


Fig. 5- Final wiring of PC board into cabinet.

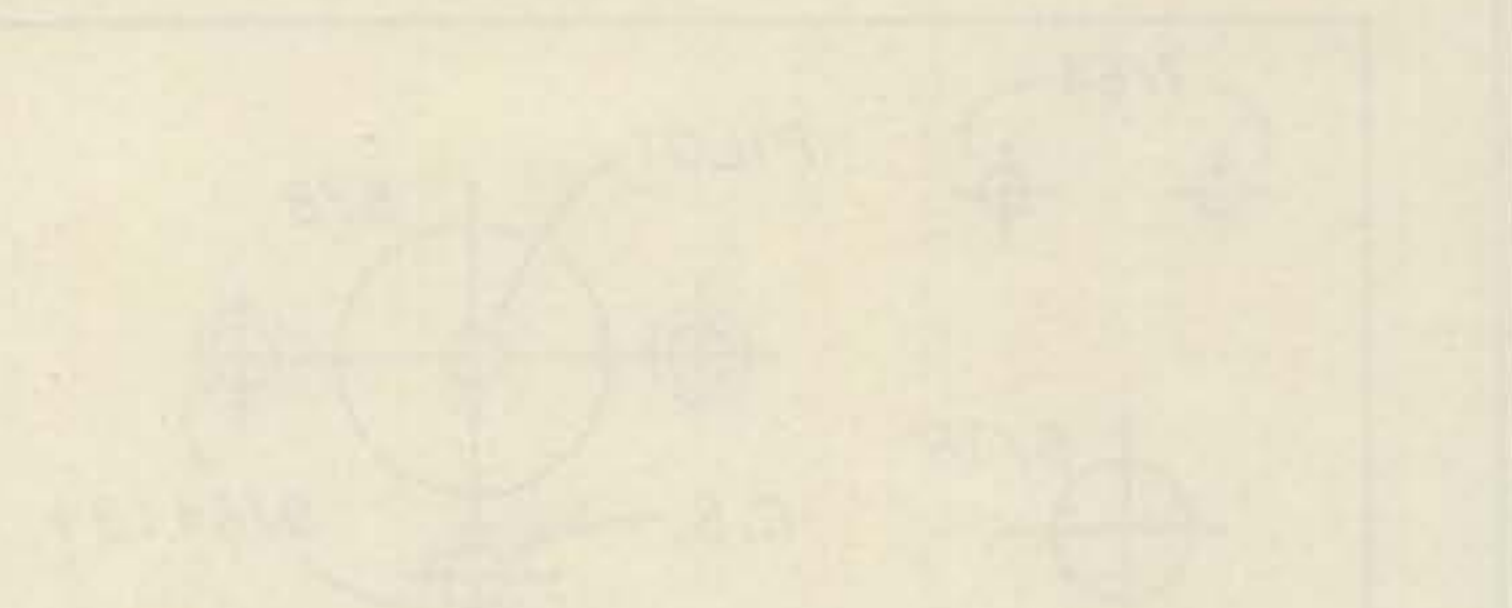


Fig. 6- PC board alignment locations.

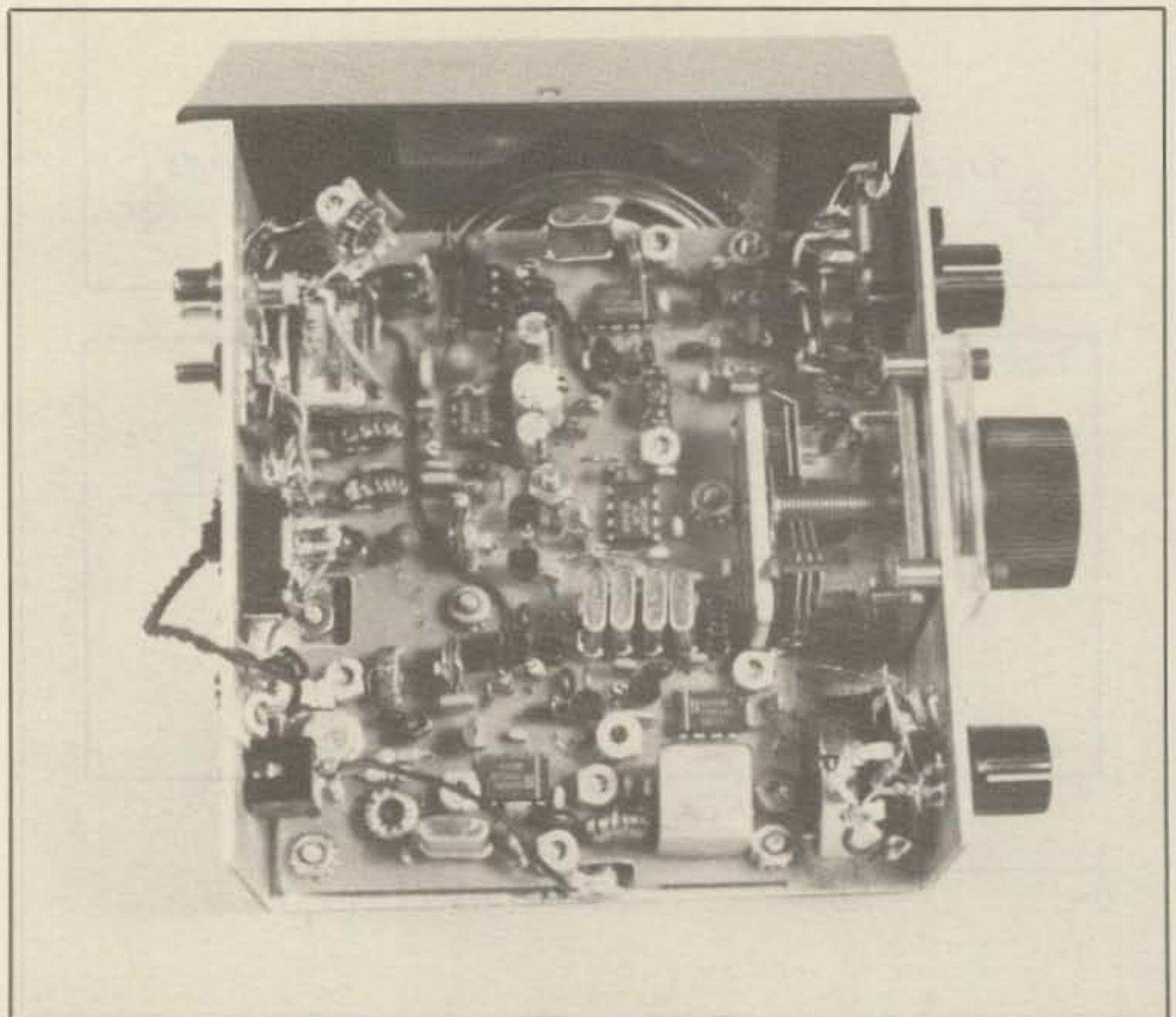
screws. Connect all jack, control, switch, and power leads as illustrated in fig. 5. Also wire the 7812 regulator, LED-power indicator, and CW pilot light. If you decide to include the 11 MHz trap, mount parts on a small piece of perfboard and install directly at the antenna connector.

To obtain full power output the QRP-15 requires 13.8 volts at 1.5 amps. While the radio will operate on 12.0 volts, this is below the 7812 regulator drop-out threshold. Under these conditions I suggest installing a 1000 uF capacitor across the +12 volt regulated line for decoupling. If you operate exclusively from 12 volt batteries, you can delete the 7812 altogether (the VFO, TX-LO, and RIT are already regulated). However, install a crowbar diode at the DC-power plug for reverse-polarity protection.

Final Alignment

To prepare for transmitter tune-up connect a key, power meter, and dummy load. If installed, disconnect the 11 MHz trap. If possible, monitor CW note on a receiver.

1. Set the **MX-Drive** pot at mid-range and key the transmitter. Peak **TX-Mixer** output and driver output. If power ex-



The QRP-15 is built on a single 3" x 4" PC board.

ceeds 4 watts reduce **MX-Drive** and re-peak.

2. For final **MX-Drive** setting adjust the pot through its range and observe transmitter output. From zero, output should increase rapidly to 4.5 to 5.0 watts, then level off. This "leveling out" indicates mixer saturation. Pushing drive beyond this point adds little output, but rapidly increases the amplitude of unwanted spurs. Set **MX-Drive** to where leveling first occurs (about 0.5 watts below maximum output reading).

3. Set **QSK Delay** to complement your sending speed.

4. Reset **AGC Threshold** so the CW pilot light illuminates on most signals. If set too low, the pilot will come on brightly, but the AGC will fail to limit strong signals. If set too high, the AGC will "overshoot," causing the pilot to flicker erratically.

5. To align the 11 MHz trap, loosely couple a signal generator to the antenna line and inject a strong 10.9 MHz signal (the image should appear at 21.100 MHz). Tune the trap carefully for a null.

6. To set up **RIT** disconnect the +13.8 line to the PC board (buffer/driver Vcc) and connect a frequency counter to VFO Buffer output. Adjust **RIT** control so your receive and transmit frequency match. Secure the **RIT** knob in the 12:00 position. Reset the transmit-mixer **Offset** for 700 Hz sidetone.

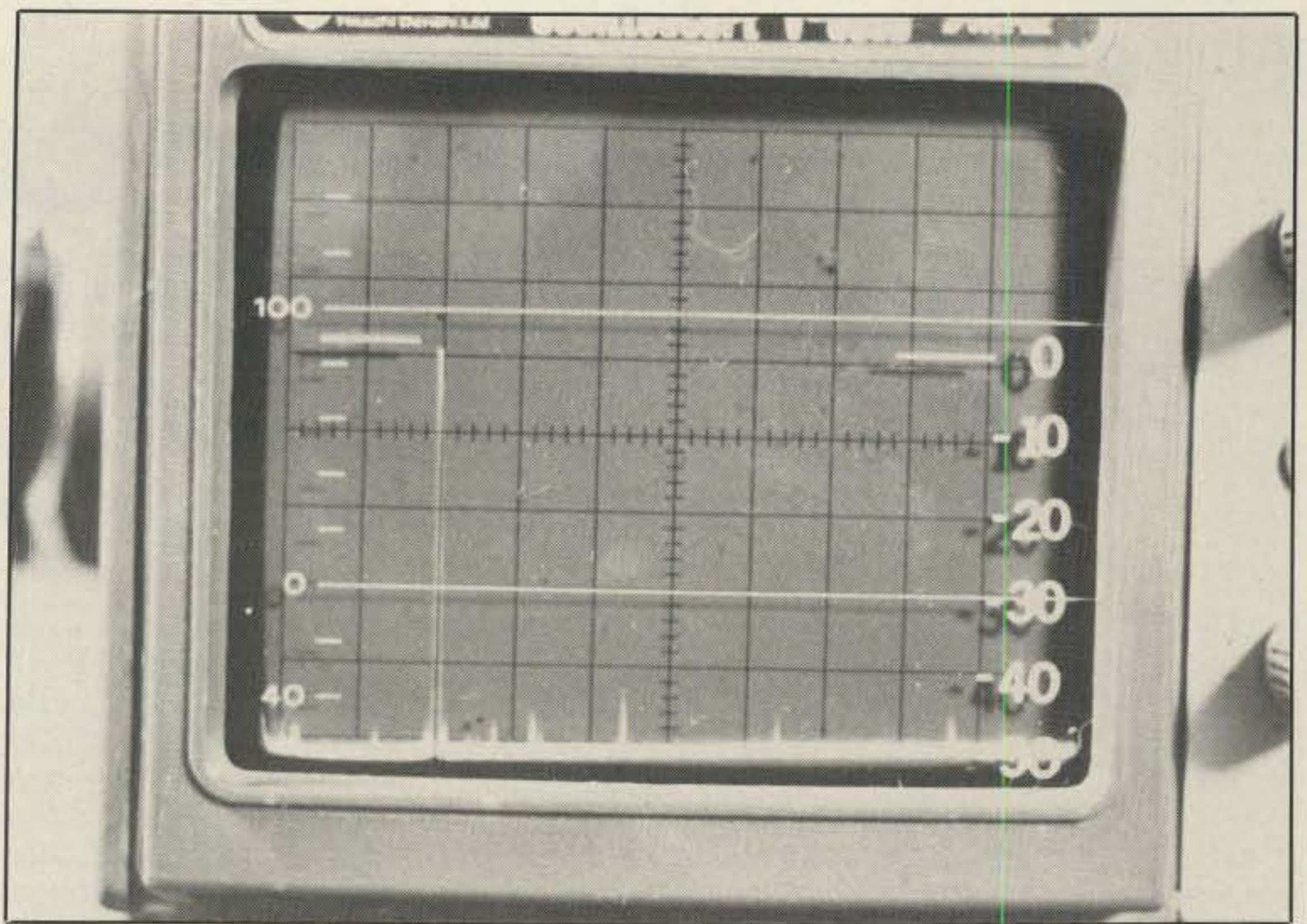
The FCC requires QRP rigs (transmitters up to 4.99 watts output) to maintain at least -30 dB of harmonic and spurious suppression. As the spectral display illustrates, a properly aligned QRP-15 easily complies with this specification.

Conclusion

This article was written as an update to my original NE-602 20 meter CW-transceiver project. Builders are advised to review that article for additional background. Here I have specified circuit values for 21 MHz operation, introduced several modifications, and provided a new PC board layout. I take only partial credit for the "brain work" behind the changes presented here; many were contributed by readers.

Special thanks go to Ed Pacyna, W1AAZ, for several excellent suggestions and for some coaching in RF design. Also, thanks to Alvin Wong of Signetics for his interest and helpful technical support. Finally, thanks to Roy from Buffalo for RIT, and many other QRP enthusiasts who shared circuits and ideas.

The more I use the QRP-15, the more I discover what a great band this is for low-power portables. Fifteen offers plenty of space, and amateurs with any class of license can join in. Best of all, a collapsible portable antenna is all you need to get on—making outdoor operation simple.



Spectral display of the QRP-15.

Thanks to the QRP-15, I can enjoy the sun as well as the sunspots.

For those of you who would like them, QRP-15 kits are available from Radiokit, Box 973, Pelham, NH 03076.

Parts List

L1—20 turns No. 28 on T30-6, tapped 7 turns from ground end. Secondary, 1½ turns No. 28 on ground end.

L2—48 turns No. 32 on ¼ inch plastic form, no slug. Shield with 11 mm can. Alternate 35 turns No. 24 on T50-7.

L3—10 turns No. 28 bifilar on T30-2. Secondary, 3 turns No. 28.

L4—10 turns No. 28 bifilar on T30-2. Secondary, 8 turns No. 28.

L5, L6—33 turns No. 32 on T25-2.

L7—10 turns bifilar No. 28 on T30-6. Secondary, 3 turns No. 28.

L8—10 turns bifilar No. 28 on T30-6. Secondary, 2 turns No. 28.

L9, L10—10 turns No. 24 on T37-6, spread to 80% of form.

L11—(optional) 20 turns No. 28 on T30-2.

T1—10 turns bifilar on FT37-61 (4:1 balun).

RFC—10 turns No. 28 on FT23-61.

K1—DPDT dip-mount, 12 volt coil (RS 275-249).

Y1-Y6—16.000 MHz series-resonant (Sintec 12325/U18-5-160).

VFO Cap—50 pF 8:1 drive (Radiokit BC-4).

Audio Pot—25 ohm 2 watt rheostat (RS 271-2665).



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Announcing:

The 1990 CQ World-Wide DX Contest

**Phone: October 27-28 & C.W.: November 24-25
Starts 0000 GMT Saturday Ends 2400 GMT Sunday**

I. OBJECTIVE: For amateurs around the world to contact other amateurs in as many zones and countries as possible.

II. BANDS: All bands, 1.8 through 28 MHz, except for WARC bands.

III. TYPE OF COMPETITION:

1. Single Operator (single band and all band).

a. Single Operator. Single operator stations are those at which one person performs all of the operating, logging, and spotting functions. **Only one signal is allowed at any one time.** The use of DX spotting nets or any other form of DX alerting assistance places the station in the Single Operated Assisted category.

b. **Single Operator Assisted.** Single operator stations are those at which one person performs all of the operating and logging functions. The use of DX spotting nets or any other form of DX alerting assistance is allowed. The operator can change bands at any time.

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

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

b. Multi-Transmitter (no limit to transmitters **but only one signal and running station allowed per band**).

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

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

4. Team Contesting. A team consists of any five radio amateurs operating in the single operator category. A person can be on only one team per mode. Competing on a team will not prevent any team member from submitting his personal score for a radio club. A team score will be the sum of all the team member scores. S.S.B. and C.W. teams are totally separate. That is, a member of an S.S.B. team can be on a totally different C.W. team. A list of a team's members must be received at CQ Headquarters by the time the contest begins. Mail or FAX the list to CQ, Att: Team Contest, 76 North Broadway, Hicksville, NY 11801 U.S.A.; FAX 516-681-2926. Awards will be given to the top teams on each mode.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IX. TROPHIES & PLAQUES (Donors)

PHONE

Single Operator, All Band

World—Dave Rosen, K2GM—WA2RAU Memorial
World—Single Operator Unlimited—Pavillion Software
World—QRPp—Milliwatt Books W0RSP
U.S.A.—Potomac Valley R.C.—KC8C Memorial
Carib./C.A.—Alex M. Kasevich, VP2MM
Europe—Potomac Valley R.C.—W4BVV Memorial
Africa—Gordon Marshall, W6RR
Asia—Japan CQ Publishing Company Ltd.
Japan—Japan Crazy Contesters Club
Oceania—Northern California DX Club
South America—CQ Magazine

Single Operator, Single Band

World—28 MHz—Joel Chalmers, KG6DX
World—21 MHz—Peter R. D. Munroe, WB1DQC
World—14 MHz—North Jersey DX Assn.—K2HLB Memorial
World—7 MHz—Fred Laun, K3ZO—K7ZZ Memorial
World—3.8 MHz—Fred Capossela, K6SSS
U.S.A.—28 MHz—Donald Thomas, N6DT
U.S.A.—21 MHz—Bill Gioia, K2EK

U.S.A.—14 MHz—Southern California DX Club
U.S.A.—7 MHz—Stanley Cohen, WD8QDQ
U.S.A.—3.8 MHz—Arnold Tamchin, W2HCW
Carib./C.A.—Pedro Piza, Jr., NP4A—KP4ES Memorial
Europe—28 MHz Zone 14—A. G. Anderson, GM3BCL
Japan—28 MHz—Take Yokoyama, JL1BLW
Japan—21 MHz—DX Family Foundation

Multi-Operator, Single Transmitter

World—So. Calif. DX Club—W6AM Memorial
U.S.A.—Carolina DX Association
Europe—Bob Cox, K3EST/6

Multi-Operator, Multi-Transmitter

World—CQ Magazine—W1WY Memorial
U.S.A.—K4VX/0 Operators
Europe—Finnish Amateur Radio League
Japan—Nippon Television Network Corp.

Contest Expeditions

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

CW

Single Operator, All Band

World—Albert Kahn, K4FW—W2AB Memorial
World—Single Operator Unlimited—Pavillion Software
World—QRPP—Gene Walsh, N2AA
U.S.A.—Frankford Radio Club
Canada—Canadian DX Association
Carib./C.A.—CQ Magazine
Europe—Edward Bissell, W3AU
Africa—Gordon Marshall, W6RR
Asia—Japan CQ Publishing Company Ltd.
Japan—Japan Crazy Contesters Club
Oceania—Maui Amateur Radio Club
So. Amer.—Venezuela DX Club

Single Operator, Single Band

World—28 MHz—Joel Chalmers, KG6DX
World—21 MHz—Don Busick, K5AAD—N5JJ Memorial
World—14 MHz—North Jersey DX Assn.—W2JT Memorial
World—7 MHz—Alex M. Kasevich, VP2MM
World—3.5 MHz—Fred Capossela, K6SSS
U.S.A.—14 MHz—Northern Illinois DX Association
U.S.A.—7 MHz—Jan Perkins, N6AW—W6AM Memorial
Canada—Canadian Amateur Radio Federation
Carib./C.A.—CQ Magazine
Europe—21 MHz—Southern New England DX Club
Europe—14 MHz—Al Slater, G3FXB
Japan—21 MHz—DX Family Foundation

Multi-Operator, Single Transmitter

World—Anthony Susen, W3AOH
U.S.A.—Douglas Zwiebel, KR2Q
Canada—Eastern Canadian DX Assn.
Europe—Friends of K3AO—K3AO Memorial

Multi-Operator, Multi-Transmitter

World—Hazard Reeves, K2GL Memorial
World—SSB/CW Combined—Ehrhorn Technological
Operations
U.S.A.—James Rafferty, N6RJ
Europe—Finnish Amateur Radio League
Japan—Nippon Television Network Corp.

Contest Expeditions

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

Special—Single Operator Awards

World—Single Band SSB/CW—Yuri Blanarovich, VE3BMV
World—All Band—CW—Most QSOs—KV4AA Memorial
(From the 14270 kHz Group)

Club

World—SSB/CW—CQ Magazine
Non-USA—SSB/CW—No. Calif. Contest Club—N6AUV
Memorial

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

X. CLUB COMPETITION:

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

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

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

XI. LOG INSTRUCTIONS:

1. All times must be in GMT.
2. All sent and received exchanges are to be logged.
3. Indicate zone and country multiplier only the FIRST TIME it is worked on each band.

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

5. Use a separate sheet for each band.

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

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

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

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

9. Duplicate contacts and broken calls penalty: up to 1% — three (3) additional contacts removed; 1% to 3% — ten (10) additional contacts removed; over 3% is grounds for possible disqualification. **Exception: If your log is accompanied by a disk (MS-DOS compatible; an ASCII file; or K1EA CT.Bin file), the penalty will be reduced to 2 and 5, respectively.**

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

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

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

The use of nonamateur means such as telephones, telegrams, etc., to elicit contacts or multipliers **during** a contest is unsportsmanlike and the entry is subject to disqualification.

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

XIII. DEADLINE: All entries must be postmarked NO LATER than December 1, 1990 for the Phone section and January 15, 1991 for the CW section. An extension may be given if requested. Indicate phone or CW on the envelope.

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

Looking for armchair VHF DXing that's really made easy? NU6F shows us how to get more DX mileage out of our HTs.

A Remote Base Controller For The ICOM 2AT

BY RON DE SILVA*, NU6F

Have you been looking for an inexpensive way to incorporate a synthesized remote base in your repeater or base station? This controller interfaces an ICOM 2AT, 3AT, or 4AT to your repeater or remote base and gives you full access to that handheld. For simplicity the rest of the article deals with adapting the 2AT handheld, but conversion of the 3AT or 4AT is similar. Because there's no commercial power at our mountaintop site, we must rely on solar power. Power needs are an important consideration when adding new equipment. Standby power for the controller and 2AT is a scant 35 mA!

Common parts were used; the total cost for the controller was about \$45. Most of the components are available from your local Radio Shack outlet. You'll find sources for the other parts at the end of the article. Perfboard and point-to-point wiring were used, but wire wrap techniques should work equally well (see the accompanying photo). The controller and portable are housed in a separate shielded enclosure. This results in a clean 2 meter signal with no incidental radiation to bother other receivers at our site.

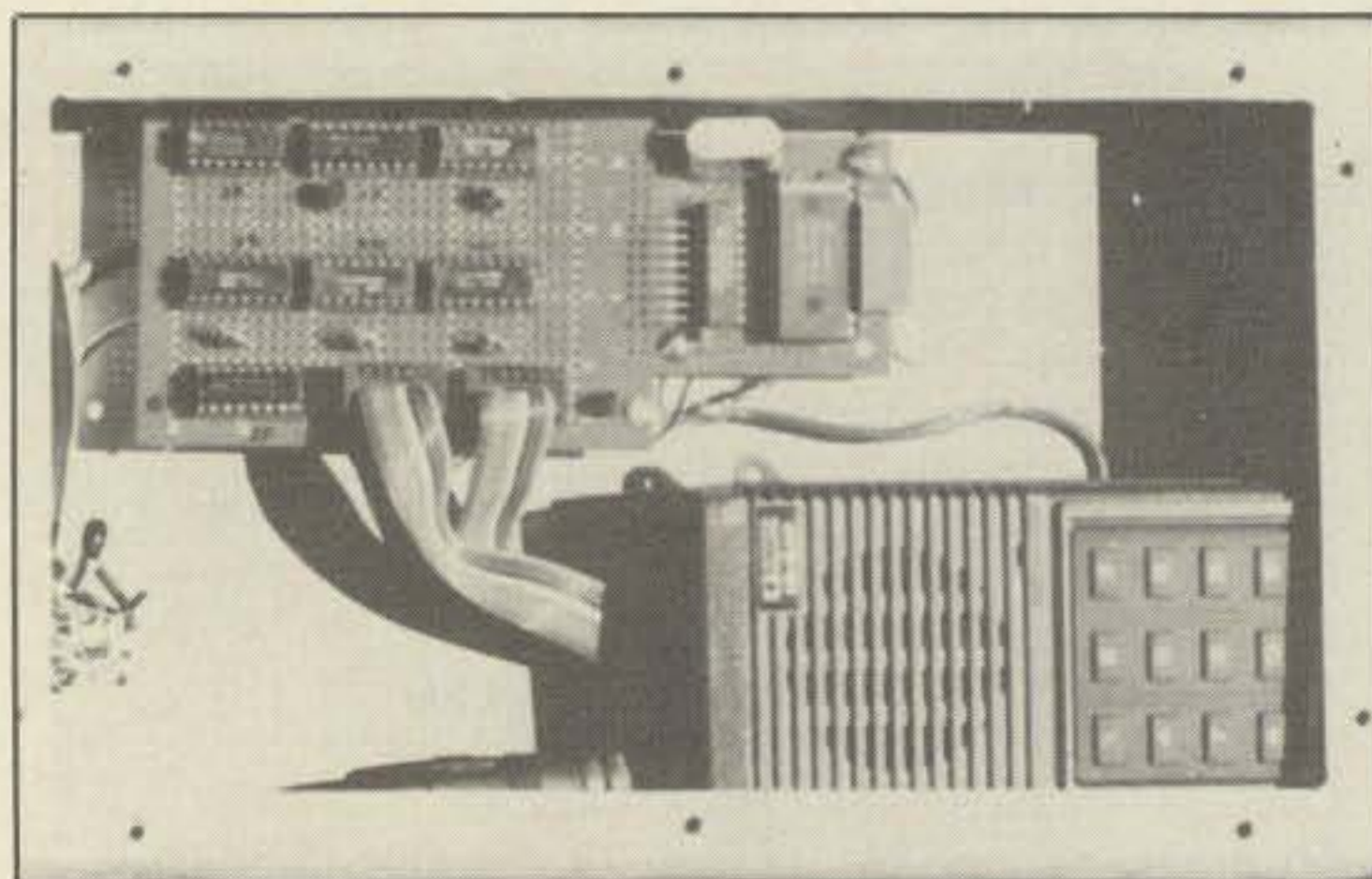
Control is Via DTMF Commands

The remote base user, via DTMF entry, has access to the 2AT's frequency, and repeater or simplex modes. Perform remote programming by loading BCD latches with decoded DTMF tones. DTMF digits A, B, and C are used to steer and load frequencies into the appropriate latches for the MHz, 100 kHz, and 10 kHz positions. DTMF digit D, and its appended control digit, selects duplex repeater offsets, or simplex operation and +5 kHz modes. For example, entering digits A6 B5 C2 *8 selects 146.52 MHz simplex operation; digits A6 B6 C4 *6 select 146.64 MHz duplex with a 600 kHz repeater offset. The *D command gives a "monitor-only" mode with the transmitter disabled, and permits chatter on the remote base or repeater without retransmission on the 2AT. Table I lists command functions.

Circuit Description

Fig. 1 shows the controller schematic. J1 is a five-pin DIN plug used for connecting the controller to the remote base. All of my radios have been modified to include this interface. Pins are designated for 12 volt DC power, receiver audio out, transmitter audio in, PTT control, and receiver carrier detection (COR). Ground is carried via the DIN shell.

*P.O. Box 689, Cobb, CA 95426



The 2AT and controller. Perfboard construction was used and both controller and radio are mounted in a shielded enclosure. Note the ribbon cables between the radio and controller.

DTMF Code	Action
*1	simplex, + 5 kHz
*8	simplex
*4	duplex, + 600 kHz
*5	duplex, + 600 kHz, + 5 kHz
*6	duplex, - 600 kHz
*7	duplex, - 600 kHz, + 5 kHz
*D	simplex, receive only
Ax	loads MHz data
Bx	loads 100 kHz data
Cx	loads 10 kHz data

Table I- DTMF control commands for the 2AT controller.

U10, a three-terminal 7805 regulator, provides 5 volts DC for the controller circuitry. When the controller is switched off, power to ICs U3, U4, and U5 (the 4042 latches used to store the frequency information for the 2AT) is removed, protecting the 2AT synthesizer from damage. Also, IC1 is put into a tristate condition. The other ICs are left on to decode control commands.

DTMF commands * and # set or reset latching relay K1. In addition to turning on the controller, the * command can also preface appended digits for selecting the 2AT simplex or repeater modes.

U11, a 7809 regulator, supplies 9 volts DC for the 2AT. Both regulators (ICs U10 and U11) are heat sunked. You might al-

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(2) Extension Speaker. Quality 4" driver, 10-ft. cord and 1/8" plug, metal mounting bracket. #21-549 **13.95**

(3) WWV/Weather Receiver. Crystal controlled. Receives WWV or WWVH on 5, 10 or 15 MHz plus local VHF weather station up to 50 miles away. Battery powered. #12-148, **39.95**

(4) Regulated 12VDC Supply. Rated 2.5 amps continuous. Circuit breaker. UL listed AC. #22-120 **39.95**

(5) Six-Outlet Spike Protector. With 0.1 to 100 MHz noise filter, breaker. Rated 15A. UL listed AC. #61-2780 ... **29.95**

(6) AC to 12VDC Adapter. 500 mA output. Includes four Adaptaplug® connectors. #273-1652 **10.95**

(7) 8-Pin Mike Plug. Fits many popular transceivers. Ideal for connecting TNC, phone patch. #274-025 **2.19**

(8) Headphone Plug Adapter. Adapts 1/8" stereo plug to monaural 1/4" jack. #274-348 **1.99**

(9) HT Adapter. Adapts 1/8" stereo headphone plug to 3/32" Kenwood handie-talkie earphone jack. #274-381 **1.99**

(10) 9-Position D-Sub Connector. #276-1537 **99¢**

(11) Metal Hood for Fig. 10. #276-1508 **2.19**

(12) Snap-Together RFI Choke Cores. Just wind on AC or coax cable and snap choke together. #273-104, Set of 2/7.95

(13) 75-Ohm High-Pass Filter. #15-579 **4.29**

(14) 300-Ohm High-Pass Filter. #15-581 **5.95**

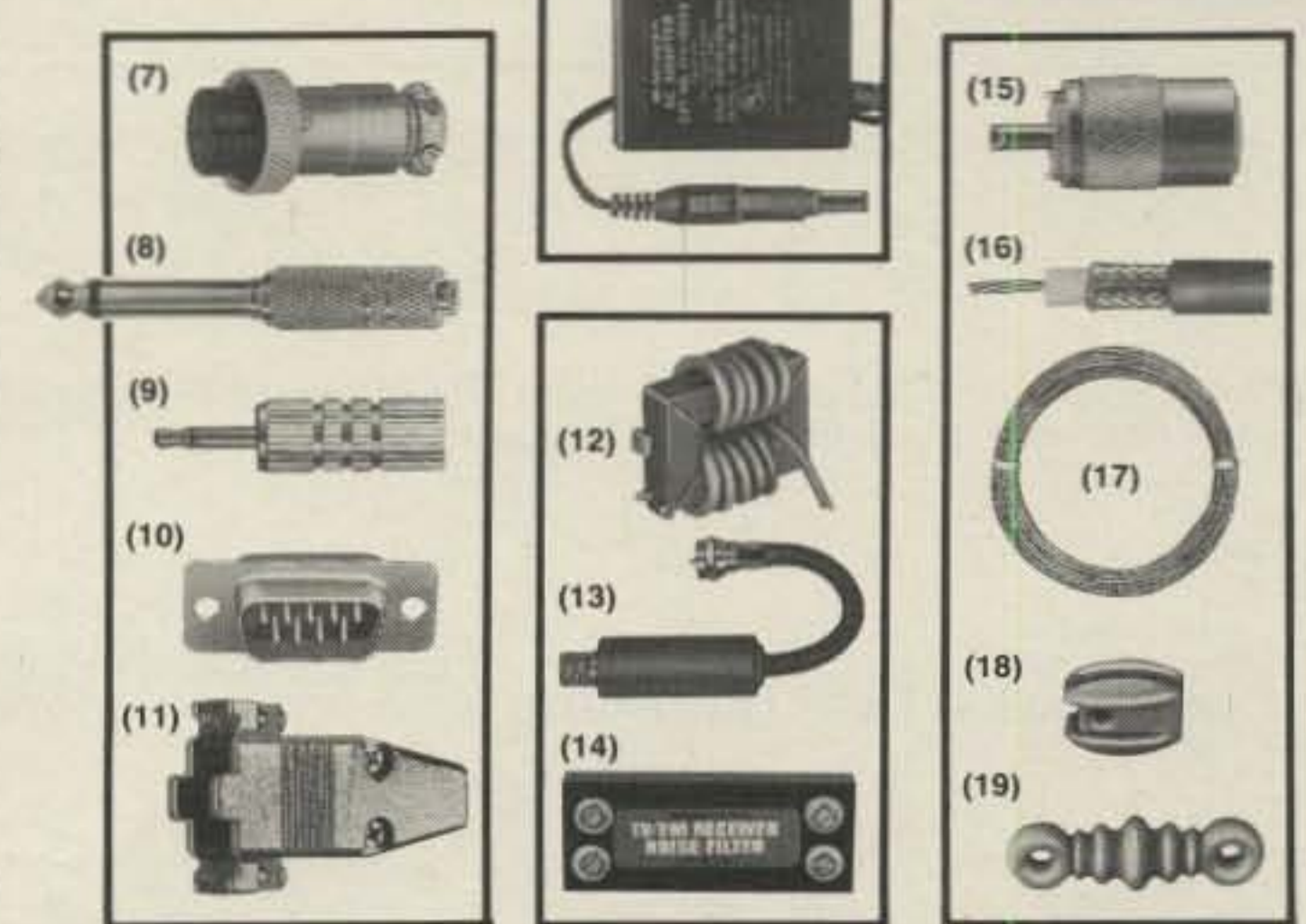
(15) Premium PL-259 Plug. Has silver-plated body and high-heat, low-loss Teflon™ insulator. #278-188 **3.49**

(16) RG-8 Coax Cable. #278-1323 **Per Ft. 42¢**

(17) Antenna Wire. 70 feet. #278-1329 **5.79**

(18) NEW! Mini-Egg Insulators. #278-1335 ... **Pkg. 2/2.99**

(19) NEW! "Dogbone" Insulator. #278-1336 **1.99**



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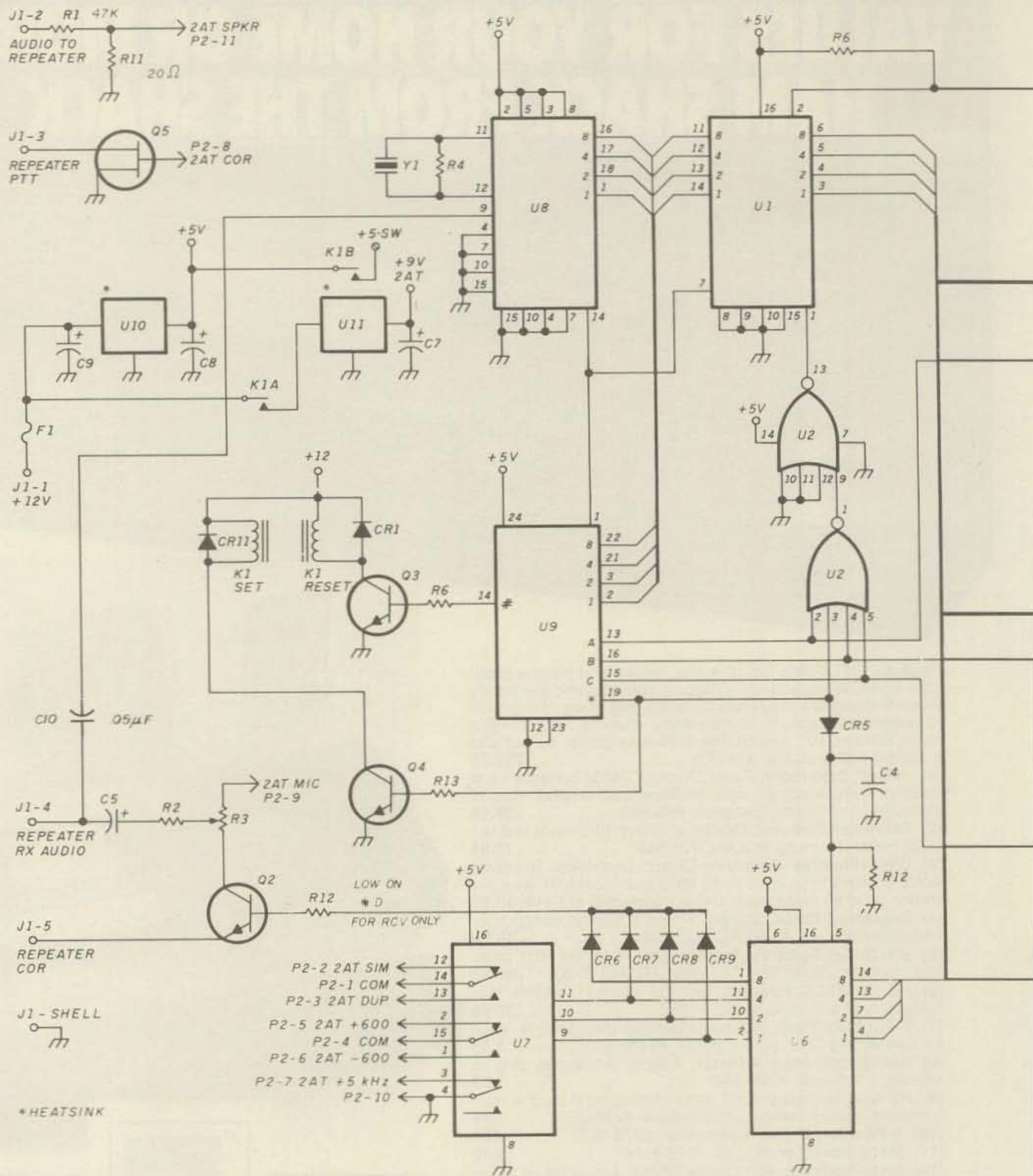


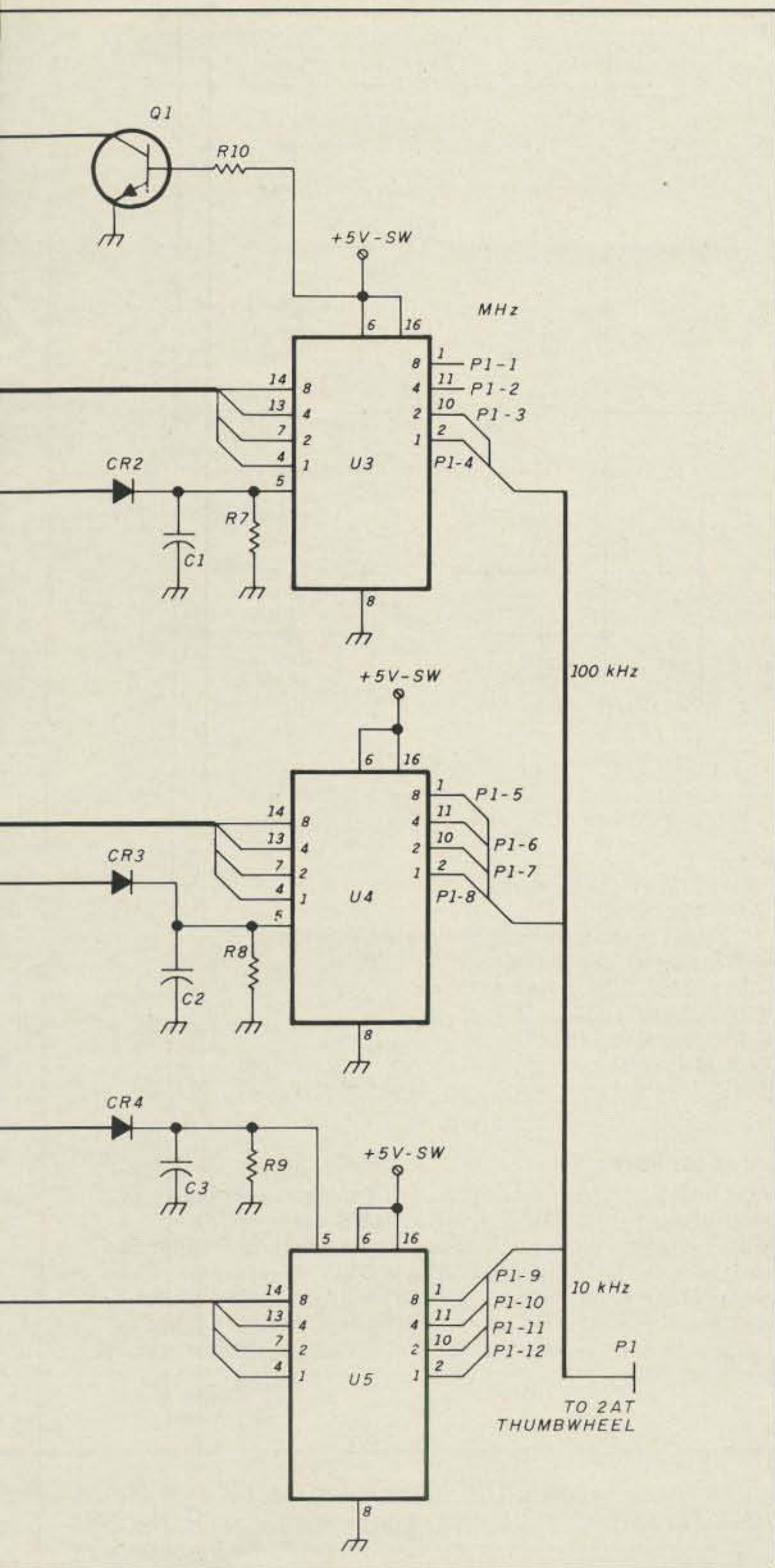
Fig. 1—Schematic for the 2AT controller. The 2AT circuitry interfaced to the controller is detailed at the right.

ready have a control function on your system that could switch power to the controller. If so, you can eliminate relay K1, transistor Q1, and ground pin 2 of IC U1 (4076) for off/on control by another means.

Single Chip Does DTMF Decoding

IC U8, an SSI201, performs all DTMF decoding functions and gives a BCD equivalent output on reception of a valid DTMF sig-

nal. Decoded BCD outputs for digits 8, 4, 2, and 1 are routed to IC U1 (4076) and IC U9 (4514, a BCD to hex converter). U1 is a tristate latch and feeds individual "thumbwheel" latches U3, U4, U5, and mode and offset latch U6. All are 4042 ICs. IC U9 (4514) decodes command digits *, #, A, B, C, and D. As mentioned before, * and # operate latching relay K1, controlling power to the controller. The * command can also be used to steer the 2AT repeater or simplex mode, and offsets, when the command is followed by an appended digit. Digits A, B, and C steer frequency programming information into latches U3, U4,



and U5—in that order. (Single chip DTMF decoders can show an apparent loss of dynamic range if any digital noise is present on the 5 volt VCC line. It's good practice to use a large value—100 to 250 μ F—tantalum capacitor directly across the VCC and ground pins on that device's socket.—ed.)

Invalid Frequency Entries Prevented

IC U2 (4001) assures that control codes A, B, C, or * aren't

passed on to latches U3 through U6 by disabling U1 (4076). Diodes D2 through D5, with their associated RC time constants, produce a falling-edge clock to enter data into the latches. The *D command disables the PTT signal to the 2AT by cutting off Q2, and is decoded by diodes D6 through D9 on the latch outputs of U6.

IC7 is a triple BIFET switch. It controls the simplex/duplex, 0 and 5 kHz offset, and plus-or-minus repeater offset selections on the 2AT.

Modifying the Portable

ICOM AT series handhelds are programmed by active high levels; the frequency thumbwheels are deactivated by setting them to all zeroes. The 0/5 kHz switch is also left in the 0 kHz position. Two 8 inch 14-conductor ribbon cables, with 14-pin DIP headers on one end, interface the portable to the controller. One end of each cable is hardwired into the portable; the dip header ends plug into P1 and P2 on the controller perfboard. These cables carry the frequency programming information, audio and COR information, and offset and mode information between the controller and 2AT. When you're finished, the 2AT will look as it did before—except for the missing 600 kHz offset switch and simplex/duplex switch, and the ribbon cables exiting the radio.

Step 1: Disassemble the 2AT

Remove the battery slide plate held in place by four metric flat-head screws. Remove the two small Phillips-head screws and

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 *Voice Meters*Paging*Logging*Polite ID's*Packet Voice B.B.S.

<p>Model CS64S \$ 359.95</p> <p>Includes: Interface, disk, cables, Manual Ultra Options</p>	<p>COMMODORE 64</p> <p>Repeater/Dual Bander</p> <p>CS8</p> <p>FT 757; 767; 980; 736; 747 TS 440; 940; 140 IC 735; 761 VHF RMT FT 727R; 767; 736 TS 711; 811; 680</p>
<p>Controller Features</p> <ul style="list-style-type: none"> *Change variables remotely from touchtones or Packet *Unlimited voice vocabulary! *Alarm Clock, auto execute *Individual 4 digit user codes *Disk & Printer logging of users, tel #'s, lapsed time *18 Rotating Polite ID's *16 External relay controls *2, 5, & CTCSS Tone Paging *CW Practice with voice *Security mode, T.tone mute *Voice announces each user call sign when logging on 	<p>Autopatch & Reverse</p> <ul style="list-style-type: none"> *1000 (18 digit) tel #'s stored *Quick dial & quick answer *Directed, general page *Selected restricted patch *Telephone control input <p>Dual Combined Remotes</p> <ul style="list-style-type: none"> *18 Macro/Scan memories *Scan up/down; 100Hz steps *Monitor & lock modes *Operate splits, combine HF & VHF radios as Dual VFO's *Automatic mode selection *Talking S Meter; Voltmeter *Voice Beacon rotating msc

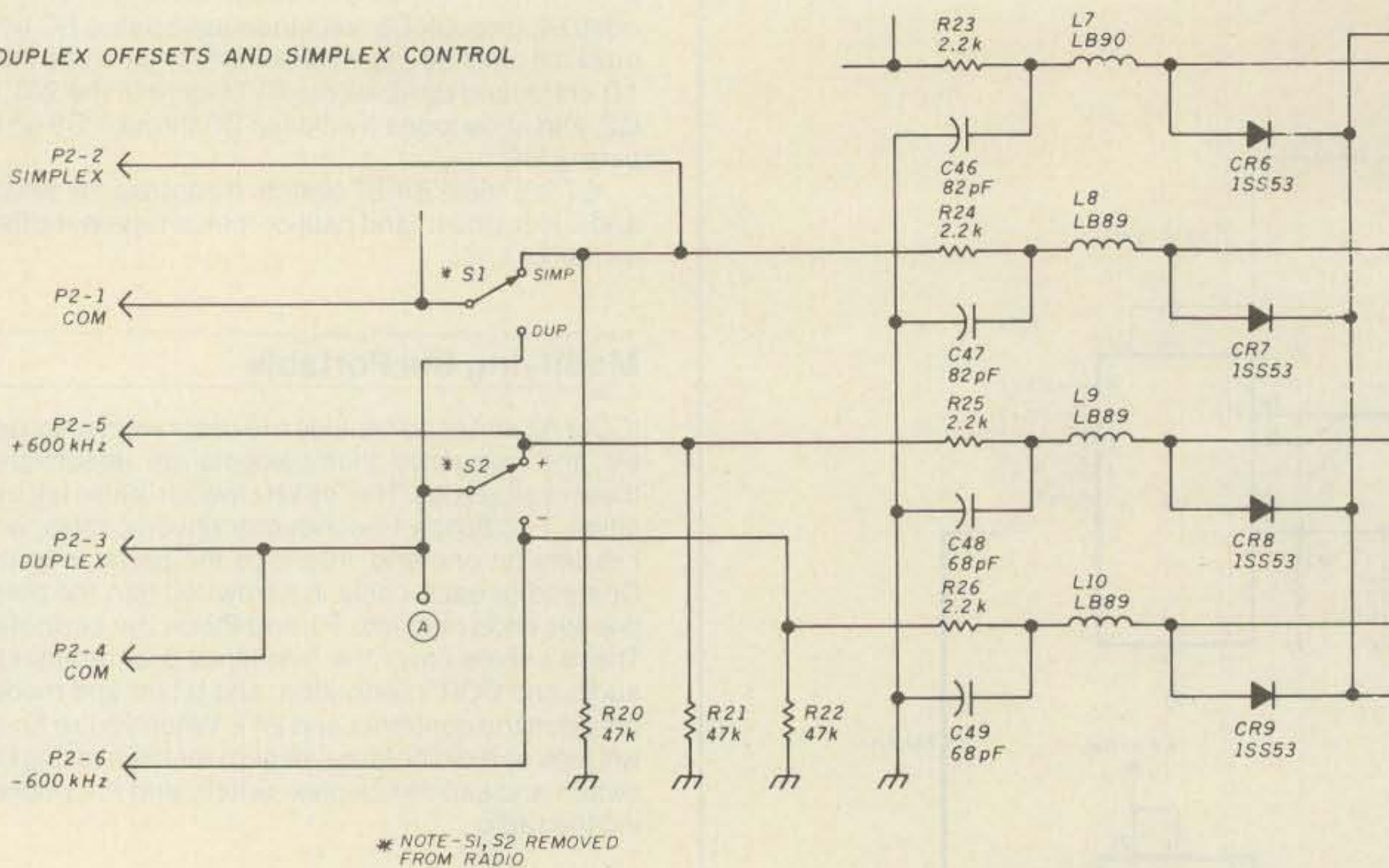
<p>Computer Control YAESU FT-727R</p> <p>C64 OR IBM Mini Cat</p> <p>Allows H.T. to scan 100 Channels & programs H.T. for field use! Digital "S" Meter; comment fields; auto resume & delay; Scan Lock-outs; Loads FT727 in 15 sec. Hardware, cables, & disk included for C64 or IBM</p> <p>Model 727 \$49.95</p>	<p>Touchtone Decoder 4 digit sequence; & QUAD expansion 4 relay option</p> <p>2"x3" TSDQ</p> <p>8/20 V & audio in; Field Program 50,000 Codes; Mom. & Latching; DPDT Relay; Wrong digit reset; LED for digit valid & latch; inc. 24 Pin connector</p> <p>QUAD option adds: four 2 Amp. relays; 5 digit master on/off control for each relay.</p> <p>TSDQ \$89.95 QUAD \$99.95</p>	<p>Decode-A-Pad Touchtone to RS232 300 Baud Interface</p> <p>DECODE-A-PAD</p> <p>Use with all computers Decodes 16 touchtones Includes Basic program</p> <p>DAP \$ 99.95</p>
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<p>AUDIO BLASTER IC02; 04; 2AT; FT-727; 411; 209; 470; 73/23; U16; TH25</p> <p>AB1S ← Miniature Audio Amp.</p> <p>Module installs inside all H.T.'s; 1 watt audio amp! When it needs to be loud! Installs in 15 Min. Used by police, fire!</p> <p>Model AB1S \$24.95</p>	<p>New Digital Voice Recorder</p> <p>Records 32 or 64 Sec. studio quality audio</p> <p>Use for auto CQ, ID tail, Mailbox, Local or logic control; Up to 16 selectable messages!</p> <p>Includes: 1 Watt audio amp; 1 Meg RAM; Mic & Spkr Jacks, vol. control; Req. 9 to 12V; Interfaces to Ultra Com Shack 64 Ver 8.0; Provides Digital Voice CQ, ID tail, Mailbox, bulletins</p> <p>DVM \$179.95</p>
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2AT DUPLEX OFFSETS AND SIMPLEX CONTROL



(A)

Parts List

C1,2,3,4—0.01 μ F ceramic disc
 C5,7,8—0.47 μ F tantalum, 25 volts DC
 C6—0.05 μ F ceramic disc
 C9—33 μ F tantalum, 25 volts DC
 D1 to D11—1N914 or 1N4148 silicon diodes
 F1—2 A fuse, in-line
 J1—DIN jack 5-pin chassis mount
 K1—Relay DPDT latching, dual coil 12 volts DC, H&R part no. TM23K326
 P1,2—14-pin male headers with 8 inches of ribbon wire
 Q1,2,3,4—2N3904 or 2N2222 transistor
 Q5—BS170 TMOS FET
 R1,7,8,9,12—47 k, 1/4 watt
 R2—10 k, 1/4 watt
 R3,6,13—10 k PC mount trimpot
 R4—6.8 meg, 1/4 watt
 R5,13—100 k, 1/4 watt
 R10—4700 ohms, 1/4 watt
 R11—20 ohms, 1/2 watt
 R12—3300 ohms, 1/4 watt

U1—4076
 U2—4002 dual 4-input NOR gate
 U3,4,5,6—4042 CMOS latch
 U7—MC14053 or MC4053 triple bilateral FET switch
 U8—SSI201 DTMF decoder IC
 U9—4515 CMOS BCD to HEX decoder
 U10—7805 5 volt regulator
 U11—7809 9 volt regulator
 Y1—3.58 MHz color burst crystal

Sources for Parts

Latching relay K1—H&R Corporation, 401 Erie Avenue, Philadelphia, Pennsylvania 19134-1187 (phone 800-848-8001).
 Integrated circuits—JDR Microdevices, 2233 Branham Lane, San Jose, California 95124 (phone 800-538-5000).
 Integrated circuits and cables—Jameco Electronics, 1355 Shoreway Road, Belmont, California 94002 (phone 415-592-8097). ACE Electronics—3479 Kifer Road, Santa Clara, California 95051 (phone 408-730-4660).

Fig. 2—(A) Connections to the 2AT offset and mode switches, and thumbwheels are shown at (B). (Parts B and C of fig. 2 are shown on the opposite page.) The audio signals and core sensing areas in the 2AT are shown at (C). Two ribbon cables connect the 2AT with the controller circuitry shown in fig. 1. The frequency information is carried on the ribbon cable from the P1 header connector. Other signals are carried on the P2 header connector and ribbon cable.

open the plastic clamshell case. The radio chassis will swing open on hinges.

Carefully unsolder and remove the two slide switches for duplex/simplex and repeater offset. Solder the appropriate ribbon wires to the now vacant switch lead holes.

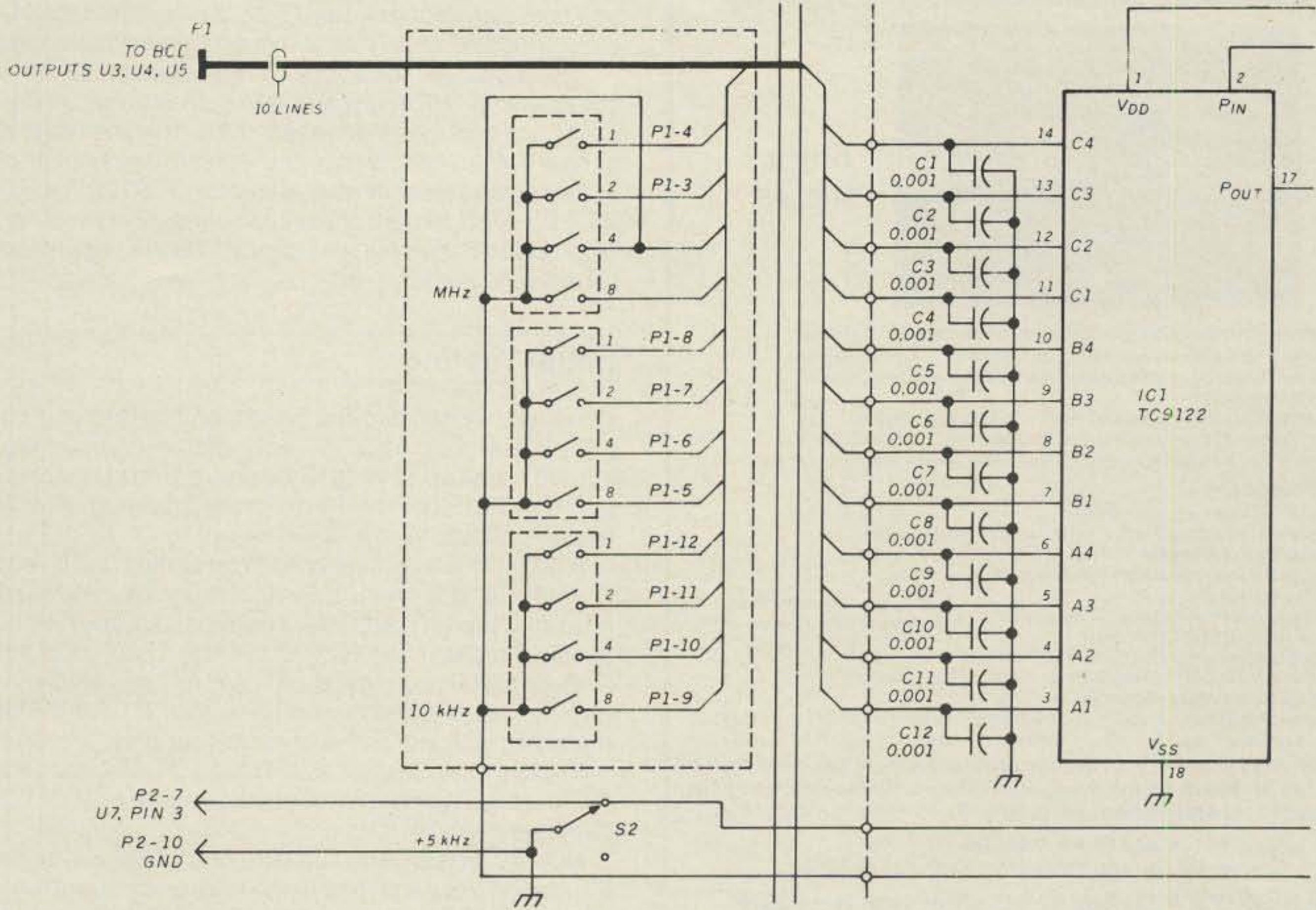
Connect the remaining leads from this ribbon cable to the speaker hot lead, the COR sensing point, and the microphone hot lead. Fig. 2 shows the connections you need to make to the 2AT. The last ribbon lead of this cable goes to the "hot" side of the 0/5 kHz selector switch. You'll find it on top of the radio, near the power switch. Note that the 3AT and 4AT models have no selection for high or low repeater offsets, that the 5 kHz

switch on the 4AT is located on the rear of the radio, and that there is no 5 kHz switch on the 3AT.

Connecting the Ribbon Cable To Thumbwheel Switches

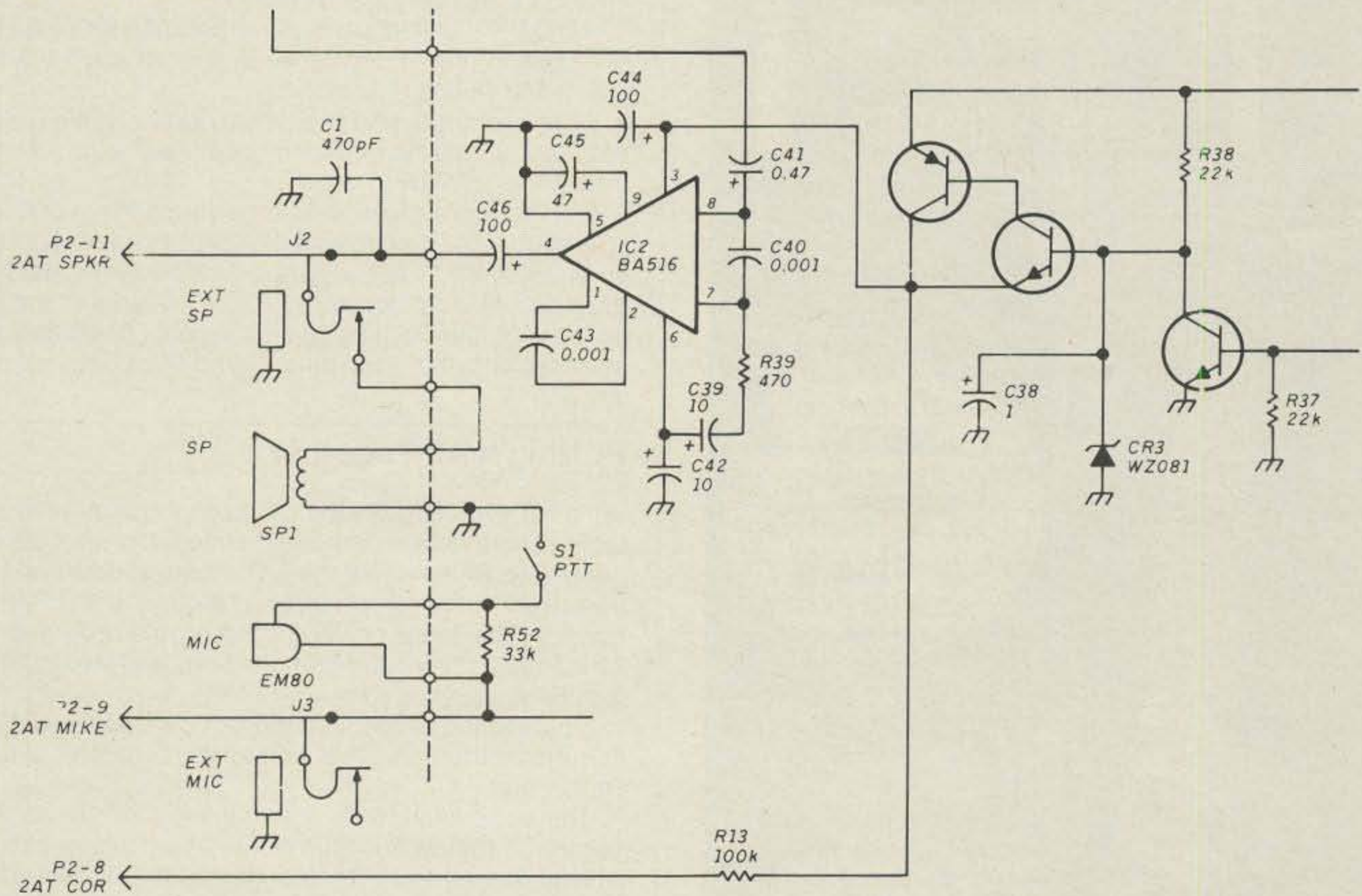
The remaining ribbon cable connects to the thumbwheel switch terminals. This is the tricky part, as quarters are tight. The 2AT's MHz thumbwheel terminal for BCD 4 is hardwired by ICOM to 5 volts. Similar, but not identical, jumpers are used in the 3AT and 4AT. Only the binary-coded 1 and 2 MHz thumb-

2AT THUMBWHEEL AND +5kHz SWITCH



(B)

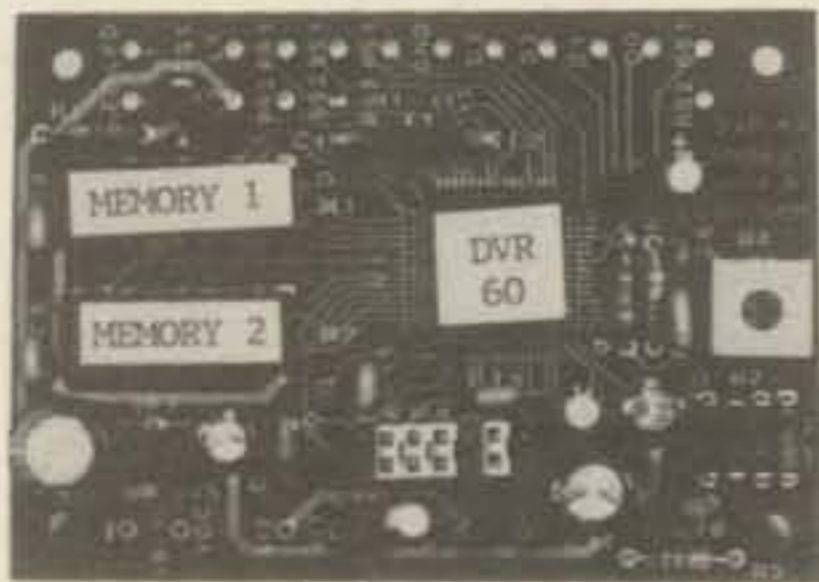
2AT COR, MIKE AND SPEAKER



(C)

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- Selectable Continuous Loop on Record
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- Message Select: Up to 4 Lines Binary Code
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wheel terminals are brought out. They allow frequency selection between 4 and 7 MHz. (Use a grounded soldering station and static protection! The TC9122 programmable divide-by-N chip in the 2AT is very sensitive and is easily destroyed!—ed.)

A small notch filed above the switches in the top of the rear cover lets you slip the two ribbon cables between the top of the cover and nose plate on reassembly. The end result looks rather neat. (Note that the thumbwheel terminals are also available at the ribbon solder header above the TC9122 in the front of the 2AT. This is a more accessible connection point for the interface ribbon cable, but would preclude the ribbon cable routing used by the author.—ed.)

Initial Testing

Once you've finished the board, and before you connect the 2AT, it's a good idea to verify that everything works as intended. Hook up 12 volts to the board, and connect the audio input to a DTMF source. Perform the following tests with a logic probe or VOM.

A DTMF * will pick relay K1. You should find 5 volts power to ICs U3, U4, U5, and U6. Switched 9 volts is now available for powering the 2AT. A DTMF # command drops K1 and removes these voltages.

Next, DTMF commands A1, A2, A4, and A8 give logic highs on pins 1, 11, 10, and 2 (respectively) of IC U3. A DTMF AD command will give logic lows at these four pins.

Try the same test for IC U4 using DTMF commands B1, B2, B4, and B8. This time highs should appear on pins 1, 11, 10, and 2 (respectively) of IC U4.

Now try the same test on U5 using DTMF commands C1, C2, C4, and C8. As a final test of the frequency control, enter DTMF command A6 B5 C2. Only pins 10 and 11 of U3, pins 11 and 2 of U4, and pin 10 of U5 should be high.

Test mode switch outputs from U7 next. Enter *1 to test the 5 kHz offset. Pin 3 of U7 should go low. This should also set the mode command to simplex; check for continuity between pins 12 and 14, and pins 2 and 15 of U7.

A DTMF *4 should set duplex operation with a +600 kHz offset. Look for continuity between pins 13 and 14, and between pins 2 and 15 on U7.

DTMF command *6 should set duplex with a -600 kHz offset. You should find continuity between pins 13 and 14, and pins 1 and 15 of U7.

A DTMF command *5 also performs the +600 kHz duplex operation—but it enables the +5 kHz offset, too. DTMF *7 also enables the -600 kHz duplex mode with the 5 kHz offset turned on. A logic low on pin 3 of U7 shows that the 5 kHz function is working. Pushing *8 sets simplex operation; you should see continuity between pins 12 and 14 of U7.

Putting It All Together

Wire the switched 9 volts DC from the controller to the 2AT. Connect the ribbon dip headers into the proper sockets on the controller. Be sure that the 2AT thumbwheels and 5 kHz offset switch are set to zeroes. Input a *A6 B5 C2 *8 DTMF control sequence. The 2AT is now transmitting and receiving on 146.520 MHz simplex. Try other combinations and give all of the control functions a good workout.

Opening the squelch on the 2AT causes the COR lead to go low. This is the signal that will key your repeater or remote base transmitter.

The audio level to the transmitter is set by the 2AT volume control. If there's too little or too much audio, decrease or increase the value of R1 to compensate. If the audio from the control receiver doesn't properly modulate the 2AT transmitter over the adjustment range provided by R3, change the value of R2.

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<p>VRM/VS-M SERIES</p>  <p>MODEL VS-35M</p>	<ul style="list-style-type: none"> • Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load <table border="1"> <thead> <tr> <th></th> <th colspan="3">@ 13.8VDC @ 10VDC @ 5VDC</th> <th>@ 13.8V</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>VS-20M</td> <td>16</td> <td>9</td> <td>4</td> <td>20</td> <td>5 x 9 x 10 1/2</td> <td>20</td> </tr> <tr> <td>VS-35M</td> <td>25</td> <td>15</td> <td>7</td> <td>35</td> <td>5 x 11 x 11</td> <td>29</td> </tr> <tr> <td>VS-50M</td> <td>37</td> <td>22</td> <td>10</td> <td>50</td> <td>6 x 13 3/4 x 11</td> <td>46</td> </tr> <tr> <td colspan="7">• Variable rack mount power supplies</td> </tr> <tr> <td>VRM-35M</td> <td>25</td> <td>15</td> <td>7</td> <td>35</td> <td>5 1/4 x 19 x 12 1/2</td> <td>38</td> </tr> <tr> <td>VRM-50M</td> <td>37</td> <td>22</td> <td>10</td> <td>50</td> <td>5 1/4 x 19 x 12 1/2</td> <td>50</td> </tr> </tbody> </table>		@ 13.8VDC @ 10VDC @ 5VDC			@ 13.8V			VS-20M	16	9	4	20	5 x 9 x 10 1/2	20	VS-35M	25	15	7	35	5 x 11 x 11	29	VS-50M	37	22	10	50	6 x 13 3/4 x 11	46	• Variable rack mount power supplies							VRM-35M	25	15	7	35	5 1/4 x 19 x 12 1/2	38	VRM-50M	37	22	10	50	5 1/4 x 19 x 12 1/2	50
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*ICS—Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

CIRCLE 97 ON READER SERVICE CARD

CQ REVIEWS:

The Hy-Gain Omni DX-88 Eight-Band Vertical Antenna

BY JOHN J. SCHULTZ*, W4FA

The DX-88 is an omnidirectional, unity-gain, self-supporting vertical antenna that operates in the 80, 40, 30, 20, 17, 15, 12, and 10 meter amateur bands. It is about 25 feet high. The antenna can be mounted at ground level or in an elevated position. However, it *must* be used with a set of radial wires. You can put together a set of radials with the information supplied in the DX-88's manual, or Hy-Gain offers two assembled radial sets—the GRK-88 for ground-mounted installations and the RRK-88 for elevated mountings, such as on a roof. The difference between the two radial sets is basically that the GRK-88 radials are non-resonant and all of the same length (14 feet), while the RRK-88 radials are resonant (two $\frac{1}{4}$ -wavelength radials on each band except 80 meters). Table I presents a summary of the specifications for the DX-88. Note that there is a power limitation on the 30 and 17 meter bands only. On all other bands the DX-88 will accept a full 1500 watts PEP of power.

Electrical Makeup

Fig. 1 shows an overall view of the antenna, except that no radial system is shown. Easily noted are the trap assemblies for the eight bands covered by the antenna. The entire length of the antenna is active on 80 and 40 meters. The 80 and 40 meter "traps" near the base of the antenna are not really "traps" in the sense of being resonant circuits, although they are composed of inductive and capacitance elements. The 80 meter "trap" provides inductive loading to resonate the entire antenna on that band, while the 40 meter "trap" has an effective capacitive action to resonate the entire antenna on that band. These two "traps" are interactive in setting the tuning for the 80 and 40 meter bands, as will be mentioned later.

The remaining traps are true high-Q, tunable resonant traps which isolate one-quarter wavelength sections along the vertical radiator starting with the 10 me-

Specifications

Electrical

Frequency:

Transmit—80, 40, 30, 20, 17, 15, 12, 10 meter amateur bands

Receive—3–30 MHz, tunable in 8 international SWL bands

Input impedance: 50 ohms

VSWR at resonance: less than 1.5:1 if using recommended radial system

Maximum power: 1500 watts PEP, 700 watts average (maximum power on 30 meters is 250 watts average; maximum power on 17 meters is 500 watts average)

Input connector: SO-239

Mechanical

Maximum height: 24 ft. 9 in. (7.54 m)

Weight, net: 18 lb. (8.2 kg)

Weight, shipping: 22 lb. (10.0 kg)

Maximum mast O.D.: $1\frac{1}{8}$ in. (41 mm)

Wind survival, unguyed: 75 mph (121 kmph)

Table I—Hy-Gain specifications for the DX-88.

ter trap and progressing in direct order with the 12, 15, 17, 20, and 30 meter band traps. Each of these traps can be tuned independently if you want to optimize the SWR in any given portion of a band. They can also be tuned to favor various SW broadcast bands if the antenna is to be used for SWL purposes (90, 74, 49, 41, 31, 25, 22, 19, 16, 13, and 11 meter band coverage).

The SWR bandwidth of the DX-88 follows fairly much the classical model for trap/loading multiband antennas—that is, progressing from fairly broad on the 10 meter band to quite restrictive on the 80 meter band. The DX-88 operates with a 2:1 or less SWR on the entire 30, 17, 15, 12, and 10 meter bands. The 2:1 SWR bandwidth is about 250 kHz on 20 meters, 200 kHz on 40 meters, and 50 kHz on 80 meters. These bandwidths do not mean that the antenna cannot effectively radiate over wider frequency excursions. It will, for instance, radiate over the entire 80 meter band, but then an antenna tuner is required to bring the SWR at a transceiver's antenna output connector to a

value such that the transceiver will deliver full power output into the antenna.

Roughly, the 2:1 SWR bandwidth for a vertical antenna such as the DX-88 can be viewed as the usable bandwidth for use with a solid-state transceiver *sans* antenna tuner. This generalization cannot be applied to any antenna form. With more complex antenna forms severe radiation pattern changes may also take place outside of a defined SWR bandwidth. However, that is getting far outside of the scope of this article. The SWR bandwidth of the DX-88 is certainly quite good on the bands above 10 MHz. On the 80 and 40 meter bands you have to decide which portion of those bands to favor when adjusting the antenna, or use an antenna tuner for complete flexibility. Fig. 2 shows a set of typical SWR wires.

Mechanical Makeup

The DX-88 is made of extremely sturdy aluminum tubing sections starting with a hefty $1\frac{3}{8}$ " \times 41" thick-wall tube as the base section. The tubing sizes decrease slowly down to a still hefty $\frac{1}{16}$ inch O.D. tube for the very top section.

You have to partly assemble the traps. That is, the coils for the traps come completely assembled. You must assemble the capacitors associated with each trap by telescoping two different diameters of tubing, which are insulated from each other, and then clamping the capacitor assembly across one or more of the coils. The value of the capacitors can be varied by sliding the inner tube of the capacitor in or out of the outer tube. This is how the antenna is tuned on each band. A bit more assembly work is required, but tuning flexibility is achieved, and you can fairly easily disassemble the capacitors in case an arc-over needs to be cleaned up. The coil covers may also be removed if it should ever prove necessary to get at the coils.

Stainless-steel hardware is used for all electrical connections (e.g., clamps for telescoping tubing sections, bolts, etc.). Aluminum clamps are used to hold capacitors across the coils.

Overall, the construction is very rugg-

*302 Glasgow Lane, Greenville, NC 27858

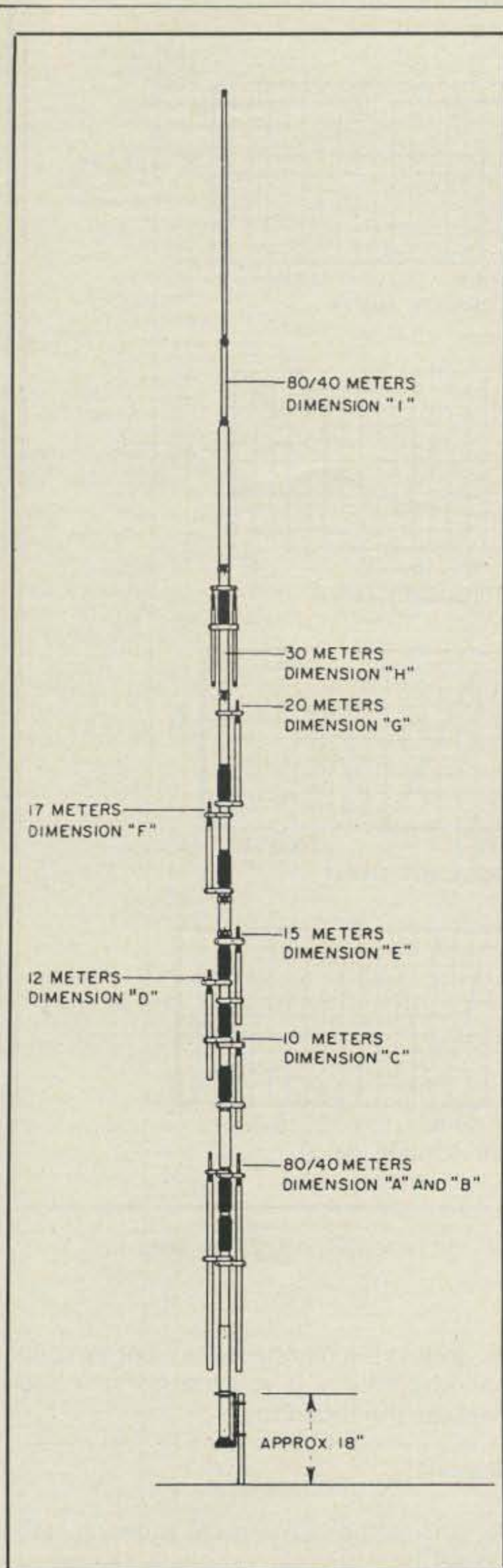
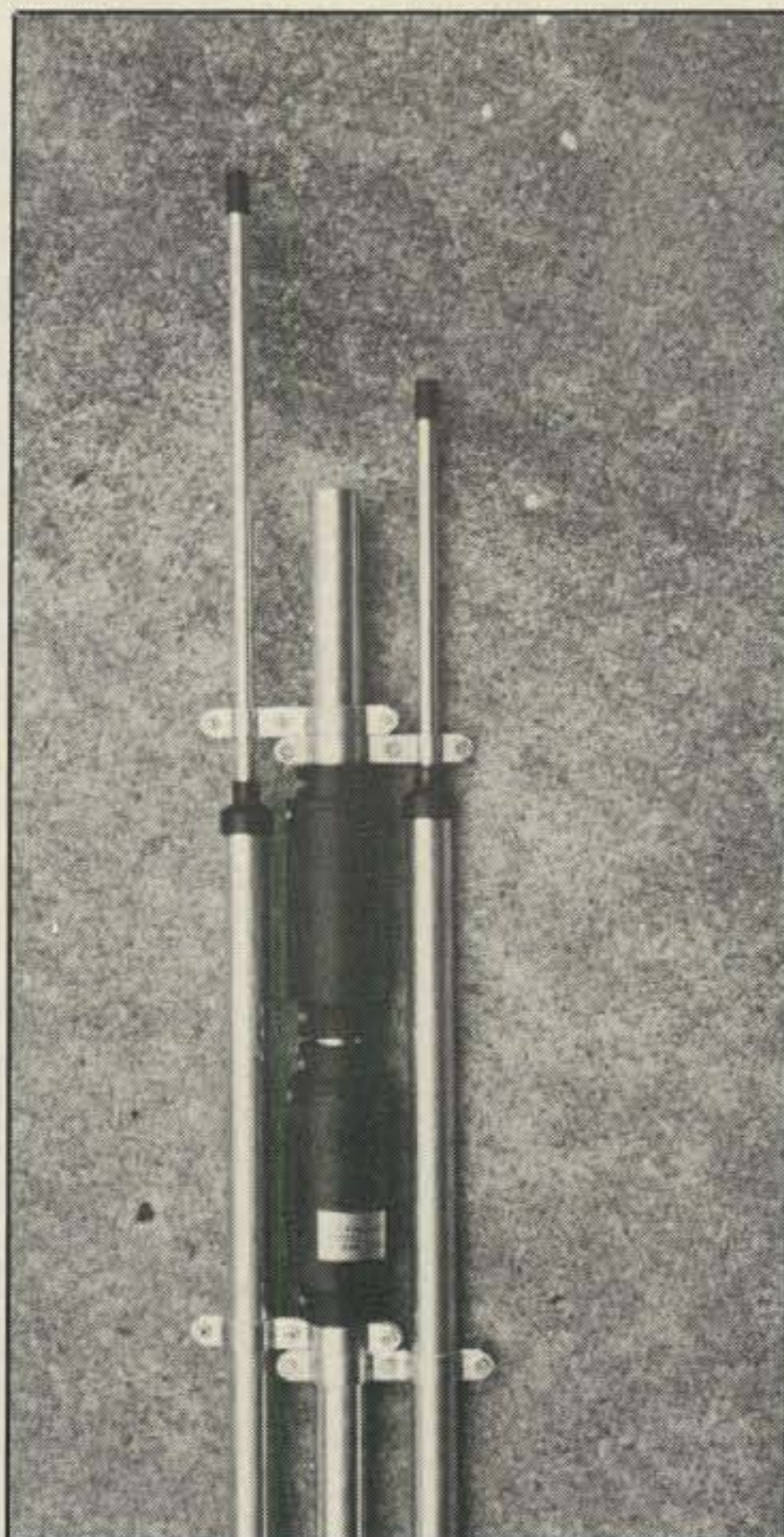


Fig. 1- Makeup of the DX-88. Overall height is about 25 feet. The dark areas are coils, while the "sidearms" are tunable capacitors associated with the coils.

ed, and the wind survivability rating of 75 MPH without guying seems conservative. In reality the wind survivability would probably depend mainly on how you secure the base of the antenna to a support.

The longest element used in the antenna measures 55 inches, and there are no overly large "L"-shaped pieces. Therefore, by telescoping sections of tubing together wherever possible, you could probably come up with a fairly compact 20 lb.



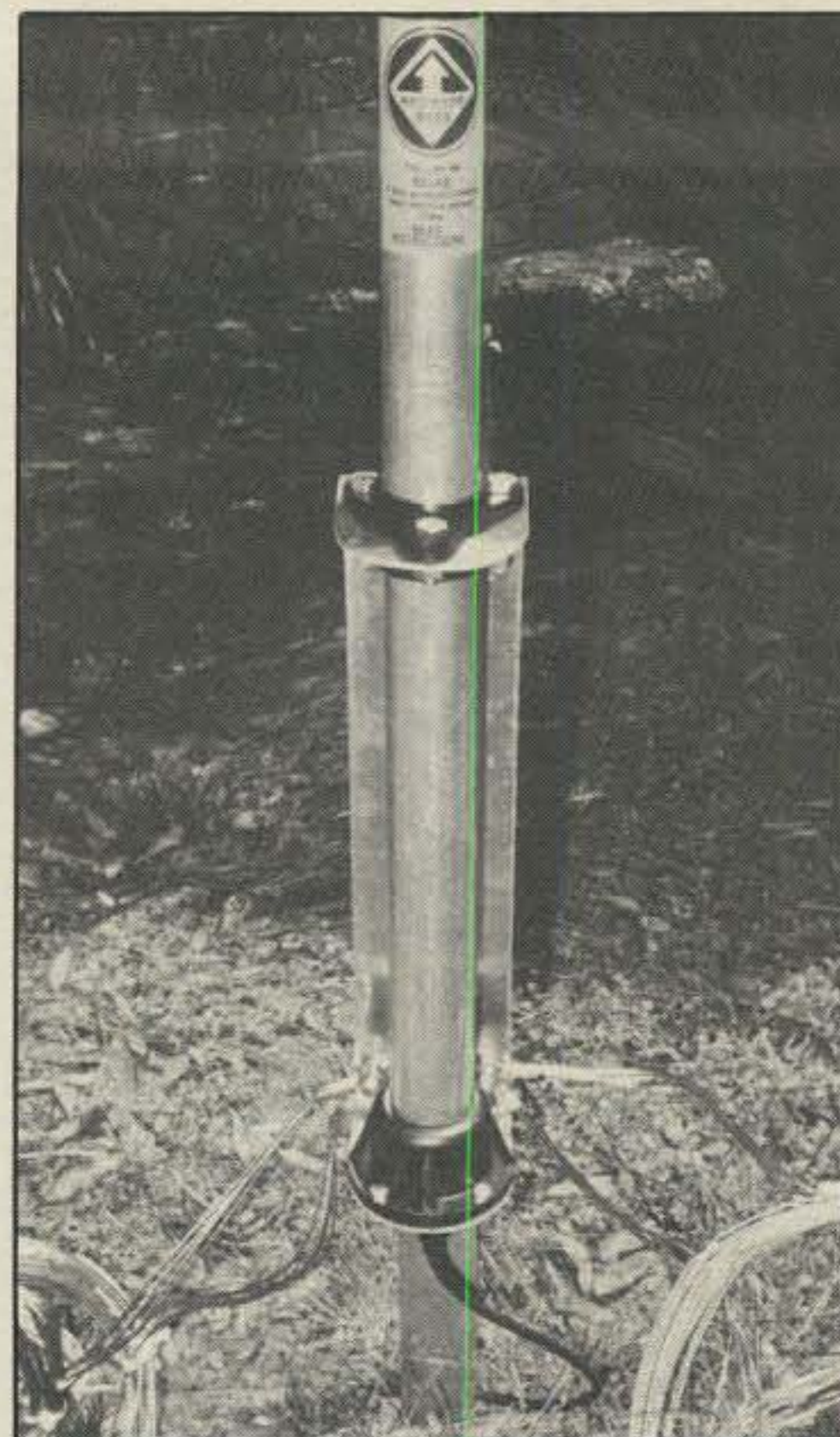
This is a view of two of the very sturdy traps in the DX-88 (actually the 80/40 meter ones shown towards the bottom of fig. 1). The coils come completely assembled, but you have to construct the tubular capacitors shown on each side. The traps are quite service-friendly should something go wrong. The capacitors can be disassembled, and the coil covers are removable.

package if you wanted to transport the antenna. Of course, an additional allowance would have to be made for the radial system, transmission line, etc.

Radial Systems

As was mentioned before, there are two radial system possibilities for the antenna depending upon whether it is to be ground mounted (radials on the ground or buried) or mounted in an elevated position such that the radials are above ground. Fig. 3 shows the radial system for ground-mounted installations, and fig. 4 shows the resonant radial system for an elevated mounting, typically on a house roof. The radials, by the way, may droop over an edge of a roof, but they must be insulated from the roof.

Hy-Gain does note that in the case of a ground installation longer and more radials will reduce ground losses and raise the efficiency of the antenna. However, they do estimate that the gain of the an-



The base of the DX-88 is held in place by an elongated "U" bracket which in turn would be attached to a support pipe. The 16 radial wires of the GRK-88 radial kit are shown still coiled up before being spread out on the ground. Not shown is an optional but highly recommended DC grounding coil which attaches across terminals provided. The coil (9 turns of #12 enameled wire on a 1 inch diameter form) can easily be home brewed. Besides providing DC grounding, the coil improves the SWR bandwidth a bit on 40 and 80 meters.

tenna on 7 MHz will be only 2 to 3 dB down (depending on soil conditions) from that of a system having 120 radials!

A salt-water beach installation with a long ground rod might be the only circumstance under which the antenna would operate efficiently without a radial system.

Assembly

Assembly is quite straightforward using only simple hand tools and a measuring tape. The manual for the antenna contains ample illustrations, and it is just a question of following the steps described in order. The assembly of the capacitors is simple enough, but a bit boring. I laid out all of the parts in a large garage space area and proceeded from there. Then the antenna was moved outside for tuning and final installation.

I found it took as much time to tune the antenna as to assemble it. The manual describes the tuning procedure quite fully and presents eight graphs that detail di-

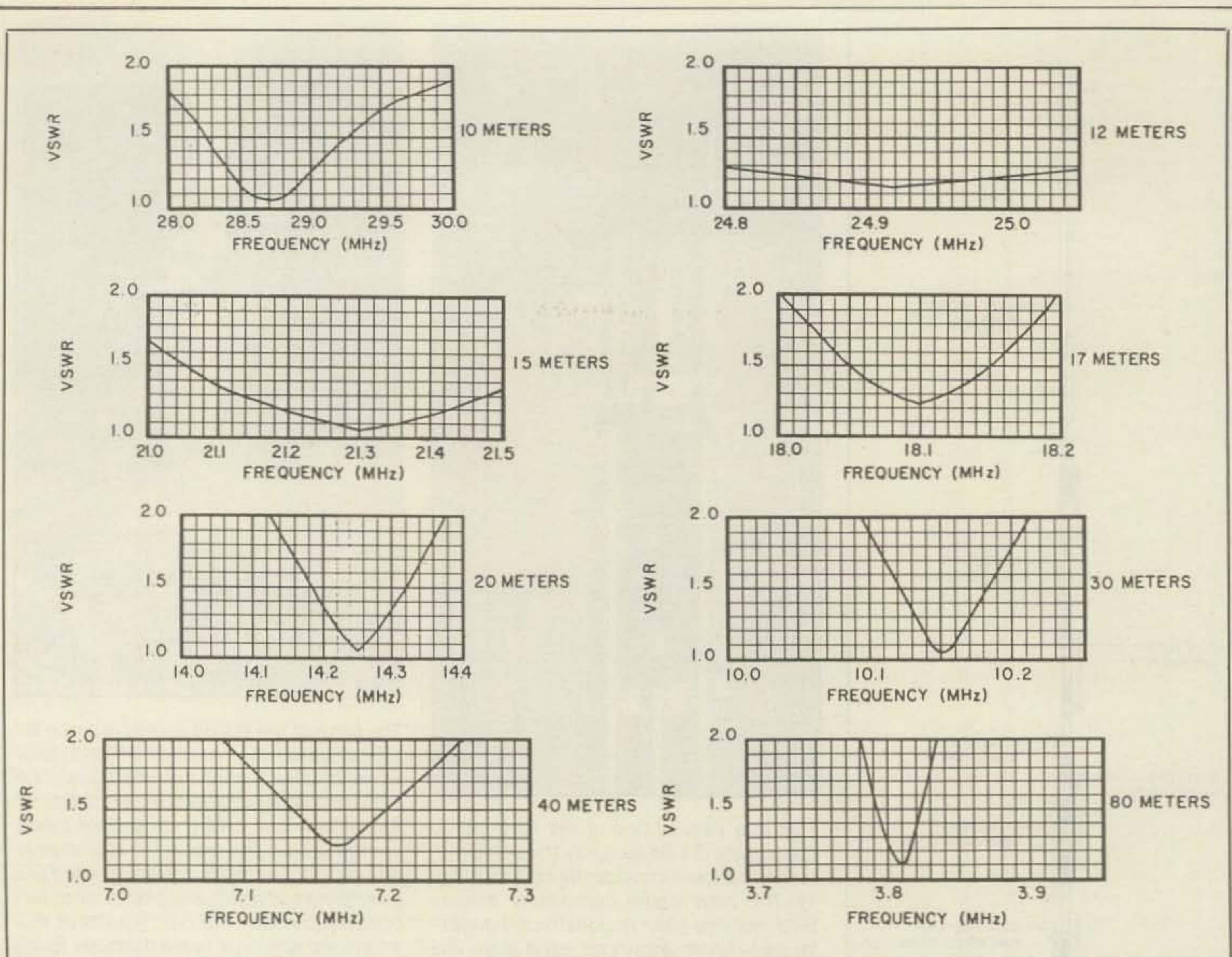


Fig. 2—Typical SWR curves. Tuning adjustments can be made on each band to change the resonant points as desired.

mensions for the trap tuning for each band. The SWR bandwidths that I obtained using a ground-mounted installation with a GRK-88 radial kit (fig. 3) paralleled very closely those shown in fig. 2. However, the SWR minimums within three bands were slightly off from where I wanted to place them. Therefore, the antenna had to go up and down several times until the adjustments were completed. Having dimensions "off" by 1/2 inch or less on some bands can easily shift the SWR minimum point by 100–200 kHz. If the antenna is mounted in an elevated position and a resonant radial system used, in many cases you can also fine tune the antenna by slightly varying the lengths of the radials for each band. This may be far easier than working on the antenna itself.

The 80/40 meter adjustments do interact and would require both back and forth adjustment of the 80/40 meter capacitors plus adjustment of dimension "l" (fig. 1) if you really want to get things set up to perfection. I didn't worry about it too much, since I expected to use moderate power

and an antenna tuner, if necessary, on 80 meters. I just used the manual dimensions to have the 40 meter SWR low center around 7.15 MHz. The resultant SWR bandwidth on 40 meters perfectly satisfied my operating needs. On 80 meters the SWR low point appeared slightly below 3.8 MHz, but it didn't matter too much since I had expected to use an antenna tuner anyway to have complete operating flexibility on the 80 meter band. The antenna did, by the way, load up quite easily on 160 meters using an MFJ-989C tuner. I assume the overall antenna efficiency to be quite low on 160 meters, but it certainly has to be much better than even physically smaller 160 meter antenna forms.

How far you want to go in getting resonant points within each band precisely where you want them is a bit of a moot question. If the antenna is to be used with a transceiver having a built-in automatic tuner and running "barefoot," it hardly matters if the resonant points are off a bit, especially on 40 meters and below. If you are going to run 1500 watts PEP into the antenna on 80 meters *without* using a tun-

er, getting the resonant point correct can become critical if you are not going to damage the trap circuits.

Results

As an eight-band vertical antenna, the DX-88 can provide excellent service. I ran 500 watts PEP into the antenna on all bands without any problems. I received good reports whether working DX on the higher frequency bands or working short skip on the lower frequency bands. At times, especially on DX contacts, I even got better reports with the vertical than when I used a 160 foot long dipole with tuned feeders that I have at about 55 feet between some pine trees. It would be too much to expect such performance consistently from the DX-88. However, the DX-88 will undoubtedly be around long after the next storm takes away the wire antenna as those pines start to sway.

Summary

The DX-88 is a good choice for those am-

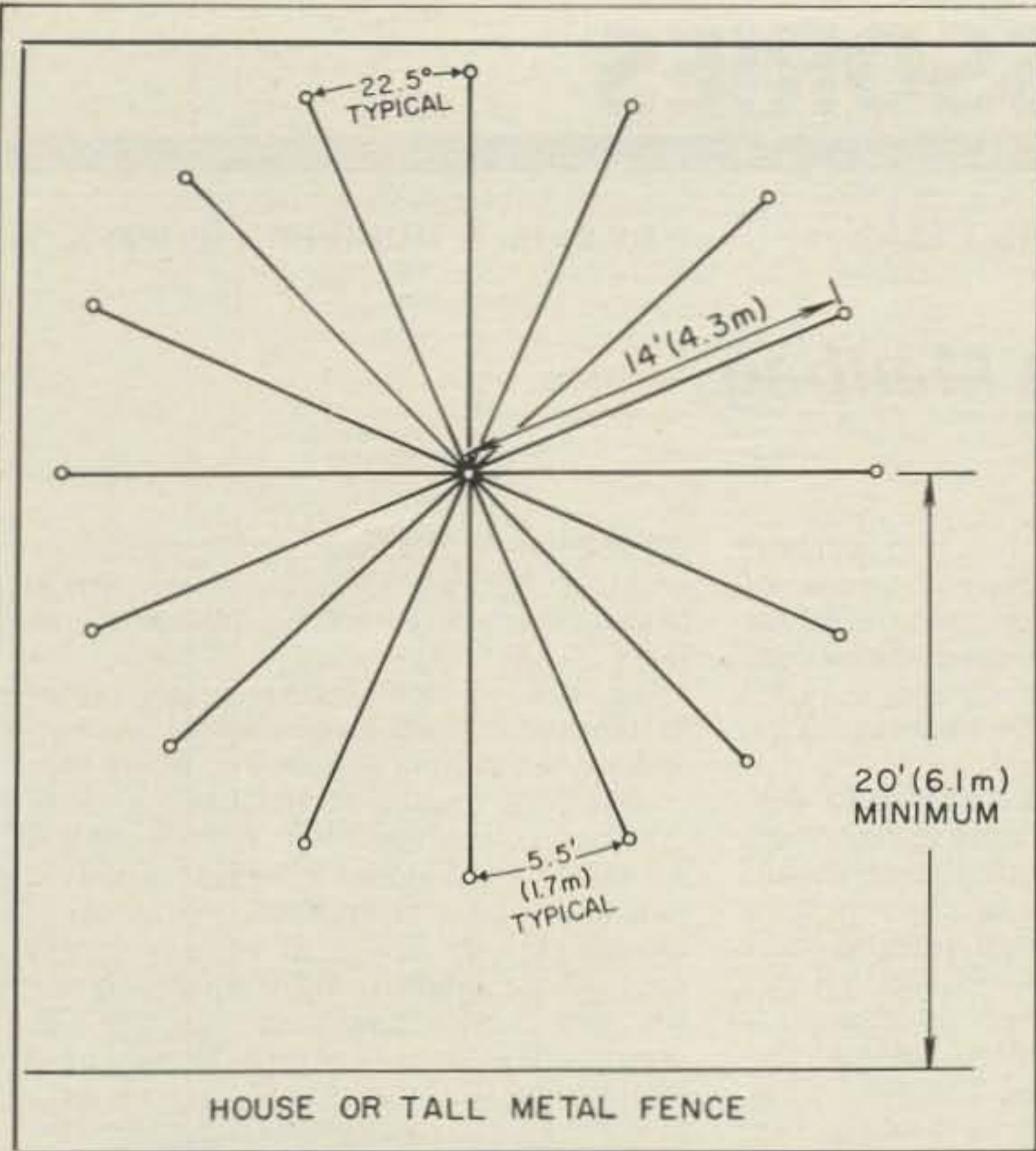


Fig. 3- Radial configuration for ground-mounted installations.

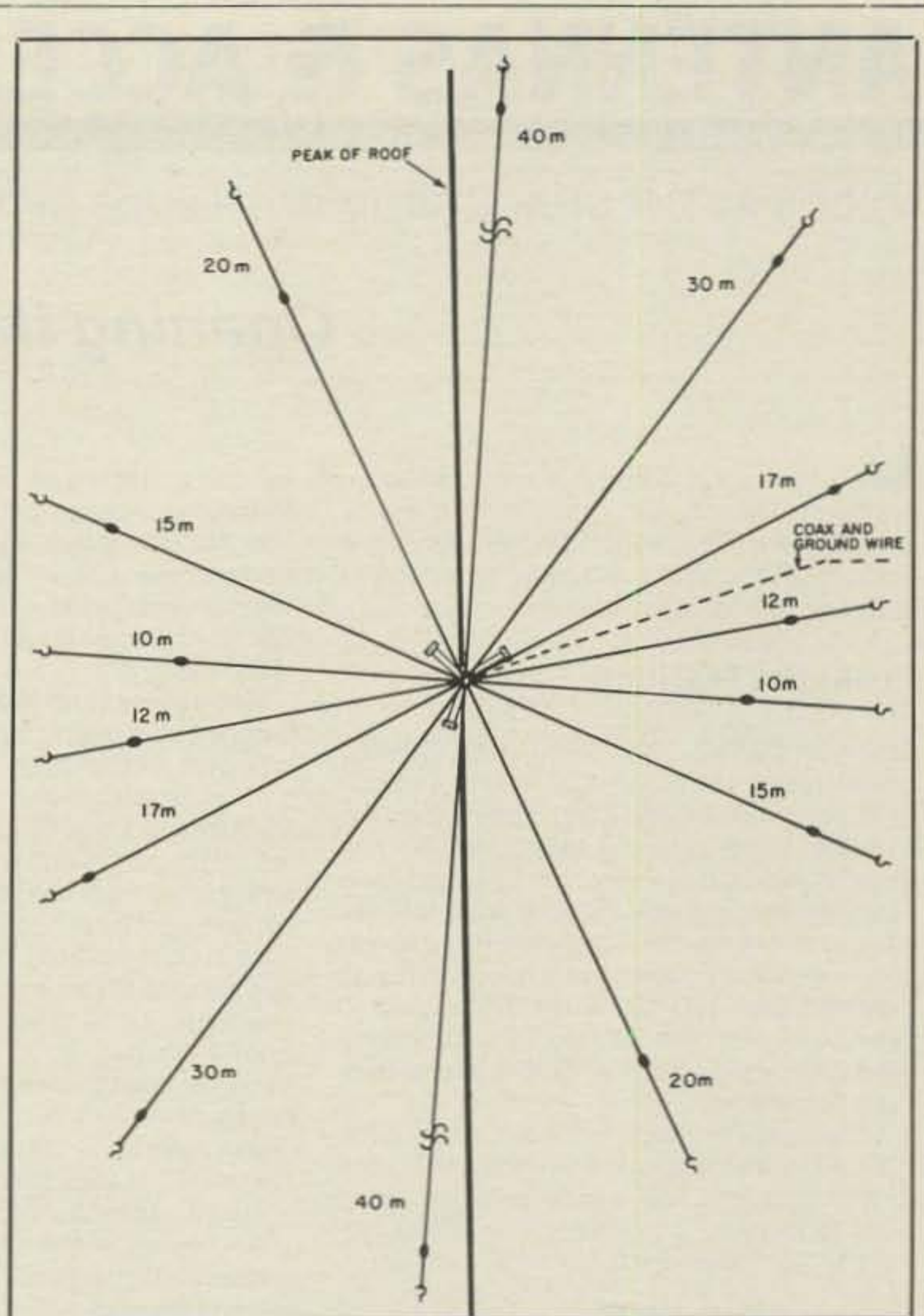


Fig. 4- Resonant radial configuration for elevated mounting such as on a house roof.

ateurs who want eight-band coverage in a single antenna that is reasonably small and that can generate some good low-angle radiation. At about 25 feet high, the antenna is not overly conspicuous. I'm not sure if it would help or hurt, but those amateurs who have problems with antenna "visibility" might consider placing some small flags on a ground-mounted DX-88. It might add some rationale to the existence of the capacitor "sidearms,"

Seriously, two other roles that the DX-88 could well fill are those of a semi-hardened ground-mounted antenna and an all-band portable antenna. The survivability of the DX-88 should be excellent if it is mounted on a concrete pad or metal plate with long ground rods. It might therefore well complement more elaborate antenna installations for emergency communications.

For portable applications most of the antenna can be preassembled and pretuned if it is to be used with a known radial system. Those who like to explore DX locations might find this of interest. I didn't attempt to time field assembly of the antenna, but I would estimate that depending upon how many of the traps are preassembled, you could get the assembly time down to less than half an hour.

The DX-88 manual alludes to modifica-

tion of the antenna being possible for 160 meter operation, but provides no details. There would appear to be no reason why the antenna could not be further inductively loaded to get it to operate, sans tuner, on 160 meters with perhaps a 10-15 kHz SWR bandswitch. But manual, or remote switching with a relay, of a 160 meter loading coil would be indicated.

The Hy-Gain DX-88 vertical antenna has an amateur net price of \$299. The

ground-mounted radial kit, the GRK-88, is priced at \$42. Two other options will be available at the end of the summer (presumably by the time you read this); both prices are to be announced. The first is the RRK-88, the roof-mounted radial kit, and the second is a 160 meter add-on trap, model number 191-S. The antenna is manufactured by Telex/Hy-Gain, 9600 Aldrich Ave. South, Minneapolis, MN 55420.



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CIRCLE 83 ON READER SERVICE CARD

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Opening the Mailbag

Last time we got together we focused on books, magazines, and catalogs for the well-read amateur. This month we open with some reader mail and save room for software topics before wrapping up the column.

From the Mailbag

Zepp or G5RV? John Morehead, N9HRS, wrote to see if we could help him decide whether to install a multiband Zepp, resonant on the 75 meter band, or a 102 foot G5RV. He has room for either antenna, which he would hang as an inverted Vee with the apex at 40 feet. He plans to use homebrew ladderline into a homebrew tuner. John's objective is good multiband capability from 160-10 meters. The answer to this one is easy: the full-size 75 meter multiband Zepp is the design choice, in my opinion. Let's see why.

Looking at the popular standard-size G5RV, with its 102 foot flattop, it's an excellent choice for a multibander. This is especially true if your claim to Mother Earth limits the length of flat-top you can have. Despite the favorable publicity that many columnists have given the G5RV (and I use one myself, mostly on 75 and 40 meters), there is nothing magical about the antenna. The G5RV is really just a special case of the multiband Zepp, the length of its 102 foot flattop chosen by its designer, Louis Varney, to be $\frac{1}{2}$ wavelengths on 20 meters. This makes it work in the same manner as a 40 meter dipole works on 15 meters, where it is $\frac{1}{2}$ wavelengths long, to present a low feedpoint impedance on both bands. On the other bands the G5RV is a multiband Zepp.

Thus, considerations of antenna pattern aside, if you can put up a 75 meter dipole and don't have any special preference for 20 meter work over the other bands, you're probably wiser in going with the 75 meter dipole for all-band (160-10 meter) work. Surely, the latter will work better on 160 than would the standard-size G5RV, where you'd likely end up tying the ends together and feeding it as a Marconi.

A well-elevated dipole of 125-135 feet, fed in the center with openwire line or ladderline, is one of the best-performing and simplest to install and use multiband antennas you could want. Line losses are characteristically low, so feedpoint impedance and SWR from band to band don't mean much. Since the antenna is mounted high and in the clear, and the transmatch can handle its impedance, it's a hard antenna to beat.

If you do go with the G5RV, you'll probably have less trouble tuning it up if you use openwire line or ladderline all the way to the shack. Do this instead of using the alternate

version that has a 34 foot matching section of ladderline coupling to the coaxial transmission line. Also, amateurs who use a balun at the ladderline/coax junction sometimes report problems with the balun, especially when using ferrite types. So use the parallel feeder all the way if you can.

Rebuilding from Hugo. Jim Miller, KF4HK, dropped us a chatty note to tell us that he enjoys both the antenna and computer-related portions of our column. He says he can use all the antenna ideas he can get, since he spent the better part of last winter rebuilding his antenna farm from the 91 mph winds of Hurricane Hugo. The winds hit his part of North Carolina almost as hard as they did coastal areas. Jim notes that these winds were totally out of character (since Charlotte is about 200 miles from the coast, 40 to 60 mph is the normal maximum wind speed that the area experiences).

Jim says he is thankful that his towers (80 feet of Rohn 25G and 85 feet of Rohn 45G) stayed up, though around a dozen or more amateur towers in the Charlotte area were destroyed. Commercial radio and TV stations weren't spared, either. Two of clear channel AM station WBT's (50 KW, 1110 kHz) towers, each 460 feet high, were destroyed. Jim tells me that his pride and joy is his phased conical vertical array for 160 meters. But he's still trying to improve on his old receiving loop made of RG-59 coax to pull the weak ones out of the low-band noise.

While Alabama didn't get any severe weather from Hugo, our area of central Alabama, along with much of the southeast, did get its taste of bad weather on the memorable (nightmarish) night of February 9-10. Your columnist wasn't spared, with very high wind gusts toppling four large pine trees in our yard and crushing three fences and taking out one of our dipoles. The good news was that our house was spared any damage. The bad news was that W8FX mobile (a 1982 Honda) went permanently QRT when one of the larger pines fell across the driveway, crushing the vehicle beyond repair.

Something to keep in mind when stringing horizontal antennas from trees is to allow enough slack for the trees to bend and sway in high winds. Also, some trees, such as the southern or loblolly pines that dot our neighborhood, have very shallow, poorly developed root systems, with the trees appearing to be top-heavy. Thus, you're likely to find a pine tree toppling over in high winds, while hardwoods growing next to it may just sway gently in the wind. Believe me, I know!

Antennas and Commodore Software. A reader in Rochester, Michigan must enjoy both the antennas and software aspects of the column, as he had a question about both.

He asks the familiar question of whether an antenna tuner is needed with a conventional

dipole antenna, and if attic dipoles can be satisfactory antennas. Both questions are typical of those we receive from new SWLs and amateurs.

As a rule, you don't need an antenna tuner or transmatch if your transceiver (or receiver) is designed to work directly into 50-75 ohm coaxial cable (most are), and if your antenna presents a close match to that. Thus, dipoles carefully cut and pruned to frequency and fed directly with coax rarely benefit from the use of an antenna tuner. The tuner, while potentially attenuating harmonics, is just something else you have to monkey with. But if you use a dipole far off resonance or on a different band than that for which you cut it, you have a different story, and you may well benefit from the tuner. Just bear in mind that you can't affect the match between the antenna and the feedline with the tuner, just the match between the feedline and the rig in your shack.

As for attic antennas, they can generally be made to work well as receiving antennas, but using them for transmitting can get you into a real mess. They suffer from the losses associated with nearby power lines, telephone wiring, roofing materials, and the like. Also, chances are that your RF in proximity to the power and telephone wiring will make your house or apartment "hot" with RF, possibly leading to RFI or TVI problems. While attic antennas are tempting and can be made with inexpensive materials since they don't have to face the weather, it's best to avoid them if you can.

Your columnist had first-hand experience with attic antenna-induced powerline problems about 20 years ago when stationed on an Air Force base in Alaska, where the quarters were rows of eight townhouses sharing a common attic. Because of outdoor antenna restrictions on the base, but wanting to operate on the HF bands, I installed a full-length 40 meter dipole in that long attic. The dipole worked fairly well, especially when I forced a full KW through it. It worked at least, that is, until one cold Alaskan night when a pajama-clad neighbor knocked on the door, asking if I might be an amateur radio operator. Seems he and his XYL had gone to sleep in their second-floor bedroom, turning off the room lights, only to notice that their ceiling light was dimly pulsing on and off to the rhythm of my 40 meter CQs at 1 KW!

He was frustrated, since he had called the base electricians to check out his wiring. They did this, pronouncing the wiring fine and him slightly eccentric! He only figured out what was going on when he turned on his night-table radio and heard our signal coming out of its speaker, synchronized with his ceiling light. Anyone else like to try pumping a full gallon into an apartment attic? Good luck.

Returning to our reader: His second question is about finding amateur software for the Commodore 64. Well, although we were early

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X-200A Dual-Band: 2m 2-5/8λ elements, 70cm 5-5/8λ elements

●Power rating : 200W ●Weight : 4lbs. ●Length : 88in. ●Wind rating : 112.5MPH. ●Connector : UHF

X-50A Dual-Band: 2m 6/8λ elements, 70cm 3-5/8λ elements

●Power rating : 200W ●Weight : 3lbs. ●Length : 67in. ●Wind rating : 135MPH. ●Connector : UHF

F SERIES

F-22A 2m 2-7/8λ elements

●Power rating : 200W ●Weight : 5lbs. ●Length : 126in. ●Wind rating : 112.5MPH. ●Connector : UHF

F-23A 2m 3-5/8λ elements

●Power rating : 200W ●Weight : 8lbs. ●Length : 178in. ●Wind rating : 90MPH. ●Connector : UHF

F-718A 70cm 18-1/2λ elements

●Power rating : 250W ●Weight : 3.7lbs. ●Length : 178in. ●Wind rating : 90MPH. ●Connector : N

F-1230A 23cm 25-1/2λ elements

●Power rating : 100W ●Weight : 2.5lbs. ●Length : 120in. ●Wind rating : 90MPH. ●Connector : N

U SERIES

U-300A Dual-Band : 70cm 4-5/8λ elements, 23cm 10-5/8λ elements

●Power rating : 100W ●Weight : 2.4lbs. ●Length : 98in. ●Wind rating : 112.5MPH. ●Connector : N

U-5000A Tri-Band : 2m 6/8λ, 70cm 3-5/8λ elements, 23cm 7-5/8λ elements

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Direct connection type Duplexer with UHF connectors for HF, 2m and 70cm bands
●Coaxial cable : None

MX-72H

Duplexer with UHF connectors for HF, 2m and 70cm bands
●Coaxial cable : 5D2VS 35cm

MX-72DN

Direct connection type Duplexer with UHF connectors and N connector for HF, 2m and 70cm bands
●Coaxial cable : None



MX-3000N

Triplexer with N connectors and UHF connector for HF, 2m, 70cm and 23cm bands
●Coaxial cable : 5D2VS 35cm



MX-3000

Triplexer with N connectors and UHF connectors for HF, 2m, 70cm and 23cm bands
●Coaxial cable : 5D2VS 35cm

MX-3000D

Direct connection type Triplexer with N connectors and UHF connectors for HF, 2m, 70cm and 23cm bands
●Coaxial cable : None

MX-3000DN

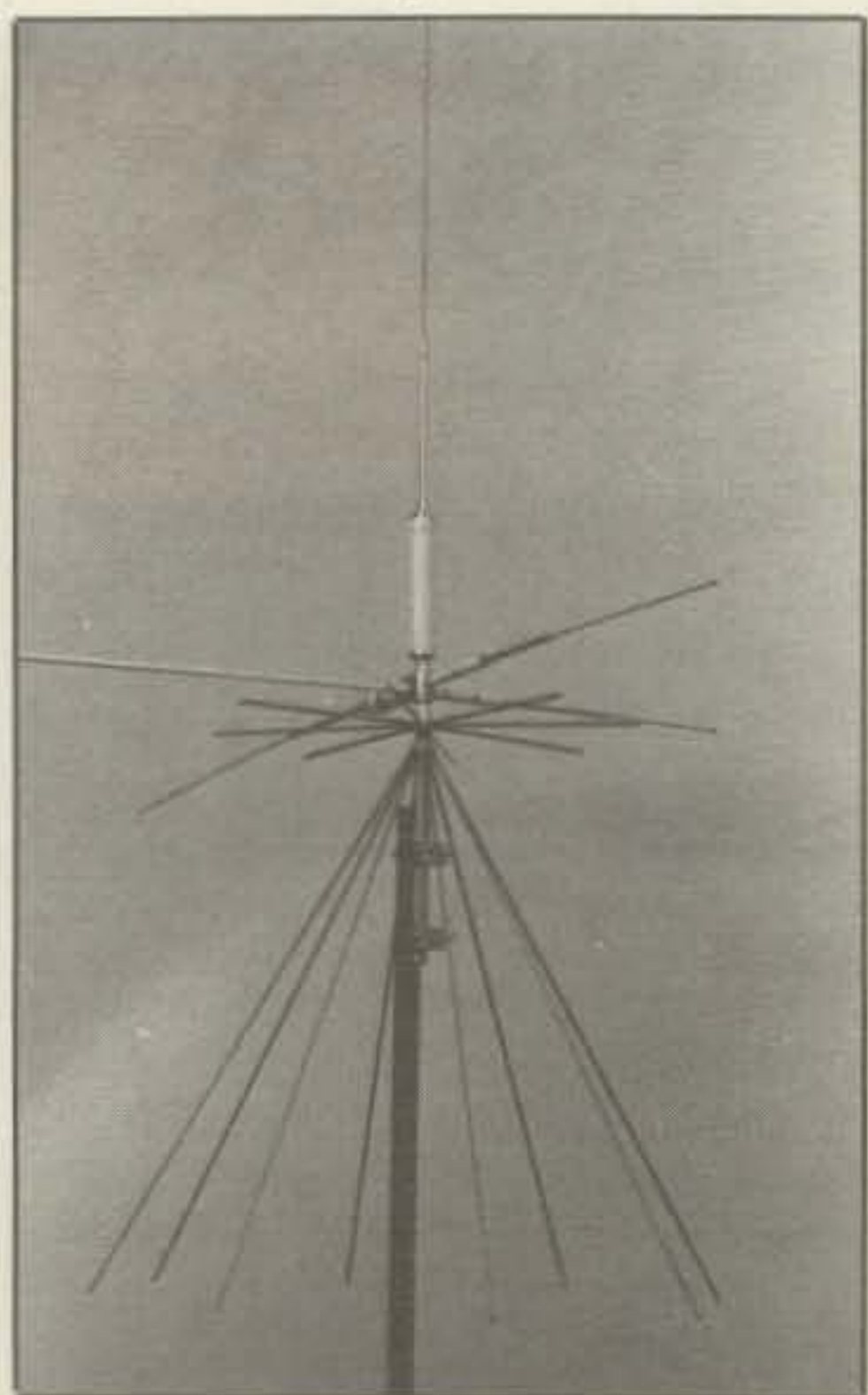
Direct connection type Triplexer with N connectors and UHF connector for HF, 2m, 70cm and 23cm bands
●Coaxial cable : None

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For those who need multiband HF/VHF/UHF fixed station performance, the PROCOMM/Digitrex DC-2515 series Discones provide HF capability (using a vertical whip and resonators) in addition to 25 MHz to 1.5 GHz coverage. The DC-2515 Plus Supercone is shown here; it can accommodate up to five resonators to cover the popular HF bands. The antenna would be a good bet for dual-band 2 meter/70 cm use. (Photo courtesy PROCOMM/Digitrex)

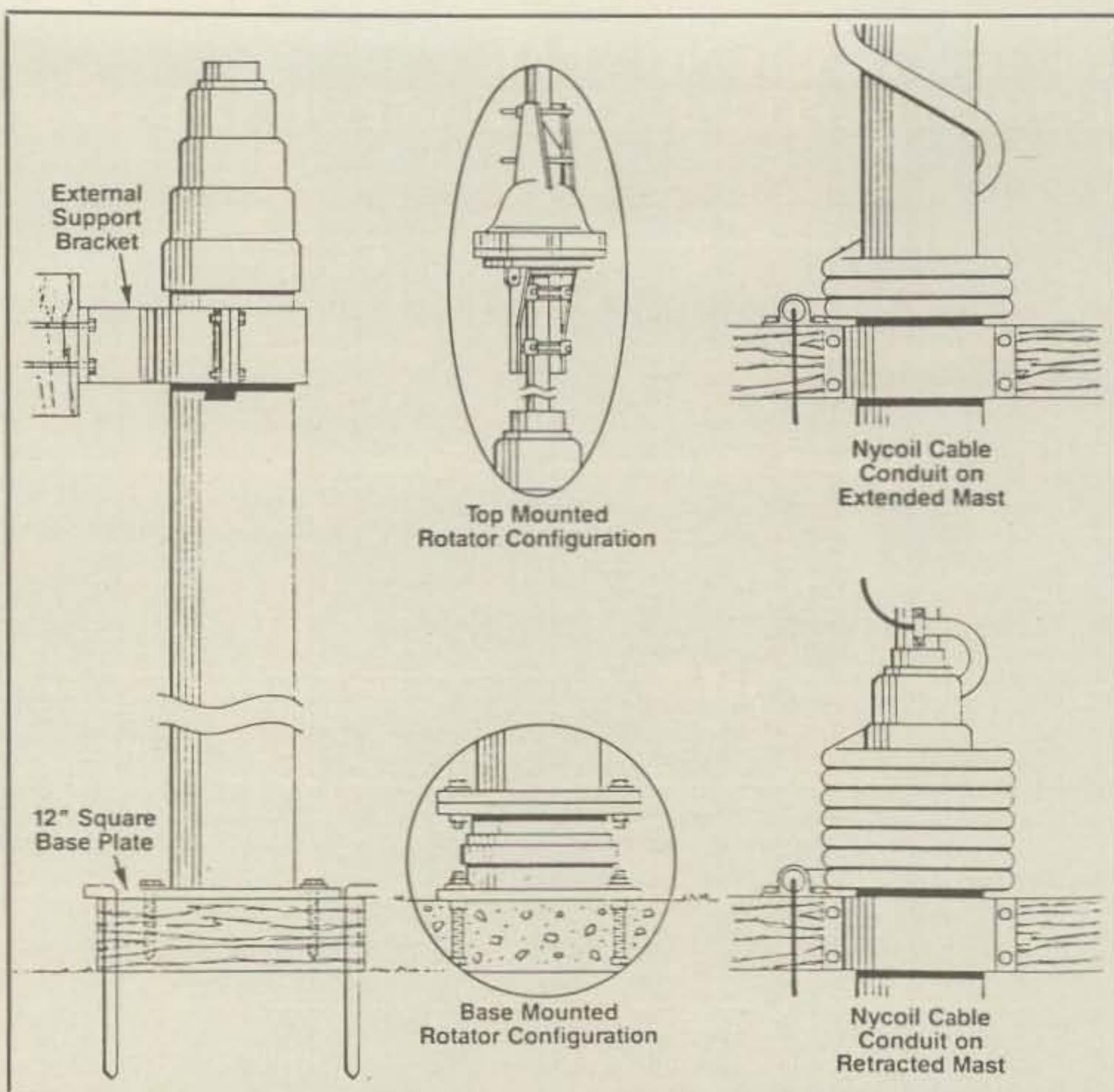


Fig. 1—Shown here are various mounting configurations for the Will-Burt TMD telescoping pneumatic masts described in this month's column. The antennas may be extended to as high as 50 feet. (Sketch courtesy the manufacturer)

supporters of the trusty 64 in this column, the market for Commodore 64 software, except for games, has just about disappeared as the IBM PC and its many clones take the 64's place. There used to be dozens of software publishers issuing amateur radio programs for the 64; that number appears to have dwindled to a handful who regularly advertise in the major amateur magazines. You can still find a few hamshack and SWL programs advertised for sale in those small-print classified ads in the back of *CQ*, *QST*, and *73*.

There still are many useful (though aging) public-domain (PD) amateur radio software programs available for the C-64, but the trick lies in finding them. The best bet is to scour the catalogs of firms offering C-64 PD software for collections of amateur radio software. The classifieds in the Commodore magazines are a good place to start. Your local Commodore user's group also may have access to some of these collections.

Dual-Band Mobile Antenna? Ted Stone, N6RNQ, wrote asking about constructing a dual-band 2 meter/70 cm mobile antenna for his new mobile transceiver.

While I haven't noted any recent dual-band mobile antenna construction articles to meet Ted's needs, constructing one shouldn't be difficult. For the simplest approach, all you need to do is use a common base mount and use interchangeable $\frac{1}{4}$ -wave or $\frac{3}{8}$ -wave (or whatever suits you) whips, assuming you don't mind swapping out the whips when changing bands.

Sometimes it is easier and cheaper to use a commercial alternative. George Shira, WD4BUM, offers an inexpensive commercial solution to multiband mobile operation. He sells a dual bander cut for 2 meters and 70 cm and also one for 2 meters and 220 MHz, at \$19 apiece. George's dual-band mag-mounts have individual elements resonant on each band to provide automatic bandswitching with no inductive losses.

For fixed station use, consider a Discone for broadband use. George Shira also recently began offering an inexpensive Discone scanner antenna that will transmit on 2 meters and 70 cm. Contact George at the Lakeview Co., Inc., Route 7, Box 258, Anderson, SC 29624.

Also, PROCOMM/Digitrex, 1948 Coventry, Thousand Oaks, CA 91362, offers two Discones to cover HF and frequencies as high as 1.5 GHz; we described these antennas in a recent column.

Another source of dual-band VHF/UHF mobile antennas is Comtelco Industries, P.O. Box 681429, Schaumburg, IL 60168. Comtelco offers a \$12.95 dual-band 140–150 MHz/435–450 MHz auto-roof-mount antenna designed to fit a standard Motorola mount. They also sell a dual-band mag-mount antenna for 140–150 MHz and 435–450 MHz for \$24.95. Both antennas have a single whip element.

More on Building and Zoning Codes. David H. Lawry, WB1FLI, wrote to *CQ* about a problem that just won't go away. The problem is that of dealing with local authorities on antennas. David stopped in to see his local build-

ing inspector to check on local regulations on "structures." The inspector reminded him that he has to look upon an antenna as a *structure*, which has a height limitation of 35 feet in his Massachusetts community.

Unfortunately, David has a tower in mind that would exceed this limit. From his conversation with the inspector, he isn't exactly *opposed* to the tower, but wanted to proceed cautiously, finding out what other communities are doing. What does *CQ* suggest?

The problem of community regulation of antennas and towers is a large and growing one, paralleling the related problems of deed restrictions and apartment/condo regulations. We have covered such problems with shared reader experiences several times. While most authorities subscribe to the public-service benefits of amateur radio, communities are increasingly limiting structures such as antennas to 30 or 35 feet. Some jurisdictions even prohibit radio transmitting antennas entirely, simply from considerations of aesthetics. (Oddly, the same jurisdictions usually allow outdoor antennas for TV reception.)

The problem became so widespread and severe that in 1985 the FCC released a ruling, PRB-1, now included in Part 97.15(E) of the regulations. It specifies that federal law takes precedence over local laws, so that too restrictive ordinances are "against the public good." According to PRB-1, allowances should be made to accommodate amateur radio communications. Although PRB-1 doesn't provide a convenient height guideline, performance

considerations and previous cases suggest the minimum to be around 65 feet. Still, local officials might think that a 35 foot structure, as in David's case, is all an amateur should ever need or want.

A short but informative article summing up ways to override restrictive antenna ordinances appeared in an article in the February 1990 issue of 73, "Enforcing PRB-1," by Gene B. Williams, KA7FQW. If you're embroiled in the "no antenna, no tower" dilemma, you might want to read it. As Gene points out, your "first line of defense" is the FCC's own PRB-1. You can obtain it from the FCC, Washington, DC 20554, or you can read it in November 1985 *QST*. The ARRL also has a comprehensive PRB-1 kit you can obtain by sending a 9 x 12 SASE with \$2.05 in postage affixed to the ARRL, Regulatory Information Branch, 225 Main St., Newington, CT 06111.

Also, a "don't miss" article by ham-attorney Wyland Dale Clift, NA1L, "Towers and the Law," appears in *CQ's* own 1990 *Antenna Buyer's Guide*. His article is one of the more comprehensive how-to-do-it treatments of PRB-1. It's about dealing with local governments and building inspectors, and obtaining the necessary building permit for your tower. Author NA1L includes a very handy glossary of the specialized "legalese" that you'll have to contend with when you seek the necessary approvals for your tower. He also addresses the special problems of condominium owners and those who live in developments having deed restrictions. (The *Guide* is \$4.95 and is available from *CQ*. You'll find it chock full of ideas to squeeze the last dB out of your investment in antennas.)

G.A.M. Electronics Update. Edward H. Russell wrote to tell us that he has become a regular reader of the column since purchasing G.A.M. Electronics last year. According to Edward, Andy Nuttle founded the firm in 1958 for the sole purpose of manufacturing high-quality, handcrafted antennas.

The firm offers both mobile and base antennas in a variety of frequency ranges for use with various mounting devices and adapters. The newest of these adapters is their "Motorola"-type adapter, which replaces existing caps on Motorola-type installations with a cap and socket arrangement that accepts a 5/8-24 base with an SO-239D connector. Some mobile antennas G.A.M. offers are the mini-series for 2 and 1 1/4 meters and commercial ranges that sport a hermetically-sealed matching transformer, and the TG base station antennas for 2 meters and other frequency ranges. (A flyer is available from G.A.M. Electronics, 191 Varney St., Manchester, NH 03102.)

Aluma Towers Update. T. E. Gottry of the Aluma Tower Co. sent us a letter recently outlining the tower products Aluma offers.

Aluma is well known for its line of all-aluminum towers and tower accessories for amateur and commercial use. The line includes special models for vans and mobile homes. The company's mainstays are its line of crank-up towers to 100 feet and its tilt-over, tripod roof, and folding towers. They also offer "mini," standard, and heavy-duty mobile van units and roof racks, trailer towers for mobile use, and other specialty tower items. These include hinged bases, foundations, building mounting brackets, crank devices, stainless aircraft cable, ground anchors, mounting poles, and other hardware.

A catalog (trimmed and bordered in alumi-

nized ink, I note!) is available from the Aluma Tower Company, Inc., 1639 Old Dixie Highway, P.O. Box 2806, Vero Beach, FL 32961-2806.

Will-Burt Telescoping Masts. Donald S. Barlow, Mast Product Manager of The Will-Burt Company, sent me a letter and information on their TMD line of pneumatic telescoping antenna masts. This type of mast is widely used in applications such as supporting antennas for live news broadcasts, military communications, temporary cellular telephone station installations, and even floodlights for emergency vehicles.

The TMD pneumatic masts are operated with an air compressor. The antenna mast is normally retracted when not in use so that antennas can be sheltered from high winds, provide a low profile for neighborhood aesthetical considerations, or even conceal the antenna from view. When the antenna is to be used, the telescoping mast is raised, remotely if desired, by compressed air. The mast has keyed tube sections for maintaining azimuth integrity, so it is possible to mount a rotator at ground level to rotate the entire mast.

The masts are available in heights to 50 feet. They are portable for mobile use and are free-standing without guy wires. However, they do require bi-level support for the base section using a bracket attached to the structure and a base mount.

I should point out that pneumatic telescoping masts aren't cheap; the masts themselves cost between \$2600 and \$3000, depending on height and options. The pneumatic system offered by the company, built around a 1/2 horsepower 115 VAC compressor, is priced at \$720.

Spec sheet no. 601 describes the masts and is available from The Will-Burt Company, P.O. Box 900, Orrville, OH 44667-0900.

Fig. 1 shows some typical mast mounting configurations.

Software News and Views

ELNEC. Roy Lewallen, W7EL, sent *CQ* a pre-release version of his new antenna modeling and analysis program, ELNEC. He considers it to be a breakthrough in making antenna analysis an easy proposition, and offers it at a price (\$49 postpaid) that won't do too much damage to most amateurs' wallets. Roy wrote the first version about two years ago for his own use but only recently decided to market the program.

The program is based on MININEC, as are most of its competitors. But it eliminates the most tedious and error-prone procedure common to these programs—the necessity of counting "pulses" to figure out where sources and loads are placed. As Roy notes, when antenna wires are changed, sources and loads move, either to different places on the wires, to different wires, or even off the antenna. With the program you enter the source and load position and the program keeps it there, even if you add, delete, or modify wires, sources, or loads (which you can do with a few keystrokes in a spreadsheet-like environment.)

ELNEC is easy to use. It is completely menu-driven, and many shortcuts are built into the program. For example, if you want to model an inverted Vee that is guyed to the corners of your lot, most other programs require you to figure out and enter the x,y,z coordinates of the wire ends. ELNEC simplifies this by letting

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CIRCLE 18 ON READER SERVICE CARD

ELNEC ver. PR1
(c) 1990 by Roy Lewallen, W7EL

```

B  TITLE:                Back yard dipole
D  FREQUENCY:            14 MHz.

E  WIRES:                * 1 Wire      U  UNITS: Feet
F  SOURCES:              * 1 Source
G  LOADS:                * 0 Loads      * : Select for more detail.
H  GND TYPE:             Real
I  REAL GND DESCRIPTION: * 1 Medium, 0 Radials

J  PLOT TYPE:            Elevation      V  ANAL RES: 1 deg.
K  AZIMUTH ANGLE:        0 Deg.
L  PLOT/TABLE RANGE:     0 - 180 Deg. (full)
M  STEP SIZE:            5 Deg.
N  OUTER RING OF PLOT:   Automatic scaling
Q  FIELD(S) TO PLOT:     Total field only

(letter) = Item to change  (A)nalyze  (R)ecall  (S)ave  <RET> = Plot
(C)urrents  s(O)urce data  (P)rint description  (T)able
e(X)it program without saving descrip.  <ESC> to Quit

```

Fig. 2— Here is the main menu for ELNEC, a new antenna modeling and analysis program designed to simplify sophisticated antenna analysis, and offered by Roy Lewallen, W7EL.

you enter the x,y coordinates of the lot corners and telling the program the wire length. The program does the rest of the calculations.

ELNEC can be used to model and analyze almost any kind of antenna. It will tell you gain, pattern, current distribution, and SWR; plot azimuth and elevation patterns (vertical, horizontal, and total field); find and report the beamwidth, angles of the 3 dB pattern points, front/back ratio, and major sidelobe ratio; and compute the sidelobe angle. You can display all this information on your monitor screen or print it out, including patterns, on a dot matrix printer. You can save and later recall antenna descriptions.

The program comes in two different ver-

sions. The standard version is for use with PCs that have a math coprocessor, while the "N" version is for those PCs without a coprocessor. The program requires an IBM PC compatible with at least 360K of RAM and at least one 5¼ disk drive. You should have a CGA, EGA, or Hercules adapter. If you don't, all program features and functions are available except plotting, which the program would present in tabular instead of graphic format. Text will print on any printer, but plots require an Epson-compatible 8/9 pin or 24-pin printer. (Incidentally, Roy says he is willing to write printer drivers for other printers for \$10 extra if you send the necessary information from your printer manual.)

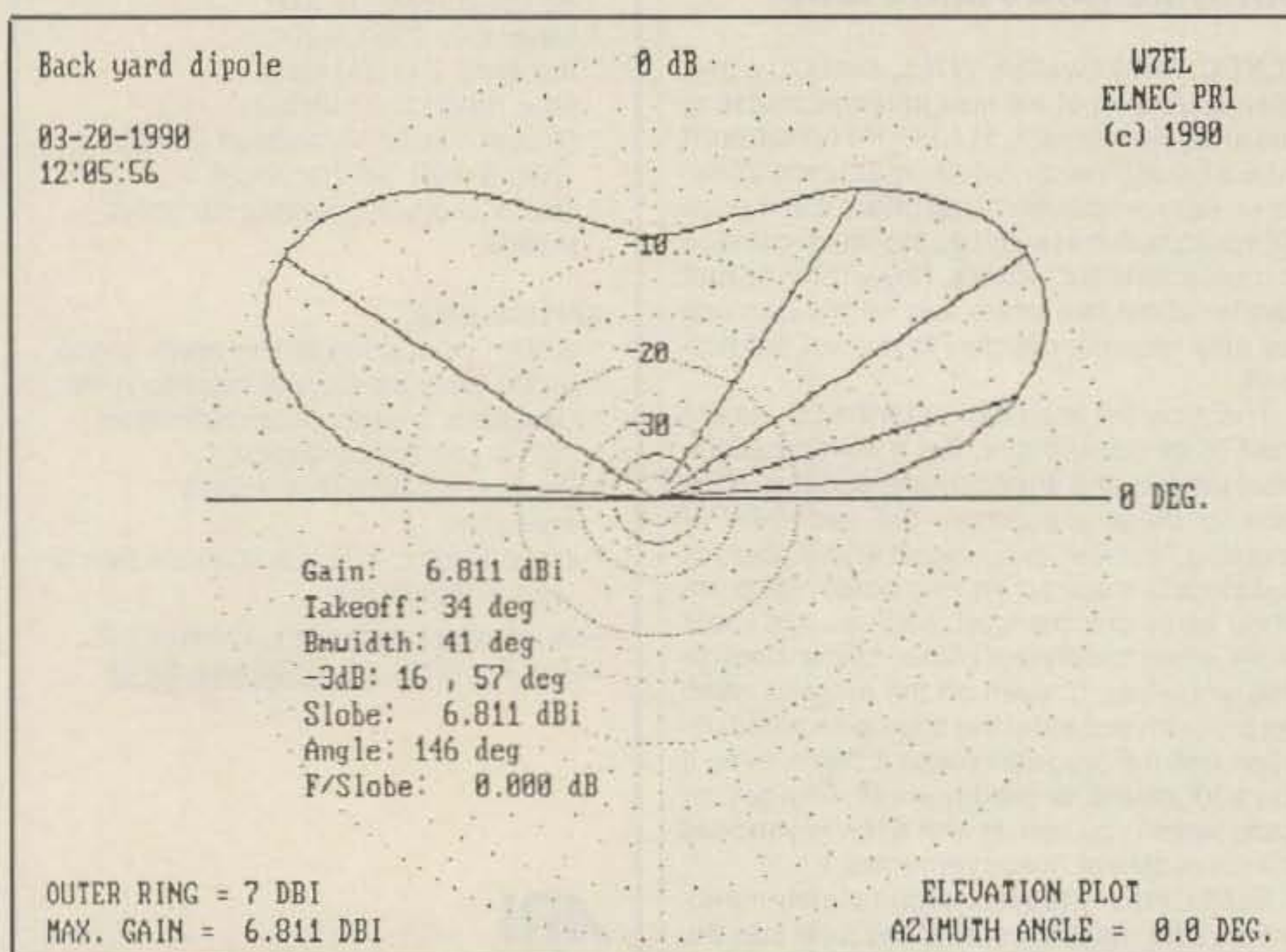


Fig. 3— Typical ELNEC graphic output. ELNEC allows azimuth and elevation plotting on Epson-compatible 8/9 or 24-pin dot matrix printers, if the computer has a graphics card installed. On non-graphics systems all features except plotting are available, and pattern data are presented in tabular form. Here's a sample elevation plot of a typical backyard dipole produced by ELNEC.

I tinkered with ELNEC and found it to be all that its author claims it to be. I did have some problem with the setup program running on my PC (a 386SX), but I ran the setup on another (80286-based) PC without any problem. Roy apparently keeps the price down by having you print out the roughly 25 pages of documentation yourself; this may be an annoyance to some readers. Otherwise, the program—even in the pre-release version I worked with—breaks new ground in making antenna analysis one step closer to practicality for many amateurs.

For more information on ELNEC, contact Roy Lewallen, W7EL, 5470 SW 152nd Ave., Beaverton, OR 97007.

Fig. 2 shows the ELNEC main menu, while fig. 3 depicts a typical ELNEC graphic output.

Postscript: Just after we finalized this column, Roy sent ELNEC production version 1.12 to CQ. It reflects many improvements made both on Roy's initiative and in response to customer suggestions. The program arrived too late to completely redo our review and include new illustrations, but in fairness we should point out some of the enhancements. The most noticeable changes are the improved quality of the printed plot and support for HF LaserJet printers. Also, the program documentation is now up to about 30 pages. Finally, the new setup program now works fine on my 386SX computer.

Color SSTV for the Atari ST. John Langner, WB2OSZ, 115 Steadman St., Chelmsford, MA 01824, wrote us that low-cost SSTV is now available for the Atari ST computer. According to John, SSTV can be very expensive but it doesn't have to be so. With an inexpensive interface and demo version of his color SSTV software, you can send and receive color SSTV for about \$10. The demo version can send and receive pictures, load pictures from files, print, manipulate images, and generate test patterns. The demo has a few limitations to encourage users to purchase the most recent full version, but it is quite usable.

Some features include the capability to send and receive the most popular formats (Robot, Wraase SC-1, and AVT); a screen containing two images with 128 x 120 pixels of 256 colors with a menu of available commands; built-in test-pattern generation; image manipulation (mirror, rotate, zoom, and shrink); loading and saving images in various file formats; the ability to hold ten images in memory; and the printing of images with 17 gray levels on a dot matrix printer. The software is intended to be used with an interface that costs about \$7 to build, connected to the modem and printer ports. A high-performance interface is also available that is connected to the MIDI port.

John wrote up his SSTV package in the December 1989 and January 1990 issues of 73. An article reprint is available for \$3 from 73 Magazine, WGE Center, Forest Road, Hancock, NH 03449, Attn. Article Reprints. A free demo version of the software also is available from various user groups. According to information John sent us, you can obtain a copy of the demo by sending a formatted disk and \$2 to the Atari Microcomputer Network, John Adams, KC5FW, 17106 Happy Hollow, San Antonio, TX 78232. If you're overseas, you can obtain a copy by sending two disks and three IRCs to ASTUR (Atari ST Users on Radio), GEERAERT Michel, W. Elsschotlann 21, B-8460 Koksijde, Belgium. The ASTUR group will return one of the disks you sent to you.



The Hot Wire file transfer utility allows hassle-free transfer of files between any two IBM PC compatibles, including the new "notebook-size" PCs. The program is offered by the same company that developed the best-selling communications software, ProComm and ProComm Plus. (Photo courtesy Datastorm Technologies, Inc.)

Hot Wire. Last month we reviewed The Brooklyn Bridge, a highly capable file-transfer and disk-management utility. This program is very useful if you have a second PC or laptop and want to transfer programs and files between them. Seems that these utilities are all the rage these days, and one of the latest is Hot Wire, from the same folks who developed ProComm and ProComm Plus, my favorite communications software.

Hot Wire features the ability to transfer data through direct PC-to-PC connections (using a so-called "null modem" cable) and through modems, a powerful macro (keystroke recording) facility, a menu bar with point-and-shoot directory display of the source and target directories, and the simultaneous logging of multiple disk drives.

You can view files in various formats, perform multiple operations on tagged files, see

immediate statistic updates on the status of all program operations, and select or sort multiple files by name, size, creation date, or DOS attributes. The file manager allows you to reorganize directories and files on both PCs, and you can use the program's "hot keys" to run up to 24 DOS commands or programs.

The program lets you transfer files between any two IBM PC compatibles, laptops or desktop, in either direction, at speeds up to 115,200 baud. If the computers are close by, you can hook them up with a cable, through the serial ports. If not, you can connect them through modems. The ability to link the master and slave computers by modem is a particularly useful feature. Entering the slave computer's phone number in the master's setup screen allows it to automatically dial up and establish the link.

I found Hot Wire to be a very competitive program that offers many features similar to those found in The Brooklyn Bridge, described last month. On the one hand, the latter program has a very sophisticated command-line interface and a bevy of device drivers you can install and customize (if you're familiar with DOS) to allow fancy peripheral sharing. On the other hand, Hot Wire is simpler to install, set up, and use. Also, its automatic link-up feature is outstanding. Still, Hot Wire didn't seem quite as intuitive to use as the company's well-established ProComm communications software, which is my terminal program of choice. Also, one limitation is that you can't run a program from the slave computer.

Bear in mind, too, that most of these file transfer programs, such as The Brooklyn Bridge and Hot Wire, operate in a master/slave relationship with the software running in the foreground. Thus, each computer is tied up while you're using the file transfer program so that you can't do other things with either computer until you finish transferring files.

Hot Wire lists at \$129 and comes with a thick (273-page) user's manual. The package also includes a 7 foot "four-headed" universal null modem cable equipped with twin 9- and

25-pin connectors on each end. The program requires DOS version 2.0 or higher and 192K of memory. For more information contact Datastorm Technologies, Inc., P.O. Box 1471, Columbia, MO 65205.

Budget LANs. If you're really on a shoestring and can afford neither a full-blown Local Area Network (LAN) nor a slick file transfer program such as The Brooklyn Bridge, Hot Wire, LapLink, or FastLynx, you may be a candidate for an inexpensive "software LAN." *PC Magazine* has even coined a name for these budget accommodators, calling them "Zero-Slot LANs." Such LAN alternatives bypass the usual expensive LAN hardware and software assembled in a complex jumble of wires and black boxes.

The so-called Zero-Slot LAN idea means that you don't need expensive adapter cards in your PCs to connect them up permanently; the LAN resides completely in software. This poor-man's LAN operates in the background like "real" LANs, and lets you transfer files back and forth and do simple resource sharing of disk drives, printers, and other peripheral devices. The PCs are connected through a null modem cable.

These alternative LANs trade dollars for performance, since the PC's processor must handle all the network's communications chores. In a word, Zero-Slot LANs are slow, particularly if you have more than two PCs interconnected, though you might not really care that much about throughput if the software lets you easily transfer files and share peripherals with minimum damage to your pocketbook.

In the April 24th *PC Magazine*, the editors reviewed several of these inexpensive (\$100-\$400) LANs, including DeskLink, LANtastic/Z, PrinterLAN, and others. One product the magazine didn't cover was a very inexpensive Zero Slot LAN I'm familiar with that a local Alabama government office uses. It's appropriately called The \$25 Network, designed to interconnect a two- or three-computer setup to "talk to one another" using standard DOS commands.

Once you install the network, you can use (share) most any peripherals hooked up to either machine, including disk drives, RAM drives, printers, and even the computer screens themselves if you so choose. You also can share any program. For example, if you're using a database program, you can look up and modify records on a remote drive, and you can load and run the program from a remote drive if you like.

The network's transfer speed is 115,200 baud using the RS-232 serial ports and a 5-wire null modem cable. You need 14K memory to run the network, which works transparently in the background. Still, you need some knowledge of DOS, especially the CONFIG.SYS file and device drivers, to install the network, which works entirely from the command-line.

For more information, contact Information Modes, P.O. Drawer F, Denton, TX 76202.

Wrapping It Up

That's all this month, gang. Next month more Antennas & Accessories topics of current interest. See you then.

Overheard: If builders built buildings the way programmers write programs, the first woodpecker that came along would destroy the entire civilized world as we know it!

73, Karl, W8FX

YOUR DISK, 1552K Used, 440K Free						YOUR DISK, 1552K Used, 440K Free					
ATTR	NAME	EXT	SIZE	DATE	TIME	NAME	EXT	SIZE	DATE	TIME	ATTR
A	CAPTURE	ASP	17090	05/09/88	08:51	CIS	ASP	5	10/30/89	15:55	A
A	TRANSMIT	ASP	17090	05/09/88	08:51	DOWJONES	ASP	5	10/30/89	15:55	A
A	XOFF	ASP	17090	05/09/88	08:51	FIDO	ASP	5	10/30/89	15:55	A
A	XON	ASP	17090	05/09/88	08:51						
A	PCPLUS	DIR	6150	03/01/89	10:29						
A	FONTS	EXE	17560	02/01/88	15:40						
A	KEYS2	EXE	9224	07/19/88	16:26						
A	PCEDIT	EXE	22434	06/01/89	14:40						
A	PCINSTAL	EXE	34032	06/03/88	09:22						
A	PCKEYMAP	EXE	21426	06/01/89	14:44						
A	PCPLUS	EXE	185392	05/22/89	00:00						
A	PCSETUP	EXE	33182	80/22/88	14:23						
A	PCSTD	EXE	33018	06/13/88	15:11						
A	SETUP	EXE	33018	04/12/86	12:52						
A	TEF	EXE	20544	05/09/88	08:51						
H:\PROCOMM\PCPLUS						H:\PROCOMM\PCPLUS\ASPFILS					
Tags: 68368 bytes in 4 files						15 bytes in 3 files (F3)					
TAG: CURRENT WILDCARD ALL FILES DATES SIZES ATTRIBUTE INVERT UNTAG											

Hot Wire has a split-screen mode that you can set up to simultaneously view the source and target directory contents on the two PCs you use with it. This side-by-side approach lets you instantly confirm the program's activity. (Photo courtesy Datastorm Technologies, Inc.)

One of the best words to use with amateur radio is serendipity. When KC1AG put Walvis Bay on the amateur radio map he also found out about a possible new one. This is the story behind this "new" amateur radio country.

The Penguin Islands of South Africa Perhaps The Next New DX Country

BY BILL SHIPP*, KC1AG

This story had its beginning in a secretive phone call I received not long ago from Bill Shipp, KC1AG. Bill wrote the story on Walvis Bay which appeared in our June issue. First I had to assure Bill that I wouldn't breathe a word of what was going on and what plans were afoot with regard to this expedition. In fact, the exact details wouldn't arrive here until some point in June. I guess whatever I promised Bill worked, for now you can read about what goes into selecting a rare DX location and what goes into creating a new DX country.

In this same month, June, a formal application was sent to the ARRL DXAC requesting country status for South Africa's Penguin Islands. Who knows? Perhaps we'll all be part of the DX pile-ups sooner than we think. —K2EEK

Have you ever wondered how new DX countries are discovered? Most additions and deletions to the official DXCC Countries List result from changes in the governments and boundaries of existing countries. To "discover" these you just have to follow the news. What I'm talking about is finding brand-new DX countries, ones which have been there all along but have been overlooked. There aren't many areas of the world that past generations of DXers have not already scrutinized, but you might be surprised at what you can find.

Dust off your atlas and take a look at the coast of Namibia, between Walvis Bay and the mouth of the Orange River. You're looking for the Penguin Islands, also known as the "Islands of Corpses."

While searching for information on Walvis Bay, I stumbled upon a short paragraph in a history of Africa that mentioned twelve guano islands. The article



The town in the foreground is Luderitz. Shark Island is now connected to the mainland by a causeway. Shark Island was used as a penal colony during the Germans' war with the Herero and Hottentots when this area was German South West Africa. Beyond Shark Island lie Penguin and then Seal Islands. The Namib Desert is seen in the background. This photograph is by Herb Theiss, V51HT, of S.W. Photo, Box 2009, Windhoek, Namibia.

said only that England claimed sovereignty over the islands in the 1860s, and that they had been annexed to the British Cape of Good Hope Colony in 1884. My hunch was that like Walvis Bay, these islands became a part of the Republic of South Africa. The hunt was on. Where are the islands? What are their names? Do they still belong to South Africa? Do they meet the criteria for separate DXCC country status?

I could only find two islands, Hollam's Bird and Possession Islands, on a map of

southern Africa in my best atlas, *The Times' Atlas of the World*.¹ There was no indication as to whom the two islands belonged. These two islands were separated by over 75 miles of Namibian land from both the mainland of the Republic of South Africa and Walvis Bay. In other words, they might qualify as a DX country if indeed they belonged to South Africa.

I discreetly asked Ian Sutherland, ZS9A (then ZS1IS), some weeks later if he knew of any islands to the south of Walvis Bay. Ian knew of several islands; they

*1195 Hill St., Suffield, CT 06078

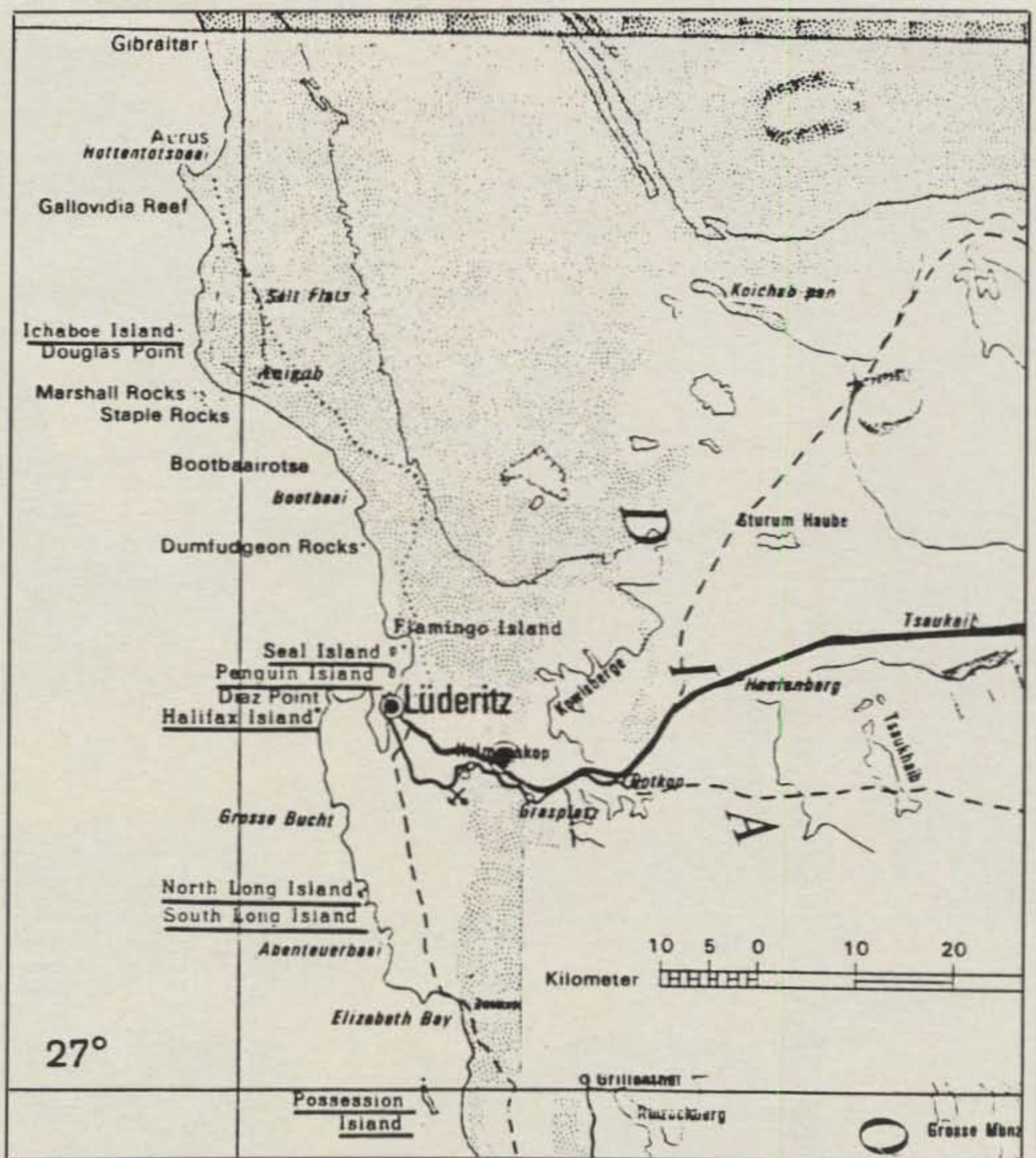
were terrible places, guano islands that one could smell from miles away. Ian was also pretty certain several belonged to South Africa. This was encouraging news! Most DXpeditioners dream of beautiful tropical isles with decent hotels, so maybe no one had bothered to investigate these little isles off the coast of Namibia.

Later Ian sent me a road map of Namibia that showed several dozen islands: Roastbeef, Plum Pudding, Black Rock, Possession, etc. These were great names for new DX countries! But which ones, if any, belong to South Africa? Digging through the library at the university where I work, I found in a dusty old economics book a table listing the tons of guano harvested annually on South Africa's "twelve Penguin Islands." This reference was not specific about the islands' locations, but from the context and the name of one of the islands, Possession, I was pretty sure that the "Penguin Islands" were the ones I was looking for.

I ordered a set of large-scale US Defense Mapping Agency charts of the Namibian coast, and they finally arrived a few days before I left for Walvis Bay. Several of the charts showed islands belonging to South Africa, so I was able to put together a tentative list of islands that might be in the Penguin group. We still needed more information, but things looked good enough to suggest to Ian that we take a "fishing trip" after the Walvis Bay DXpedition. (See "Walvis Bay—The ZS1IS Story," *CQ*, June 1990.)

In Windhoek in late August 1989 I could hardly believe what I saw on the huge map that was hanging on the wall of the shack of Derek Moore, V51DM. Between 25° and 28° south latitude, just off the coast of the Namibia, were the Penguin Islands: Albatross Rocks, and Halifax, Hollandsbird, Ichaboe, Mercury, Penguin, Plum Pudding, Pomona, Possession, Seal, Sinclair, and North and South Long Islands. There were thirteen islands listed, not twelve, but the map clearly indicated they belonged to the Republic of South Africa. And all of the distances and separations looked good! Al Foksett, K1NTR, Ian, Derek, and I joked over dinner that evening that it was too bad that Roastbeef wasn't one of the Penguin Islands. We could just imagine hearing the OTs ragchewing on the bands about our possible new one—"Roastbeef was tough; did you get it? Nah, I got Plum Pudding." Just like a DX banquet.

I used every opportunity during our two-week operation in Walvis Bay to search for additional information on the islands. In the local bookstore I found a set of South African Navy large-scale nautical charts of the coast and a copy of the *South African Sailing Directions*, which gave detailed descriptions of all of the islands. With these references, the question of twelve versus thirteen islands



This is a copy of a portion of a map showing the islands described in the article. The map, which hangs on the wall of Derek Moore, V51DM's shack, shows the entire coast and all of the islands in the group.

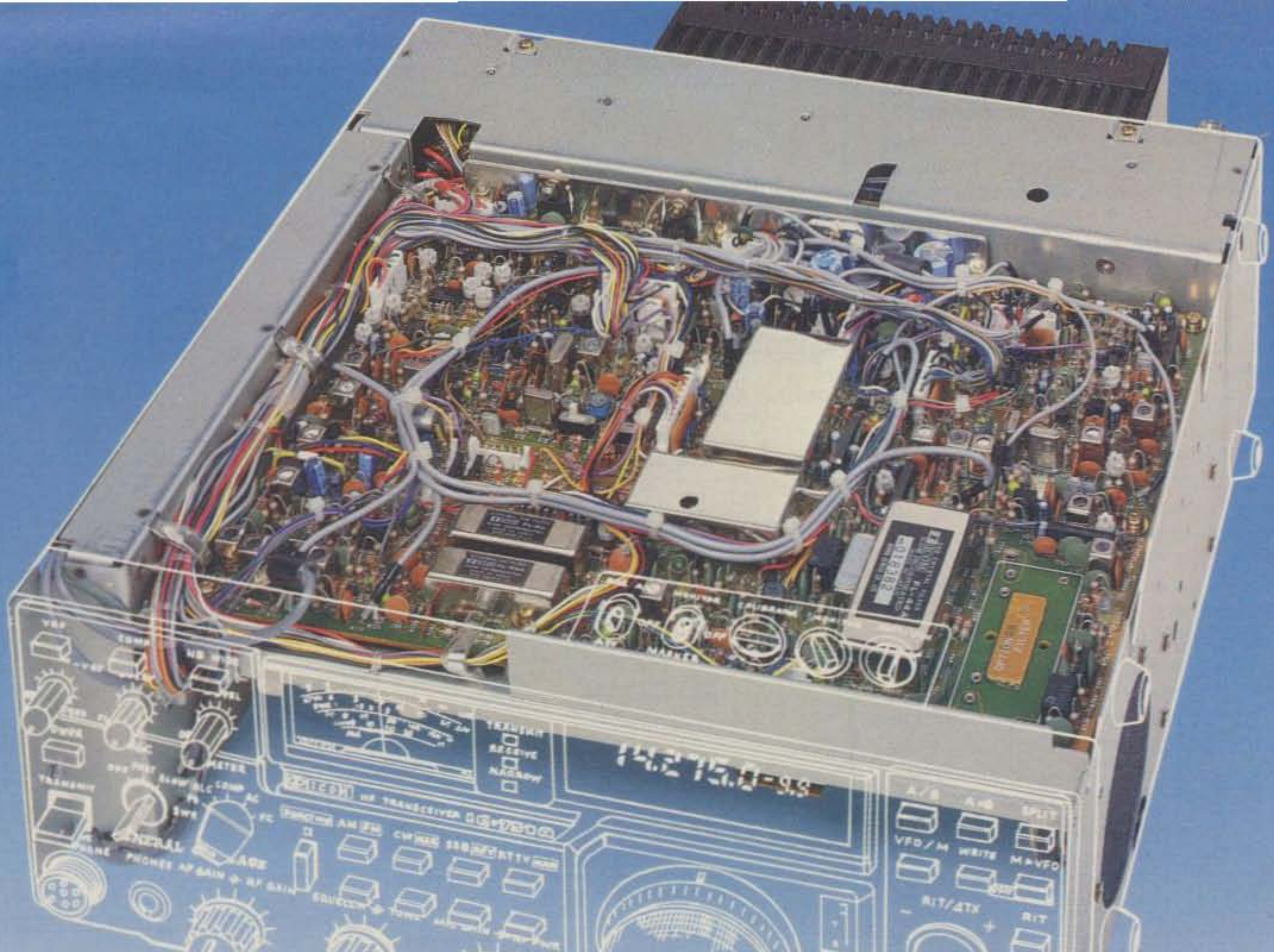
was resolved: North and South Long Islands are often grouped together as one, the Long Islands. The bar of the Mermaid Hotel also proved to be an excellent source of information. The fishing fleet was in port, and the fishermen were all too happy to tell us everything they knew about the islands, as long as we were buying.

Ian and I discussed taking off to one of the islands and operating for a short time. It would have been fun, but we decided to wait for several reasons. First, the appearance of not one but two possible new DX countries might jeopardize our chances of getting Walvis Bay approved. The case of Walvis Bay had been befuddled at the ARRL for the past twenty years, so any possible confusion ran the risk of delaying its acceptance.

Second, if what the fishermen told us was true, getting to any of the close-by islands, landing safely, and not getting shot were no small feats. The coast of Namibia is one of the most inaccessible, most

treacherous stretches of coastline in the world. South of Walvis Bay to the mouth of the Orange River lie two mining zones, Restricted Diamond Areas 1 and 2, where the bulk of the world's gem-quality diamonds are mined. Access to the coast along the diamond areas from the interior is prohibited except for a 20 meter wide roadway running from Aus to Luderitz. The restricted areas are patrolled by the notorious *diamond detectives*, members of a Namibian governmental police force responsible for keeping out all intruders and tracking down diamond thieves. We were not convinced the diamond detectives would bother to distinguish between DXers and diamond thieves before shooting at them.

Third, we were not certain at the time from whom one got permission to land on the islands. With the turmoil in Namibia over the forthcoming elections and independence, it was hardly an opportune time to arrange transit permits across the diamond areas and to secure landing per-



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mission from the authorities in Cape Town.

After the DXpedition was over, I spent two days in Windhoek with Derek searching bookstores and the city library for information on the islands. With help from Rudi Wiechers, V51W, I eventually located a German text that covered the islands' colorful early history.² Loaded with the charts, maps, and books I had found, plus all of the radio gear used on the DXpedition, I prepared to return to the US.

It seemed like half of the amateur population of Namibia was assembled in Windhoek's airport when I left. Word must have gone out that I needed help at the bar in getting rid of the remainder of my local currency, so it was quite a farewell. I wasn't worried about losing my luggage or getting lonely on the way back to the US. When you're designated a "security risk," your luggage is sealed and you have an armed escort at every airport on the way to your final destination. How

was I to know that large-scale aeronautical charts of the diamond areas would arouse suspicions?

I sent Jim Maxwell, W6CF, one of the members of the DXAC who had been helpful in preparing the application for Walvis Bay, a map showing the islands and asked for his advice. Some time after we began corresponding and unbeknownst to Ian and me, Jim found himself in a potentially awkward situation. Hans Hannappel, DK9KX, had also asked about several of the same islands. You can imagine our surprise when Jim told us another DXer had inquired about our islands! Jim asked if we would consent to his exchanging the names of the interested parties. All agreed. Hans, Ian, and I soon decided that we would combine our efforts in applying for separate country status and in attempting to put the islands on the air for the first time.

There was some evidence that the larger islands were inhabited, but finding current information seemed impossible. Hans hit the jackpot when he found an article in the travel section of a Frankfurt newspaper entitled "Ichaboe is a Hellish Place."³ Willy Lutzenkirchen, the author, told how he sailed out of Luderitz Bay on board the *Sailfish*, a Portuguese boat used for sealing, fishing, and guano gathering, and visited Ichaboe and Possession Islands to collect guano. American sealer Captain Benjamin Morrell was the first person to describe Ichaboe. In 1828 he wrote in his log: "Arrival on Ichaboe Island; . . . the surface of the island is covered with 25 feet of bird dung."⁴

Ichaboe's history is a bloody one. After word of Morrell's guano discovery was finally published in 1843, some 450 ships from England, America, Scandinavia, Italy, Portugal, and southern Africa converged on the tiny 15-acre island, bringing with them an estimated 6,000 men. The men who came to Ichaboe were a tough bunch. Living and working under the most primitive of conditions, it was not long until fighting broke out. British war ships were dispatched from Cape Town on several occasions to stop the killing and to restore order.

Today the guano accumulates to less than a foot deep before it is collected and hauled away for use as fertilizer. The overpowering ammonia odor of the guano and cries of the hundreds of thousands of birds of some dozen different species that inhabit Ichaboe made Willy Lutzenkirchen want to leave Ichaboe before he had even landed.

The *Sailfish* was met by the head man of Ichaboe, Barney Smith, a former Englishman from Liverpool, who is the caretaker and weatherman of the island for the Bureau of Fisheries in Cape Town. During the several weeks of the harvesting season Barney oversees a crew of from 60 to 100 men hired to scrape and

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shovel up the guano covering the small island and load it on boats like the *Sailfish*. All the rest of the year he and two helpers live alone, except for the thousands of birds and a few remaining seals. Every three months Ichaboe is visited by the *Nautilus*, a patrol boat that brings all of the fresh water, food, and supplies used by Barney and his crew.

For four months of the year the island is buried in fog generated by the cold Antarctic waters of the Benguela Current flowing northward along the coast. When there is no fog, the winds are fierce. There are not only frequent sand storms, but also *rock storms*, where the wind picks up pebbles and hurls them through the air along with the sand from the adjacent Namib Desert.

The islands continued to attract wave after wave of profiteers and adventurers after their annexation by Queen Victoria in 1876. Sailors call the Penguin Islands the "Islands of Corpses," possibly because well-preserved human remains are occasionally found mummified and buried in the deep layers of gray-white guano. John Gove, a Scotsman buried on Ichaboe in 1893, is said to have earned a handsome sum trading guano-mummified corpses in Cape Town. Diamonds were found on the Penguin Islands around 1905, and this brought still another surge of men seeking precious stones

in addition to guano, seal skins, and bird feathers.

The *Sailfish* left Ichaboe and headed south of Luderitz to Possession Island, the largest of the Penguin Islands. Possession is a ship graveyard and has a considerable cemetery. The crew met Edy Johnson, Possession Island's caretaker. Edy likes to lie down after meals behind a gravestone in the cemetery to escape the howling winds. There he plays a harmonica and talks to Randy, his pet rooster. Randy is Edy's constant companion, following him around the island and listening to everything that Edy has to say. Their conversations are said to get very heated after the supply boat replenishes Edy's ration of gin, along with all the food and water they need.

A \$2.5-million packet of rough diamonds smuggled out of the adjacent diamond area is rumored to have been hidden on Possession and lost, so perhaps some DXer will get lucky some day. But beware! It's illegal to possess rough diamonds in Namibia.

Edy and Barney sound like interesting fellows, and both would no doubt welcome the company of a group of DXers. However, the newspaper's description of the guano and bird life on Possession and Ichaboe was so potent that Ian declined the offer to use the government's facilities on these islands. We looked instead

for an island with as few birds and as little guano as possible.


Seal Island (26° 35' .7 S, 15° 08' .4 E), one of the two Penguin Islands located in Luderitz Bay, was the final choice for a DXpedition. Our application to the DXAC for separate country status was submitted in June. Unfortunately, I had to bow out of the trip planned for July because of a move. It is disappointing not to be able to go, but I am looking forward to hearing the story of the gang's experiences off the coast of Namibia. In the meantime, I have been looking at my atlas again. The Indian Ocean and the eastern coast of Africa are interesting areas. Take a look; there's no telling what you might find.

Footnotes

1. See Plate 94, *The Times Atlas of the World*, Seventh Comprehensive Edition, Times Books Ltd., London, 1985.

2. Phillips, J.A.S., *Deutsch-englische Komodie der Irrungen um Sudwestafrika*, Afrika Verlag, Pfaffenhofen, 1986.

3. Lutzenkirchen, W., "Ichaboe ist ein hollischer Ort," *Frankfurter Allegemeine Zeitung*, 5 April 1990, No. 81, p. R 3.

4. From *Morrell's Narrative of a Voyage to the South and West Coast of Africa*, p. 62, London, 1844. Quotation in Phillips, J.A.S., footnote 2 above, p. 26. 

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This month's column contains information about amateur radio specialty items such as badges, caps, jackets, patches, pins, and T-shirts. I have included a wide variety of items which amateurs can wear and use. Station equipment and accessories are not covered in this article. Where prices are stated, they are only included to provide some idea of costs; exact current costs should be determined by requesting such information from the seller.

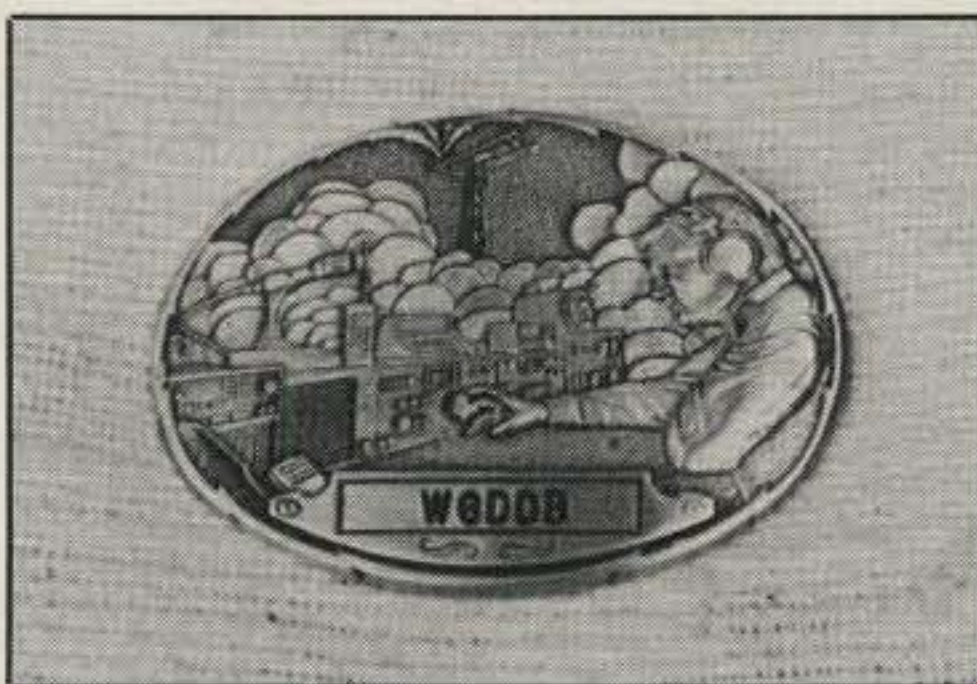
It is hoped that this article will make amateur radio a bit more interesting to many new amateurs. I believe in advertising amateur radio. Everyone who knows me is aware that I am an amateur radio operator. I have my callsign on my door-mat, car license plates, belt buckles, T-shirts, sweatshirts, caps, jackets, stationery, cups, glasses, mugs, badges, pencils, pins, and business cards. Almost every day a few people ask me what W6DDB means, which gives me a chance to tell them a little bit about our amateur radio service. Many of those brief introductions have resulted in additional amateurs.

State sales taxes are not included in this article, but they frequently apply. Also, prepaid charges only apply to U.S.A. addresses.

ARRL. The American Radio Relay League (ARRL) has a nice assortment of items. Most of the League items are only available to members. These items are listed in this article for the benefit of ARRL members. A 14 by 16 inch gold banner with the ARRL diamond \$7.50. A bumper sticker printed "Amateur Radio—a National Resource" \$2. A membership charm or an appointee charm (state your appointment) \$2.50. The 5 inch member (diamond) or life-member decals, two for 50¢. A 3 by 5 foot cloth flag \$21. ARRL flag license plate \$5. Cloth ARRL flag patch \$5, 3 inch ARRL diamond patch \$1, 5 inch ARRL diamond patch \$2, life-member patch for 3 inch diamond \$1, and life-membership patch for 5 inch diamond \$1.25. ARRL flag pin \$5, membership pin \$3, life-membership (replacement) pin \$3, and League appointee (state appoint-

ment) pin \$3. Life-membership plaque \$25. Scarf \$6. Set of 50 ARRL member letterhead stationery sheets with 50 matching business-size (No. 10) envelopes \$8. Fifty pieces of stationery \$4, or 50 envelopes (separately) \$5. Blue or maroon tie with ARRL diamond \$12. Exact details can be requested from ARRL Membership Services, 225 Main Street, Newington, CT 06111.

Bail/Tilt Stand. Budwig sells a bail (tilt stand) that is 2½ inches tall. It can be added to equipment to lift the front panel to a better viewing angle. It is steel finished in black epoxy. The bail can be folded flat against the bottom side of equipment. Mounting centers of 5½, 7, 10, 12, and 15½ inches are available to match almost all amateur equipment. Each bail costs \$7.50 prepaid. The address is Budwig Manufacturing Company, P.O. Box 829, Ramona, CA 92065-0829.



Amateur radio belt buckle available from Award Design Medals.

Belt Buckles. Award Design Medals, Inc. offers a unique amateur radio belt buckle. It shows an amateur operating his station. A tower and beam antenna are included in the background. The stated prices include buckle, shipping, handling, callsign engraving, and any tax that might apply. DX amateurs should include \$5 to cover delivery to non-U.S.A. addresses. Payment should be made by check or money order. The all-brass buckle is \$25.95. The two-tone 24K gold-and sterling-silver-plated buckle is \$54.95. The sterling-silver-plated buckle is \$29.95. Allow 4 to 6 weeks delivery time. Orders may be sent to Pat Guillory, 9487 Dartry Court, Elk Grove, CA 95758 (telephone 916-684-1730). These are the



Solid-brass belt buckle custom engraved and available from Henry Hornsby, N6MRG.

most unusual amateur radio belt buckles I have seen.

Henry Hornsby, N6MRG, manufactures a very good solid-brass belt buckle of his own design. Each buckle is machine engraved and hand finished. He custom engraves anything a purchaser requests on his buckles. The price is \$11.99 per engraved buckle (callsign only) plus \$2 shipping and handling. Add \$1 if you order a second engraved line (name). A nice drawstring-type denim pouch is available at \$1 more. His address is 3205 Cook Peak Road, Lake Isabella, CA 93240 (telephone 619-379-4749). He can be called evenings and weekends.

S. Slonim, W2PD, sells solid-brass belt buckles. One-line (name or callsign) buckle is \$13 ppd. Two-line (name and callsign) buckle is \$15 ppd. As many as ten digits may be used on each line. The address is 320 Rose Street, Massapequa Park, NY 11762 (telephone 516-541-2342).

Amateur Radio
N4YH

Bumper stickers are printed with callsign, "amateur radio," or club name and may be purchased from N4YH Print.

Bumper Stickers. Star Ridge Communications sells bumper stickers at \$1.75 each and five for \$5, prepaid. One reads

45527 Third Street East, Lancaster, CA 93535-1802



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"Bells & Whistles" is a tame word to use for the new DJ-160T, newest "Magnificent" one from Alinco. Keyboard entry is just one of four ways to enter a frequency in the extended receiver (137-173.995 Mhz) of the DJ-160T. You can store duplex /simplex pairs in any of 20 Memories, or Call Channel, with offsets, and any of 38 encoding subtones. Choose one of 3 scan modes, "Band" "Program" or "Memory" and one of five step ranges in VFO. Priority mode can be used in VFO, Memory or Call. "Dual Watch" allows the DJ-160T to scan 3 seconds alternately on CALL, VFO or one MEMORY. "Pager" is for group or single person alert. Other features include: Auto "Battery Save", Auto "Power Off", and 2-Memory Autodialer. Get 3-watts on standard 700 mah battery, or increased power from built-in DC to DC, or optional 12V battery. The Alinco DJ-160T, now the "Top Gun" with the competition today! DJ-460T for 70 cm.



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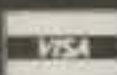
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"Pray For My Wife. I'm A Ham Operator," and the other message is "Pray For Me. My Husband Is A Ham Operator." The address is P.O. Box 141, Newton, CT 28658

Callsign Bumper Stickers. Large (120 point) callsign bumper stickers are available at \$4.70 each prepaid. "AMATEUR RADIO" or club name may be added at no extra cost. Address is N4YH Print, Box 784, Ojai, CA 93023.

Call Sign Cups. Call Sign Cups sells a variety of mugs showing one's callsign. Ten ounce stoneware mugs sell at \$7.45, or two for \$12.95 ppd. The 15 ounce mugs are priced at \$9.45 each, or two for \$16.95 ppd. The ARRL or QCWA logo is added to the opposite side of the mug at no extra charge, if you request it and state which logo you want. Walter Van Gieson, AB4DQ, is the proprietor of Call Sign Cups. The address is P.O. Box 17062, Raleigh, NC 27619 (telephone 919-782-1424).

Call Sign Display. Signalcraft sells a callsign (Model CSD-1) which lights up to display one's callsign while one is transmitting 50 watts (or more) on 160-2 meters. The price is \$37.95. Three to four weeks is required to fill each order. The address is 1555 14th Street, Santa Monica, CA 90404. A delay is built in to minimize/eliminate flickering during transmissions.

Callsign Items. LQV Engraving markets callsign desk plates, identification badges, and small signs. Your request (with SASE) will bring a data sheet with prices. The address is Box 4133, Overland Park, KS 66204-0133.



Jim Veverka, KA9WHK, sells callsign license plates and magnetic signs.

Callsign License Plates and Magnetic Signs. Jim Veverka, KA9WHK, sells standard-size (6 by 12 inch) callsign license plates. They are made using 0.024 inch aluminum, and they are slotted to fit a standard front license-plate bracket. Six digits maximum for callsign. City and state (or amateur radio) added above and below callsign. Each plate sells at \$9 prepaid. White magnetic strips have callsign screen printed in black, blue, or red weatherproof enamel, plus border. These strips are 2½ by 8 inches. They sell at \$7.75 each, or \$13.75 for a pair with the same callsign. The address

W6DDB

The Computer Budget Shopper sells laser-printed callsigns for display in car window or on an operating table.



Various caps and decals are available from Caps Unlimited.

is 6434 Woodridge Drive, Woodridge, IL 60517 (312-964-8445).

Callsign Signs. The Computer Budget Shopper (CBS) sells laser-printed callsigns which are suitable for display on an operating table or in the rear window of a vehicle. If you commonly monitor one frequency, it can be printed on the heavy-grade paper below your callsign at no extra charge. The price is \$3 each postpaid. The address is 2203 Park Avenue, Cheyenne, WY 82007 (307-635-2173). Jim Hassler, WB7TRQ, offers an excellent 48-page catalog of public-domain computer software at \$2.

Caps. The Embroidery Warehouse sells summer (mesh) and winter (corduroy) caps at \$10.45 and \$11.75 each ppd, respectively. The embroidered name, callsign, and town/city can have a maximum of 14, 6, and 14 letters, respectively. Summer caps are red or royal-blue mesh with a white foam front. Embroidery matches the cap color. Full corduroy (winter) caps are red or navy blue with gold embroidery. The address is P.O. Box 1476, Severna Park, MD 21146.

Caps and Decals. Caps Unlimited sells a 2 by 3 inch embroidered SKYWARN patch with heat-seal adhesive backing. It shows a black tornado inside a fluorescent orange eye, and it has the word SKYWATCH below the eye. This patch is also available on a black baseball-type summer cap. They sell the same kind of cap with the words AMATEUR RADIO COMMUNICATIONS centered between a pair of lightning bolts in day-glo

bright chartreuse. RACES decals are sold to RACES members. They are self-adhesive on the front side for attachment inside vehicle windows and windshields. The address is P.O. Box 460118, Garland, TX 75046-0118. Their telephone number is 214-276-0413. They also sell identification badges and embroidered patches. As usual, your SASE would be appreciated if you request data.

Caps, Emblems, and Jackets. A. T. Patch Company sells patches (emblems), jackets, and caps in a wide variety of styles, colors, and prices. Emblems sell in a basic range of 60¢ to \$5.25 each. Up to six colors can be used in an emblem without extra charge. Each additional color adds 6¢ to the price of every emblem. If metallic thread is ordered, it adds 30¢ to the base price. Similarly, solid em-



A. T. Patch Company sells a variety of patches, jackets, and caps in various styles, colors, and prices.

broidery increases the price 30¢, and a felt background costs 20¢ more. If heat-seal backing is ordered (to avoid sewing), that raises the price 15¢. There is an initial \$10 pattern setup charge, and patterns are retained for possible use in filling future orders. These emblems can be added to caps and jackets. Cap emblem size is 3 inches (maximum). Caps cost \$5.95 to \$8.10 (depending on the quantity ordered), plus a \$10 initial pattern setup charge. The size of an emblem added to a jacket or windbreaker is 4 inches (maximum). The prices of jackets and windbreakers vary between \$24 and \$36 each (depending on the quantity ordered), plus the initial pattern setup charge. Obviously, these items should be purchased by groups (such as amateur radio clubs) in large quantities to obtain low prices. The address is P.O. Box 682, Littleton, NH 03561 (603-444-3423).

Caps, Golf Shirts, and T-Shirts. Anne Wright, N6BOP, sells a very good assortment of T-shirts, golf shirts, and caps. T-shirts and golf shirts are available in beige (tan), light blue, light yellow, or white. They can be printed on both sides. A red ARRL logo is available in sizes of 2¼ by 5 inches or 1½ by 3 inches. Lettering style can be ivy open or sportswear using black, brown, green, maroon, orange, red, or royal-blue ink. T-shirts cost



Jackets, T-shirts, and caps are available from Rod Williams.

\$13.75 each ppd, printed both sides. Golf shirts cost \$17.25 each (printed one side), or \$18.25 each (printed both sides). Her caps have a foam front, mesh back, and a strap to adjust the size. Caps sell at \$8.25 each ppd. Print styles and colors for caps are as stated for shirts. The address is 2272 Kellogg Park Drive, Pomona, CA 91768.

Caps, Jackets, and T-Shirts. Rod Williams offers an interesting variety of jackets, T-shirts, and caps. Each item can be customized to include name, callsign, and other information. His address Box 7486, Toledo, OH 43615 (telephone 419-829-6254 and 419-843-2014). Rod gives clubs a 10% discount when you place multiple-item orders. If you want details about Rod's products, you should re-

mugs and 11-ounce ceramic coffee cups at \$12.90 each ppd. First name and call-sign are etched on the large glass mug. The first name and callsign are etched in white on the black or blue (state your choice) ceramic coffee cup. The ARRL logo (diamond) or ARES logo can be added to the other side of the cup at an additional cost of \$2.50 or \$3.50 each, respectively, per cup. If at least 24 cups are included in a single order, a 10% discount applies. Orders can be placed for cups displaying club logo on one side, plus individual club members' callsigns and first name on the other side. Camera-ready artwork is required, and the minimum acceptable quantity for custom artwork cups is 24 cups. A club person is required to coordinate such an order. The address is Todd W. Skogen, P.O. Box 3025, Fox Valley Station, Aurora, IL 60504 (312-805-5972)

Eyeball QSL Cards. MFJ Enterprises, Inc. sells 500 eyeball QSL cards at \$39.95. These 2 by 3½ inch cards are particularly useful at conventions, swap-fests, and radio-club meetings. The address is P.O. Box 494, Mississippi State, MS 39762.

This completes the first segment of this two-part article. The second segment covers Ham Radio Bookstore, ICOM, identification tags, Kenwood, license-plate key chains, license plates, Littlite, medals, embroidered emblems, mugs, pencils, pins, pottery mugs, QSL card wall display, rings, rubber stamps, signs, sweatshirts/T-shirts, and tie tacs/lapel pins. If you want to buy specialty items as Christmas gifts for your friends, now is the right time to place orders.

Printed Aids


My previous columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business-size (No. 10) self-addressed envelope to my California address. Any single item is available at no charge to anyone who supplies a self-addressed stamped envelope. It is advisable to supply a large (at least 9 by 12 inch) envelope and to include a couple of extra stamps (loose in your envelope) in case extra postage is required. Some items are long. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements.



Don Claar, K6DGK, of southern California, has a weekly 40 meter code shedule with his brother (Ken, W6RDI) in northern California. Their father listens in at a third location to get the family news. This picture indicates that Dad's dog, Lucky, is also interested in hearing about what is happening! Lucky is a real code hound.

quest information from him. My wife (Marie, W6JEP) and I are two of his satisfied customers.

Cups and Mugs. Todd W. Skogen, KA9OBH, sells 13-ounce etched-glassed



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NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for September is:

Joseph Cannon, KA5RNH USA-CA All Counties #601, All SSB, 12-23-88

"The first thing I would like to say is a very special 'Thank You' to my wife, Brenda, for all her help, understanding, and support.

"It is hard to describe the feelings I had when I heard Ed, W5ILR, tell net control on 20 meters that he was on the Nolan and Mitchell county line in Texas. Mitchell, Texas was my last one to complete All Counties. After we had exchanged 5-9 reports both ways and I had thanked Ed for his help, I felt exhausted. I felt as if a big weight had been lifted from my shoulders. It had been 2 years, 10 months, and 3 days since I started county hunting.

"I got into county hunting when a friend of mine, Abner, WN5W, called me one day and asked me to get on 80 meters with him that night to keep a sked with K8CW, who needed Ascension Parish on 80 meters. While we were calling Allen at 3.875, Galen, KB5FU, and Ed, W5ILR, came up and invited us to join the county hunters net at 3.865. We chatted with them for a while. After my friend made his contact, I went down and listened to the CH Net to see what was going on.

"On February 15, 1986 I made my first mobile contact with WD4HRN, who was on the Houston and Henry county line in Alabama. I said this wasn't going to be hard, and boy, was I wrong! If I had known about the sleepless nights and the nail biting that I was going to go through during the next two years, I don't know if I would have started it. But once you start county hunting it gets into your blood, and you say to yourself, 'I'm going to finish this no matter what it takes.'

"I have put out all of the Parishes in Louisiana and some of the counties in Mississippi. I enjoy putting out the counties more than I do collecting them. I have met Galen, KB5FU, Ed, W5ILR, and Ed, KF5HY, and hope one day to meet more of the many friends I have made on the CH net.

"I would like to thank all of the mobile operators and net controls, and give a special thank you to Dave, N8ESR, and Carl, WA9PQY, for all of their help. Also a

333 South Lincoln Ave., Mundelein, IL 60060



Joseph Cannon, KA5RNH, USA-CA All Counties #601, in his shack with some of his impressive awards on display.

special thank you goes to Dorothy, WB9RCY, the USA-CA Director, for all of her help with the books and upgrades.

"See everybody mobile soon—73, Joe, KA5RNH."

USA-CA Honor Roll

3000		1500	
SM6CVX	690	KC2YW	918
K5IID	691	WM9F	919
2500		1000	
WM9F	769	TI2KD	1115
		WM9F	1116
2000		WB4QZD	1117
WM9F	835	500	
		W5HQL	2417
		K3IMC	2418

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 nonsubscribers 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 U.S.A. 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 U.S.A. DX stations must include extra postage for airmail reply.

USA-CA Special Honor Roll

Thomas R. Horton, K5IID
USA-CA All Counties #661, Mixed
5-22-90

Awards Issued

Thomas R. Horton, K5IID, completed all of his paperwork and claimed USA-CA All Counties #661 and USA-CA 3000 #691, Mixed, dated 5-22-90.

Hans Hjelmstrom, SM6CVX, received USA-CA 3000 #690, Mixed, dated 5-10-90. Hans worked all fixed stations to reach this level.

Joseph Dinger, WM9F, submitted another collection of confirmed county contacts and received USA-CA 2500 #769, USA-CA 2000 #835, USA-CA 1500 #919, and USA-CA 1000 #1116, All SSB Mobiles, dated 5-17-90.

Douglas Cropper, KC2YW, added to his good record by claiming USA-CA 1500 #918, All SSB, dated 5-15-90.

Carlos W. Diez, TI2KD, filed his good application and received USA-CA 1000 #1115, All SSB, dated 5-14-90.

J. Archie Hampton, WB4QZD, updated his good record by claiming USA-CA 1000 #1117, Mixed, dated 5-26-90.

USA-CA 500 certificates went to: Robert Metcalf, W5HQL, USA-CA 500 #2417, All CW, 5-22-90.

Donald L. Flynn, K3IMC, USA-CA 500 #2418, Mixed, 5-22-90.

Awards Available

European 1992 Community Award. Issued under the patronage of the European Community, this new and very attractive award should emphasize the objectives of the Community. The "E-1992-C" Award can be obtained by all licensed radio amateurs and shortwave listeners from January 1, 1989 onward. The awards will be numbered and dated on issue. Following are the requirements.

There are three ways to log 12 x 12 different stations from the 12 member countries on the HF bands, in CW, SSB, or Mixed.

Portugal CT, CU; Germany FRG DL; Spain EA, EA6; Ireland EI; France F, TK; Italy I, IS; Denmark OZ; Belgium ON; Luxembourg LX; Greece SV, SV5, SV9, SY; Netherlands PA; U.K. G, GD, GI, GJ, GM, GU, GW, ZB2.

Note: A contact with OR5EEC, club station of the European Community in Brussels, may be used to replace a maximum of three missing contacts.

Outside the UBA Contests: Log 144 different stations from the EC Member Countries. At least six different stations from each of "The Twelve." At the most,



European 1992 Community Award issued under the patronage of the European Community.

20 stations per country to complete the required 144.

During the UBA Contests: Log 144 different stations from the EC Member Countries. At least two different stations from each of "The Twelve." At the most, 24 stations per country to complete the required 144. The application is free of charge, but must arrive with your contest entry.

Combined results: A missing LX or SV station in the contest may be replaced by two other stations from that country outside the contest. All other contacts should be logged in the UBA Contest, and you must have sent your log to the organ-

izer. Combined results from up to four consecutive years since the start of this award will be accepted to achieve the requirements.

The application must consist of:

1. A written request signed by the applicant and certified by two licensed amateurs. Please specify the requirement for which you apply.
2. A list with Date, Time, Callsign, Report, Band, and Mode of 144 contacts.
3. The award fee of 7 IRCs, U.S. \$4.00, or equivalent value in other currency unless the requirements of the second possibility are fulfilled.
4. Name, callsign, and full address of the applicant and his witnesses.

The award claim should be sent to UBA HF Awards Manager, Van Campenhout Mat, ON5KL, Hospicestraat 175, 9080 Moerbeke-Waas, Belgium.

Guernsey Bailiwick Award. The Guernsey Bailiwick Award, organized by the Guernsey Amateur Radio Society, is open to all licensed amateurs and SWLs, all modes and bands eligible.

The Bailiwick of Guernsey is made up of the island of Guernsey (consisting of ten small parishes), Alderney, Sark, and Herm. This award is given for working various islands and parishes, as described below.

Bronze Award. Make contact with GU stations in six of the Guernsey parishes, plus contact with GU3HFN or GU8NIS

(club stations), a total of seven QSOs.

Silver Award. Make contact with GU stations in eight of the Guernsey parishes, plus one contact with either Alderney or Sark, and contact with GU3HFN or GU8NIS, a total of 10 QSOs.

Gold Award. Make contact with GU stations in all 10 of the Guernsey parishes, plus one contact with Alderney and one with Sark, and contact with GU3HFN or GU8NIS, a total of 13 QSOs.

Contact with /M and /P stations count as long as the QSL card states which parish was activated.

Endorsements are available for single band and/or single mode.

Five Band Award. Claiming Gold standard on 5 separate bands makes the ap-

GUERNSEY BAILIWICK AWARD
managed by the Guernsey Amateur Radio Society

This is to certify that Sample
operator of _____
has fulfilled the conditions of the Guernsey Bailiwick Award.
Contact has been made with GU stations
in _____ different parishes in Guernsey,
_____ in Alderney, _____ in Sark, and
_____ the GARS station to gain the _____

Date: _____

Award Manager: _____

G.A.R.S. President _____
G.A.R.S., P.O. Box 100,
Guernsey, Channel Islands.

Guernsey Bailiwick Award organized by the Guernsey Amateur Radio Society.

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plicant eligible for an engraved copper Guernsey can (cost on request).

The cost of the award is 8 IRCs, 2 pounds sterling, or \$4.00 U.S.

A list of QSLs certified by two amateurs or a National Society is required.

Full details and a list of GARS members is available from the Awards Manager, Andy Nightingale, GU1WDT, P.O. Box 100, Guernsey, Channel Islands, or directly from "Armorique," Pre De La Fontaine, Robergerie Rd., St. Sampsons, Guernsey, C.I.

Tassie Trout Award. The Tassie Trout Award is sponsored by the Central Highlands Amateur Radio Club of Tasmania. Only members of the Central Highlands Amateur Radio Club of Tasmania are eligible to give out kilograms to other stations trying to qualify for the award.

All overseas stations, except ZL stations, need only "catch" 4 KGs to qualify (ZL same as VK—14 KG).

To qualify, work 4 KGs of "trout" after the 25th of May 1989, any band, any mode. Weights are as follows: VK7CHT (Club Call) 3 KGs; VK7KZ (President) 2 KGs; VK7NDO (Treasurer) 2 KGs; VK7NBF (Vice President) 2 KGs. All other members are 1 KG as follows: VK7s—AY, DY, GT, HX, JK, KB, KX, KBA, KV, NIM, NRR, NWR, NXA, RM, VV, XA, YW, LJ, NXX, NBO, JH, KBG, YXX, ZMF; VK3DMN; VK3CWJ; VK2ELE; VK4PCL; VK5NEH; VK7ZA.

If any of the ordinary members are located *portable* in the central highlands of Tasmania, they are worth 2 KGs.

Send extract of your log to the Awards Manager, 28 Hamilton St., 7000, Tasmania, Australia with \$4.00 U.S. or \$4.00 Australian.

Spec-Com Journal and USATVS Awards. The *Spec-Com Journal* and The USATVS have two new awards.

Amateur TV Hall of Fame Award. This



Amateur TV Hall of Fame Award by Spec-COM/USATVS.

award is printed on 8" x 10" cardboard. It is awarded to those Fast and Slow Scan TV operators who have been operating in increments of 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, and 60 years. Apply by written letter to Mike Donovan, KA0JAW, at P.O. Box 1002, Dubuque, IA 52004, and describe station setup, years of on-the-air operations, etc. Photos are appreciated and used in an issue of *Spec-Com* if permission is given.

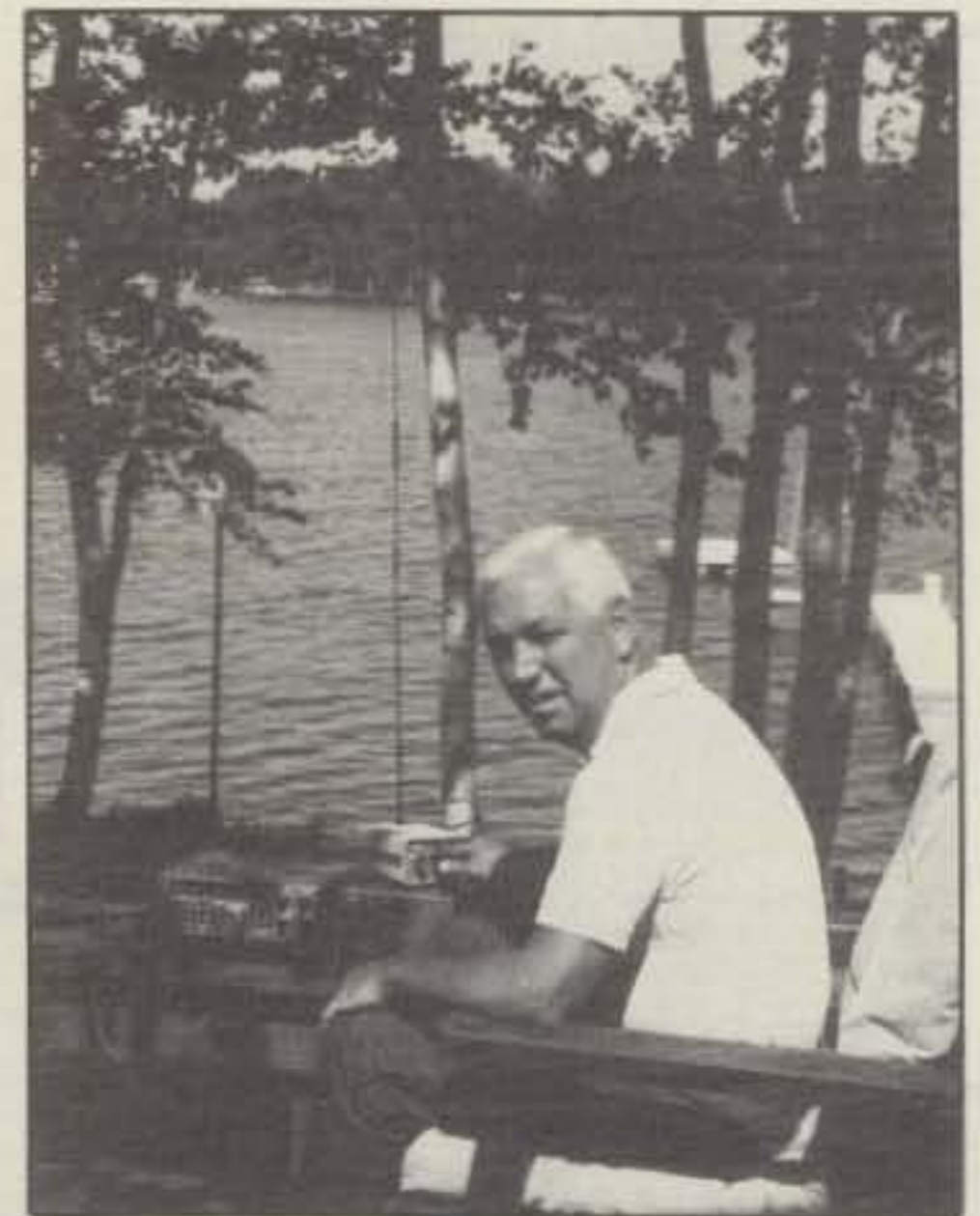
Ham TV Test Pattern Award. This award is printed on framable 8" x 10" cardboard stock. It depicts the Indian Head Test Pattern with gray scale resolution pattern. It is awarded to any ATVer (FSTV) who successfully makes that first UHF "simplex" contact! Space is available to draw in callsign and frequency



Ham-TV Test Pattern Award issued by Spec-Com/USATVS.

monitored. There is a limit of three per request. Apply to KA0JAW.

For information on *Spec-Com*, a specialized communication mode magazine, contact Mike Stone, WB0QCD.



A candid shot of John Kroll, K8LJG, courtesy of Rick Dorsch, NE8Z/HC1MD. John is a CQ Awards checkpoint in Michigan, is on the CQ WPX and DX Honor Rolls, is an active county hunter, and has been QSL Manager for more than 30 DX stations over the years. In this photo John is operating 18 from Alcona County, Michigan.

Notes

The 17th edition of the *County Hunters Directory* is now available from the B & B Shop, P.O. Box 850652, Mobile, AL 36685. The *Directory* contains names, addresses, and telephone numbers of County Hunters who are or have been active on the County Hunters Nets. The directory is priced at \$6.00.

Until next month . . .

73, Dorothy, WB9RCY

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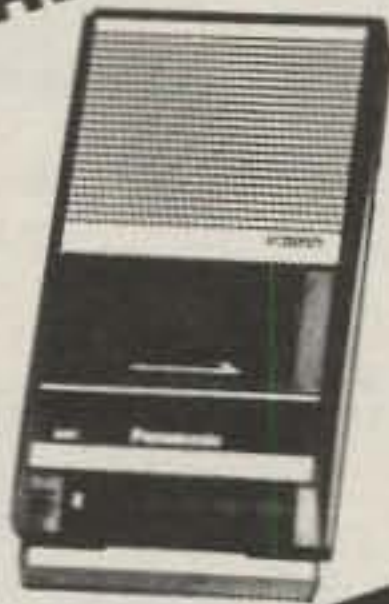
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SouthNet Packet Conference

It's cleanup time around the computer room here at the K4ABT QTH. The mail has been answered (for this week), and I've researched several topics I plan to cover later this fall.

First, however, before we get to this month's topic, there are a few short subjects to cover.

Thanks, Guys

With regard to the 14.105 MHz packet frequency, thanks to the guys on "MOORE" node, and "MORCHT" CONVERS node in Oklahoma, who noticed that I was/am missing. It's nice to receive letters asking what happened to me or to where did I move. I've not really moved away from 14.105. However, a number of rather powerful storms have hit this area, and my antenna system was broadsided by one of them. My "WD4BUM" 20 meter vertical took about as much of a near-miss from a tornado as it could stand (or maybe could *not* stand).

Two conditions contributed to the destruction of my dedicated 14.105 MHz packet antenna. It was not so much the antenna as it was the "skimpy" tubing that I was using for the mast. I was derelict in not tying it more securely in place with some of the durable, lightweight, nonconductive, and weather-resistant ty-line that I got from Butch.

Look for me back on 14.105 at 300 bps packet soon. I'll be contacting George Shira at Lakeview Antenna Company in Anderson, South Carolina, so I can get another one of the loaded, 20 meter, 96 inch sticks of RF dynamite airborne again.

The SouthNet Packet Conference

When packeteers hear about a group of packet authors, speakers, and manufacturers dispensing information about the latest packet techniques, packet networking, or about packet radio in general, they appear to come out of the woodwork to learn more about the fastest growing facet of our hobby.

Nearly 1400 amateurs gathered at Albany, Georgia on June 1st and 2nd for the

506 Pheasant Ridge Drive, Warner Robins, GA 31088



Andy DeMartini, KC2FF, of DRSI (right), is presented with a 1990 SouthNet Packet Conference commemorative award. (Thanks to Frank, K4ICT, and Justin, KC4QAO, who are responsible for the photos in this month's column.)



Martin Jue, K5FLU, of MFJ Enterprises (right), is presented with the 1990 SPC OEM commemorative award.



Gwen Reedy, W1BEL, of PacComm (right), receives the 1990 SouthNet Packet Conference commemorative award. Gwen also received a special SouthNet Packet Pioneer award.

1990 SouthNet Packet Conference (SPC) and the annual Albany Amateur Radio Club (AARC) Hamfest.

Friday evening I hosted the opening of the SouthNet Packet Conference and the opening forum. The topic was "The Future of Packet Technology."

All the forums during the two days were very well received and informative. There was only one complaint and it was universal—"not enough time." It was evident from the opening of the SPC that



Linda of PacComm awaits the opening of the SouthNet Packet Conference. The "star" of the display is in the upper left corner. See the "performance review" of the PacComm "HandiPacket" TNC elsewhere in this issue of CQ.



Bill Levy, WA4FAT (background), and "the boss" (foreground) of Alabama Amateur Electronics introduced some of the new "Band-Master" Quad antennas at the SPC.



The air-conditioned fleamarket area was a real hit with everyone. The crowd thinned a bit during the forums, but it was business as usual between the packet forums and the seminars.



Dana, N4PGE, demonstrates the "Braille 'N Speak" for us. The "Braille 'N Speak" is connected to the RS-232 port of the MFJ-1274 in much the same manner as a terminal would be. The incoming data from the MFJ-1274 is fed to the "Braille 'N Speak," where the voice synthesizer converts the data to words.

many packeteers were hungry for more information on the topic—any topic, as long as it was about packet radio!

Bigger Plans for SouthNet '91

John Crosby, K4XA, the chairman, and co-chairmen Chuck Nobes, K9UTY, and Leon Perrett, K4CR, did a super job putting together the hamfest and packet conference. John informs us that steps are being taken to provide more time for next year's SouthNet Packet Conference forums.

The 1990 SPC brought the SouthNet to the forefront in the southeast. Thus, there will be greater attention paid to its participation in the 1991 session.

Thanks to Heather Johnson, N7DZU,

office manager of the Tucson Amateur Packet Radio Corporation (TAPR), for the "I'm A Packeteer" TAPR lapel stickers. They were highly visible on lapels throughout the conference.

Largely composed of packeteers, this crowd converged on Albany, Georgia to hear Tom Moulton, W2VY, talk about the latest advances in the "ROSE" switch; learn from Andy DeMartini, KC2FF, of DRSI about the new 9.6 Kb RF modem; and hear Travis Brann, WA5RGU, discuss the use of the DX PacketCluster.

The PacComm PACSAT 1.2 Kb Phase Shift Keyed (PSK) modem was well covered by Gwen Reedy, W1BEL. One interesting note about this modem is that it has Doppler shift compensation designed into the modem. The PacComm



Dennis Barrow, WB4GQX, presenting a very informative program centered around the use of the GRAPES 56 Kb system.



Count them: four stations, HF, VHF, and UHF command posts, and information stations were directing amateurs into the SouthNet Packet Conference from all areas of the southeast.



Dennis Barrow, WB4GQX (right), receives the SouthNet and Georgia State Packet Pioneer award. No, those are not prizes under his arm. Dennis was about to present a forum on the GRAPES 56 Kb modem when he was interrupted to receive the award.

PACSAT modem is designed to be attached to the modem disconnect header of the PacComm TNCs and other TAPR TNC-2 clones.

A wide array of PacComm TNCs were on display at their booth. Attracting a lot of attention was the very compact (shirt-pocket size) "HandiPacket" TNC. It was a star attraction highlighting the front row of their display. It has the features of TNCs that are several times larger, and the power source is built in. It can run for days without recharging the internal nickel-cadmium batteries. There is an advanced mail-box feature in the "HandiPacket" that is also compatible with the MBL and RLI packet BBSes. There is more on this miniature packet system elsewhere in this issue (see "CQ Reviews: The PacComm HandiPacket TNC").

Phil Anderson, W0XI, of Kantronics, presented a video on the development and operation of the G3RUH 9.6 Kb modem in conjunction with the Kantronics "Data Engine" platform. The information from Kantronics is that it will be ready for delivery within the next couple of months, prices to be announced at a later date. This should give the backbones, trunks, and BBS forwarding routes a boost in throughput.

Dennis Barrow, WB4GQX, presented a very good outline of the GRAPES 56 Kb



Frank Hough, K4ICT, is speechless as he receives the Georgia Amateur Digital Systems "GARDS" Packeteer of the Year award. Speechless here he may be, but Frank makes a lot of racket on packet.



This gathering of packeteers is awaiting the introduction of Tom Moulton, W2VY, and the forum on the "ROSE" networking switch.

modem and high-speed packet switching system. There is a video relating to the GRAPES 56 Kb modem that I hope to acquire soon. If so, I'll prepare more information on that area of packet switching. Dennis conducted a user-level presentation using Vu-Graphs and easy-to-understand dialogue. Afterward he answered a lot of questions in the question-and-answer session.

The 56 Kb data handling is not an "end-user" item, but I strongly feel that in the near future we may see more trunk and backbone activity relating to the GRAPES high-speed, RF packet modem.

Martin Jue, K5FLU, of MFJ Enterprises, was on hand, along with Bob Slomka, WD4MNT, demonstrating the new MFJ-1278/TURBO and the MULTICOM.EXE. (See the review of the MULTICOM.EXE in August CQ.)

In addition to the many added features of the MFJ-1278, a "TURBO" demonstration of the MFJ-1278 (option) 2400 bps/PSK modem was direct-connect linked, and a half-million byte file was transferred "without a retry"!

For those who are not familiar with the MULTICOM, it has a built-in "usable" data rate, baud rate, block counter, and file-transfer timer which provides an on-screen running account of all the just-mentioned items. The system only counts the usable data that is stored to disk and disregards the Frame Check Sequences (FCS), Address frames, or routing Headers.

Andy DeMartini, KC2FF, of Digital Radio Systems Inc., was not only letting the onlookers "read his LIPS," he was presenting an on-site demonstration of the PC*Packet Adapter, and the full dual-port



Chuck Nobes, K8UTY (left), and John Crosby, K4XA (right), did a superb job putting together the SouthNet Packet Conference and the Albany Georgia Hamfest. ("No, Chuck, you can't do that. The Kantronics DVR 2-2 transceiver is one of the main prizes. And will someone take that MFJ-1278/TURBO away from John? It's also one of the major prizes.")

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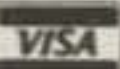

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- Positive detent roller bearing drive for "no question" switch positioning.
- The Delta Series handles full legal power.

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- Designed and produced in the U.S.A. by Alpha Delta.

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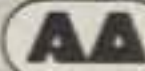
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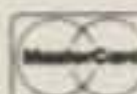
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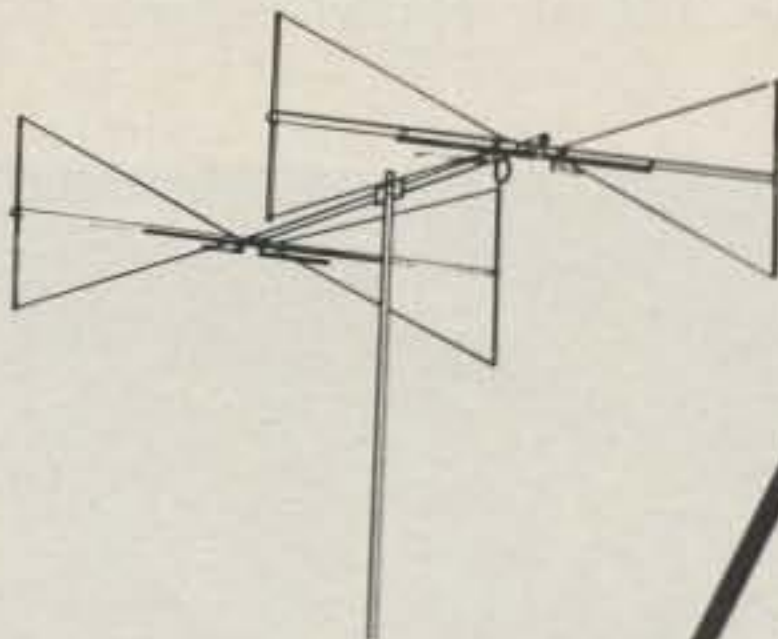
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- DC antenna relay for hum-free operation
- Illuminated SWR and power meters
- Vernier tuning for accurate settings
- Pi-L output for greater harmonic attenuation

Ruggedly constructed of proven design, this amplifier reflects the manufacturer's critical attention to details—such as the silver-plated tank coil for maximum efficiency. Cathode zener fuse and internal/external cooling are among the protective and safety devices employed. Input and output impedances are 50 ohms.

Dimensions: 17" wide x 19" deep x 8 1/2" high
Weight: 80 lbs. (shipped in 3 cartons to meet UPS requirements)

Price: **\$2175.00** FOB factory. Price includes one year limited warranty.

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FEATURES INCLUDE:

- Series parallel capacitor connection for greater harmonic attenuation.
- In-circuit wattmeter for continuous monitoring.
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Front panel switching allows rapid selection of antennas, or to an external dummy load, or permits bypassing the tuner.

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capabilities that allow multiple, simultaneous connections on both ports at the same time.

Another of the new additions to the PC*Packet Adapter family is the Packet-Cluster™ and ClusterCompanion software from the Pavilion Software folks. I overheard one of the DRSI PC*Packet Adapter purchasers commenting on the full line of software that he received with his DRSI PC*PA. From what I learned, it contained the AA4RE BBS, the WA8DED firmware, the G8BPQ PC/Node, and more.

Informative Forums

The Packet BBS forum was an informative learning session for me, as I listened to Kay, W8DUV/BBS; Jim, W4DPH/BBS; Tom, K9RXG/BBS; Wayne, WD4LYV/BBS; Frank, K4ICT (SYSOP at WB4EZL/BBS); Mike, N4NAU (SYSOP at WB4GNA, BBS); Glynn, WB4RHO/BBS; Fred, W4SDL/BBS; Tom, W1EOH/BBS; and Bob, WD4BIW/BBS discuss a lot of BBS terms and jargon that only they understood.

Some were the SYSOPs of major BBSes in the SouthNet Conference. They covered the latest versions and new BBS systems that are currently being implemented. There was some valuable routing information developed that will enhance the current traffic-handling techniques. In addition, some alternate routes using the HF frequencies were set into motion, which may soon improve the BBS traffic flow to the local area BBSes.

I learned of a BBS now in beta-testing that is soon to be released. It is purported to support easy binary up loading and down loading. The system is primarily designed around LAN use. While it offers all the standard BBS functions and features, it also supports packet pictures CGA,



Thanks to Justin Dyer, KC4QAO, and Lynn for these photographs. Justin (right) is smiling because he just up-graded from Novice to Technician (some new blood coming into amateur radio!).



Frank of F & M Electronics was just one of many dealers who were "wheeling and dealing" at the SPC.



These are some of the BBS system operators (SYSOPs) preparing for the upcoming BBS and SYSOPs forum.



Wayne Harrell, WD4LYV (left), gets first-hand information on the PC*Packet Adapter at the DRSI booth from CEO Andy DeMartini. Wayne was also the co-chairman of the BBS forum.

EGA, and VGA, up to 256 colors. In addition, it has Facsimile and SSTV file up loading and down loading. I'm told that while this system is able to perform all these modes of digital transfer, it will also be compatible with the other BBS protocols with regard to message handling and forwarding. I'll have more on this system as data becomes available.

OEMs Were Doing A "Bumper" Business

Not only were the TNC Original Equipment Manufacturers (OEMs) doing a good business, but some other OEMs were doing okay, too. The best part of it all was that even the fleamarket was inside the air-conditioned convention center. This made it nice for everyone.

Bill Levy, WA4FAT, of Alabama Amateur Electronics (AAE) was busy showing his new line of HF, VHF, and UHF "Band-Master" quad antennas. If you've never used a quad at VHF, then you are in for a pleasant surprise when you discover their superb performance. The inherent ability of the quad to reject influence from terrestrial noise makes it a natural for use with packet radio. As a matter of fact, the Georgia Amateur Radio Digital Systems (GARDS) purchased a pair of the AAE Band-Master qQuads last year, and placed one of them at the 125 foot level of a tower for nodes "ABY5 and ABY24" (1200 and 2400 bps) at Albany, Georgia.

I'm located about 12 miles south of Macon, Georgia, some 90 miles north-northeast of the Albany node site. Running 25 watts, with another Alabama Amateur Electronics "Band-Master" Quad at 25 feet above ground level, I can connect to the ABY5/ABY24 nodes about 90% of the time. Because I've had such good luck with this system, Frank, K4ICT, and I each purchased one of the 4-element, 2

meter quads to use with our recreational and mountaintop packeting. My reason was to keep an antenna in the mobile that would be fast and easy to assemble and disassemble. In addition, I'm using one of the "Easy-Up" BandMASTER portable masts with this 4-element powerhouse. It takes about 5 minutes to disassemble it and stow it inside the Chevrolet Blazer.

The 4-element AAE "Band-Master" Quad is very light, because it is constructed of a strong, lightweight fiberglass material.

The packeteers saw to it that AAE never returned to Birmingham with the load of "Band-Master" antennas they had brought with them to the SouthNet Packet Conference.

Thanks For The Comments

I am truly grateful for all the good comments on the May and June articles. I'll be covering more articles related to this

kind of information for the SYSOPs in future "Packet User's Notebook" columns. Please remember that these topics require a considerable amount of research time. If you have a topic that you would like to learn about, drop me a letter and I'll look into the subject matter that shows the greatest interest. It is your comments that inspire me to go an extra mile and draw on the available knowledge for future articles.

In addition to these articles, I've just completed a new book that's built around the next generation of packet radio. This book adds many more interface drawings and information for "TNC to Radio" and "TNC to Computer/Terminal" diagrams than earlier packet-radio-related handbooks. I've compiled this book at a level for the packeteer who has completed my book the *Packet User's Notebook* and who wishes to move to the next plateau in the field of amateur radio packet communications.

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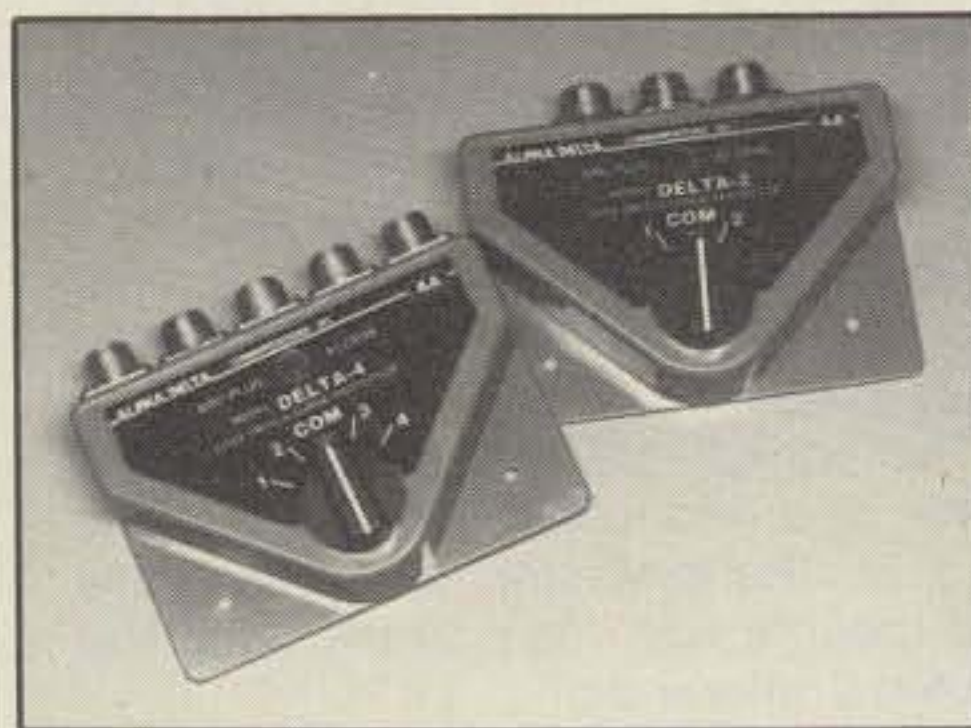
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Prices range from \$50 for the Delta-2 (2 positions, UHF connectors) to \$90 for the Delta-4/N (4 positions, N connectors). For more information contact Alpha Delta Communications, 1232 E. Broadway, Suite 210, Tempe, AZ 85282, or circle number 107 on the reader service card.



ICOM Dual-Band Mobile Transceiver

ICOM has introduced the IC-3220A/H dual-band FM mobile transceiver which measures 5.5"W x 1.6"H x 7.7"D. The IC-3220H boosts a full 45 watts output power on 144 MHz and 35 watts output power on 440 MHz. The IC-3220A version sports a complete 25 watts on both bands. Every function is accessible at the touch of a button with illuminated controls. Frequencies may be stored in the 36 memory channels, 18 channels for each band. Two call channels and two scan-edge channels are also included. The HM-56 hand microphone has 14 DTMF memory channels, convenient for autopatching.

In addition to full-duplex QSOs, the transceiver receives both main and sub-band signals simultaneously. The built-in duplexer pro-

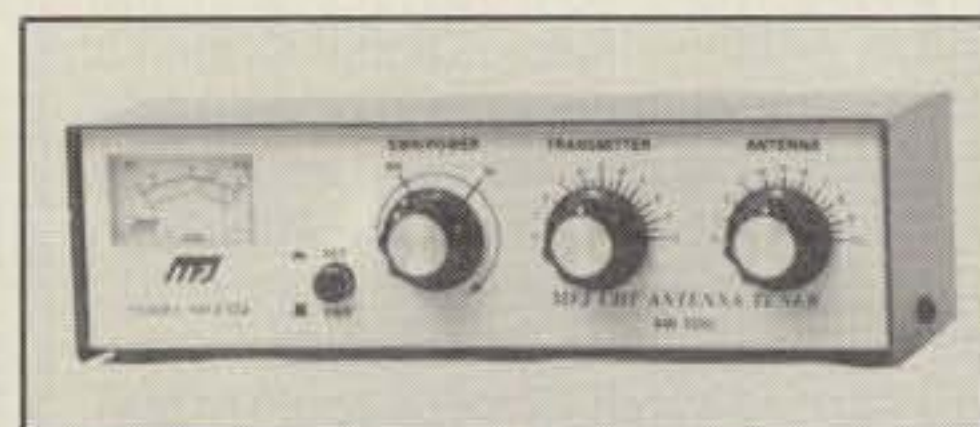
vides ease of dual-band antenna connection. Options available for the IC-3220A/H include the UT-50 tone squelch unit and UT-55 DTMF tone encoder/decoder unit. Suggested retail price for the IC-3220A is \$659, and \$699 for the IC-3220H. For more information contact ICOM America Inc., 2380 116th Ave. NE, Bellevue, WA 98004, or circle number 105 on the reader service card.



Optoelectronics RF Finder/Counter

Optoelectronics' Model 2210-A Personal Frequency Finder/Counter fits in a tool box or the palm of your hand and specifies a 10 Hz to 2.4 GHz operating range, and is useful to 2.8 GHz. It measures 4" x 3 1/2" x 1" and weighs 9 oz. It detects and displays two overlapping frequency ranges—from 10 Hz to 12 MHz, and from 10 MHz to 2.4 GHz. Resolution is 1 Hz and 100 Hz, respectively. Accuracy is plus or minus 1 PPM.

The Model 2210-A is priced at \$219. For more information, contact Optoelectronics Inc., 5821 NE 14th Ave., Fort Lauderdale, FL 33334, or circle number 111 on the reader service card.



MFJ Antenna Tuner

Now available from MFJ is the MFJ-924 440 MHz antenna tuner with built-in SWR/wattmeter. The UHF tuner handles power up to 200 watts, and its compact size and wide impedance matching range make it suited for mobile and/or base operation. It also features SO-239 input and output connectors and a

wing-nut post for ground. The built-in SWR/wattmeter shows power on 30 or 300 watt scales and SWR.

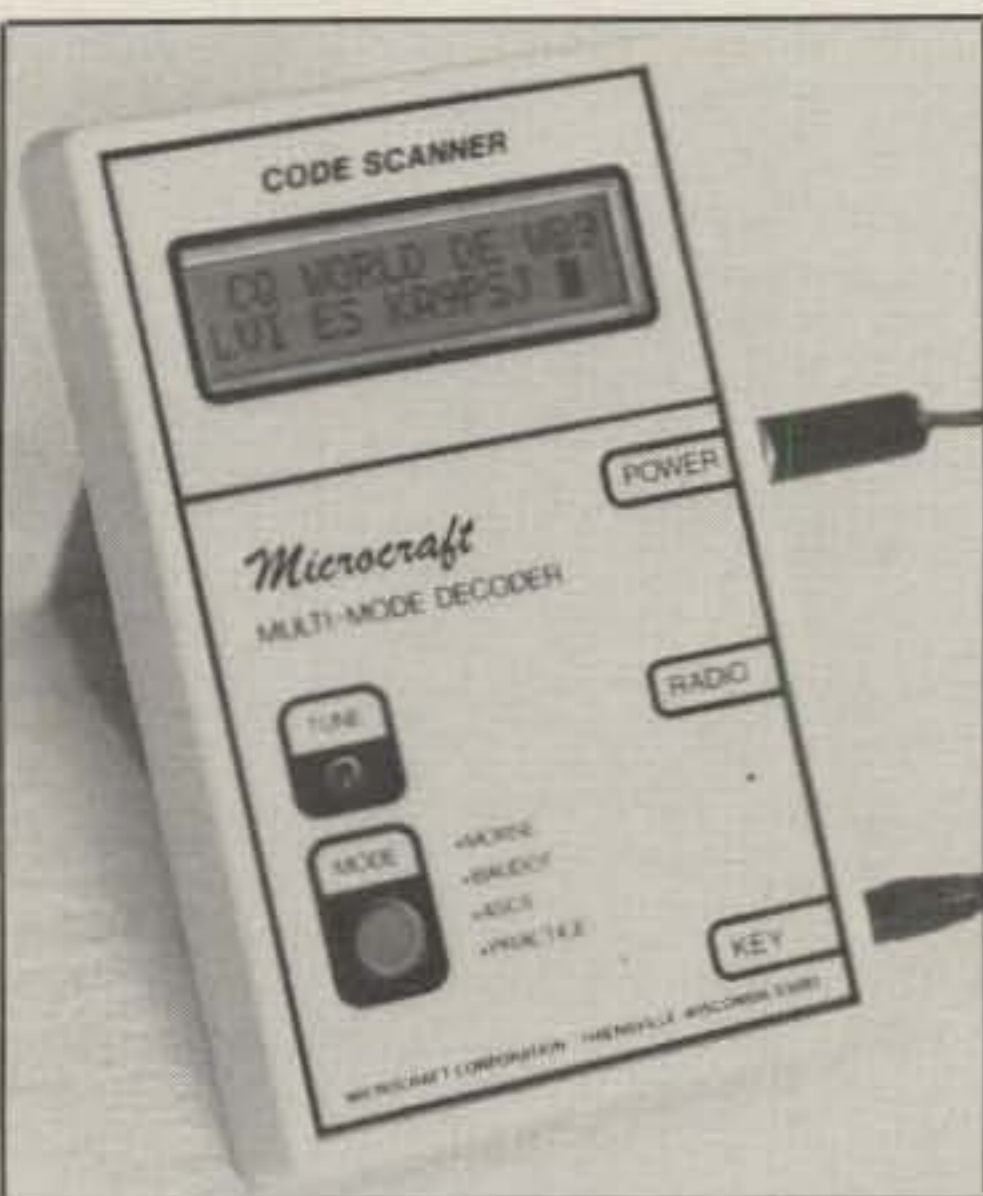
The MFJ-924 sells for \$69.95 and comes with MFJ's one-year unconditional guarantee. For more information contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762, or circle number 106 on the reader service card.



Astron Power Supply

Astron Corporation has introduced a low-profile power supply, Model SL-11A, which was specifically designed as a base-station power supply for two-way radios. It is very well regulated, maker says, and will provide 11 amps of current at 50% duty cycle. The power supply has fold-back current limiting to protect the power supply from overload and short circuit and also has an overvoltage protection feature to protect the radio should the output voltage exceed a safe level. The SL-11A is available in black or gray.

For more information contact Astron Corp., 9 Autry, Irvine, CA 92718, or circle number 108 on the reader service card.



Microcraft Code Scanner

Microcraft's Code Scanner is a 2-line, 32-character, multi-mode decoder that copies Morse, Baudot, and ASCII codes from a radio. It features built-in code-practice oscillator for handkey with readout to the display, a built-in speaker, advanced analog and digital filtering with AGC, and a special practice mode for learning Morse characters. It measures 3½" x 5½" and operates from 12 VDC or 120 VAC with the adapter provided.

Code Scanner (Model CSCAN) is priced at \$189 (plus \$5.00 s&h). For more information, contact Microcraft Corp., P.O. Box 513, Thiensville, WI 53092, or circle number 109 on the reader service card.

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Solar Cycle Progress?

Sunspot Cycle 22 is now in its 45th month, and it has remained relatively stable for the past 7 months at the 158 level (± 1).

The Royal Observatory of Belgium reports a monthly mean sunspot level of 132 for May 1990. This results in a 12-month running smoothed sunspot number of 158 centered on November 1989. During May daily levels of solar activity varied between a low of 59 on the 2nd and a high of 193 on the 21st.

The Royal Observatory of Belgium has also released the official mean sunspot number for 1989. This is the average of all daily values observed throughout the year and amounts to 157.6. Except for the record-breaking years of 1957, 1958, and 1959, this is the highest yearly mean recorded in the more than 200 years that sunspot records have been kept. Although solar activity may have been somewhat lower than expected by some experts, 1989 will go into the record books as a truly great year for propagation on the radio amateur shortwave bands.

According to daily observations made in Ottawa, Ontario by the Algonquin Radio Observatory, a mean level of 187 was reported for 10.7 cm solar flux during May 1990. This results in a 12-month running number of 206 centered on November 1989.

A smoothed sunspot number on the order of 145 is forecast for September 1990, with a corresponding smoothed 10.7 cm solar flux level of approximately 200.

CQ DX Contest Special 1990

This year's CQ World-Wide DX Contest will be held on the following dates:

October 27-28 Phone Section

November 24-25 CW Section

In the tradition of the past 39 years, next month's Propagation column will be devoted to a special comprehensive forecast which will focus on both sections of the contest period. Be sure to read it if you are planning to participate in the 1990 World-Wide Contest.

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: 6, 9, 18, 21	A	A	B	C
High Normal: 5, 7-8, 10, 14, 16-17, 19-20, 27	A	B	C	C-D
Low Normal: 4, 13, 15, 22, 25-26, 30	A-B	B-C	C-D	D-E
Below Normal: 1, 3, 11-12, 23, 28-29	B-C	C-D	D-E	E
Disturbed: 2, 24	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 fair-to-poor (C-D) on September 1, poor (D-E) on the 2nd, fair-to-poor (C-D) on the 3rd, good-to-fair (B-C) on the 4th, good (B) on the 5th, etc.

September Conditions

September and early October represent a time of transition for HF propagation conditions. On some days conditions will seem to be much the same as during the summer months, and on other days the first signs of wintertime conditions should be noticeable. For this reason this month's column contains both Short-Skip and DX Propagation Charts. The Short-Skip Charts are valid for the entire months of September and October, while the DX Charts are valid from mid-September through mid-October.

By mid-September days should be getting noticeably shorter and nights longer in the northern hemisphere. Static levels should be considerably lower and daytime absorption reduced from summer levels. This should result in a greater number of DX openings on 10, 12, 15, 17, and 20 meters during the hours of daylight with somewhat stronger signals. Im-

proved nighttime DX propagation conditions are also expected for the 30, 40, 80, and 160 meter bands, with considerably lower static levels. A seasonal decline should be noticeable on 20 meters during the hours of darkness, but this is expected to remain a very good band for DX almost around the clock.

Another solar phenomenon that will have considerable influence on propagation conditions during this period is the autumnal, or fall, equinox. This will occur on September 22nd as the sun crosses the plane of the equator on its apparent travel from northern to southern skies. On this day the hours of daylight and darkness are equal in length throughout the world. The effect of the autumnal equinox will be felt on HF propagation conditions from about mid-September through early October. During this period the characteristics of the ionosphere are similar over large areas of the world, and this is usually the best season for DX openings between the temperate regions of both the northern and southern hemispheres. A similar period occurs during the spring equinox, which is centered on March 21st. Equinoctial propagation conditions should produce a considerable improvement in inter-hemispheric DX openings, for example, from the USA to South America, to the South Pacific area and Australia, to southern Asia, and to southern Africa and Antarctica. This improvement should be noticeable on all bands 10 through 160 meters. The best times for equinoctial-type DX openings should be the twilight periods around local sunrise and sunset, but they will occur at other times as well. Many of these inter-hemispheric openings may follow either the long or the short great circle path, or both, so be sure to check both directions.

VHF Ionospheric Openings

The combination of continuing high solar activity and seasonally higher daytime usable frequencies should result in a considerable number of DX openings on 6 meters. Openings in the quadrant between northeast and south are most likely to take place between 9 AM and noon local daylight time. From noon to approximately 4 PM expect conditions to peak towards the Caribbean, Central America, and South America. Look for openings to-

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distances column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 40 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in () after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

- (4) Opening should occur on more than 22 days
- (3) " " " between 14 and 22 days
- (2) " " " between 7 and 13 days
- (1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. On the Short-Skip Chart appropriate daylight time is used at the path midpoint. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are HST. To convert to daylight time in other USA time zones, add 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone, and 6 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to daylight time in other areas of the USA subtract 7 hours in the PDT zone; 6 hours in the MDT zone, 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave length above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the propagation index will increase by one level for each 10dB loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Department of Commerce, Boulder, Colorado, 80302.

**CQ Short-Skip Propagation Chart
September & October 1990
Local Daylight Time
At Path Mid-Point (24-Hour Time)**

Band Meters	Distance Between Stations (Miles)			
	50-250	250-750	750-1300	1300-2300
10	NIL	10-19 (0-1)	08-10 (1) 10-12 (1-2) 12-14 (1-3) 14-15 (1-4) 15-17 (1-3) 17-19 (1-2) 19-22 (0-1)	08-09 (1-2) 09-10 (1-3) 10-12 (2-4) 12-14 (3-4) 14-15 (4) 14-15 (4) 15-17 (3) 17-19 (2) 19-20 (1-2) 20-22 (1)
15	NIL	08-10 (0-1) 10-14 (0-2) 14-15 (0-3) 15-17 (0-2) 17-21 (0-1)	08-10 (1-2) 10-14 (2-4) 14-15 (3-4) 15-17 (2-4) 17-20 (3) 17-20 (1-3) 20-22 (2-3) 22-23 (1-2) 22-08 (0-1) 23-01 (1) 01-08 (1-0)	08-09 (2) 09-10 (2-3) 10-17 (4) 10-17 (4) 14-16 (4-3) 16-22 (4) 16-22 (4) 22-00 (3-4) 00-01 (3) 01-03 (2) 03-06 (1) 00-01 (3) 01-03 (2) 03-06 (1-2)
20	12-14 (0-1) 14-17 (0-2) 17-22 (0-1)	08-10 (0-3) 10-12 (0-4) 12-14 (1-4) 14-17 (2-4) 17-18 (1-4) 18-22 (1-3) 22-03 (0-2) 03-08 (0-1)	06-08 (1-2) 08-10 (3-4) 10-18 (4) 18-22 (3-4) 14-16 (4-3) 22-01 (2-3) 01-03 (2) 03-06 (1) 00-01 (3) 01-03 (2) 03-06 (1-2)	06-08 (2) 08-10 (4) 10-14 (4-2) 14-16 (4-3) 14-16 (4-3) 16-22 (4) 22-00 (3-4) 00-01 (3) 01-03 (2) 03-06 (1-2)

40	08-10 (2-3) 10-12 (3-4) 12-18 (4) 18-20 (3-4) 20-23 (1-2) 23-06 (0-1) 06-08 (1-2)	08-10 (3-4) 10-12 (4-3) 12-16 (4-2) 16-18 (4-3) 18-20 (4) 20-23 (2-4) 23-01 (1-4) 01-06 (1-3) 06-08 (2-3)	08-10 (4-2) 10-12 (3-1) 12-16 (2-1) 16-18 (3-2) 18-20 (4-3) 20-01 (4) 01-04 (3-4) 04-06 (3) 06-08 (3-4)	08-10 (2-1) 10-16 (1-0) 16-18 (2-1) 18-20 (3-2) 20-04 (4) 04-06 (3-4) 06-08 (4-3)
80	07-09 (3-4) 09-11 (4) 11-19 (4-3) 19-00 (4) 00-05 (3-4) 05-07 (2-4)	07-09 (4-2) 09-11 (4-1) 11-17 (3-1) 17-19 (3-2) 19-21 (4-3) 21-07 (4)	07-09 (2-1) 09-17 (1-0) 17-19 (2-1) 19-21 (3-2) 21-22 (4-3) 22-06 (4) 06-07 (4-3)	07-09 (1-0) 09-17 (0) 17-19 (1) 19-21 (2) 21-22 (3-2) 22-04 (4-3) 04-06 (4-2) 06-07 (3-1)
160	17-19 (1-0) 19-21 (2-1) 21-06 (4) 06-08 (3-2) 08-10 (2-1) 10-12 (1-0)	18-20 (1-0) 20-21 (1) 21-03 (4-3) 03-06 (3-2) 06-08 (2-1) 08-10 (1-0)	20-21 (1-0) 21-23 (3-1) 23-03 (3) 03-06 (2-1) 06-08 (1)	21-23 (1-0) 23-03 (3-2) 03-06 (1) 06-08 (1-0)

**HAWAII
September & October 1990
Openings Given In
Hawaiian Standard Time #**

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	06-08 (1) 08-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-16 (2) 16-18 (3) 18-20 (2) 20-22 (1)	11-14 (1) 14-16 (2) 16-18 (3) 18-21 (4) 21-00 (3) 00-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	18-20 (1) 20-23 (2) 23-00 (3) 00-01 (2) 01-02 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Central USA	06-08 (1) 08-11 (2) 11-14 (4) 14-16 (2) 16-17 (1)	05-06 (1) 06-08 (2) 08-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-22 (1)	09-14 (1) 14-16 (2) 16-18 (3) 18-22 (4) 22-00 (3) 00-04 (2) 04-06 (3) 06-09 (2)	18-20 (1) 20-22 (2) 22-01 (3) 01-03 (2) 03-04 (1) 21-22 (1)* 22-00 (2)* 00-02 (1)*
Western USA	07-09 (1) 09-11 (2) 11-14 (4) 14-16 (3) 16-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-14 (3) 14-17 (4) 17-19 (3) 19-22 (2) 22-00 (1)	10-15 (2) 15-17 (3) 17-19 (4) 19-00 (3) 00-02 (2) 02-04 (1) 04-06 (2) 06-08 (4) 08-10 (3)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 21-22 (1)* 22-23 (2)* 23-02 (3)* 02-03 (2)* 03-04 (1)*

**ALASKA
September & October 1990
Openings Given In GMT**

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	18-20 (1) 20-23 (2) 23-00 (1)	16-18 (1) 18-22 (2) 22-01 (3) 01-02 (2) 02-03 (1)	14-16 (1) 21-23 (1) 23-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	08-12 (1)
Central USA	19-21 (1) 21-00 (2) 00-02 (1)	17-19 (1) 19-22 (2) 22-00 (3) 00-02 (4) 02-03 (2) 03-04 (1) 05-06 (1)	15-17 (1) 21-23 (1) 23-00 (2) 00-04 (3) 04-05 (2) 05-07 (1)	08-11 (1) 11-13 (2) 13-14 (1) 11-13 (1)*
Western USA	20-22 (1) 22-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	18-21 (1) 21-23 (2) 23-02 (4) 02-03 (3) 03-05 (2) 05-06 (1)	16-18 (1) 18-20 (3) 20-00 (2) 00-02 (3) 02-04 (4) 04-05 (3) 05-06 (2) 06-10 (1)	08-11 (1) 11-14 (2) 14-16 (1) 11-14 (1)*

#See explanation in "How To Use Short-Skip Charts" at the beginning of this column.

Note: The Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter distances use the preceding Short-Skip Propagation Chart.

*Indicates best time 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. 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.

**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.

3. The propagation index is the number that appears in () after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

- (4) Opening should occur on more than 22 days
- (3) Opening should occur between 14 and 22 days
- (2) Opening should occur between 7 and 13 days
- (1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. wtc. Appropriate daylight time is used, not GMT. T convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

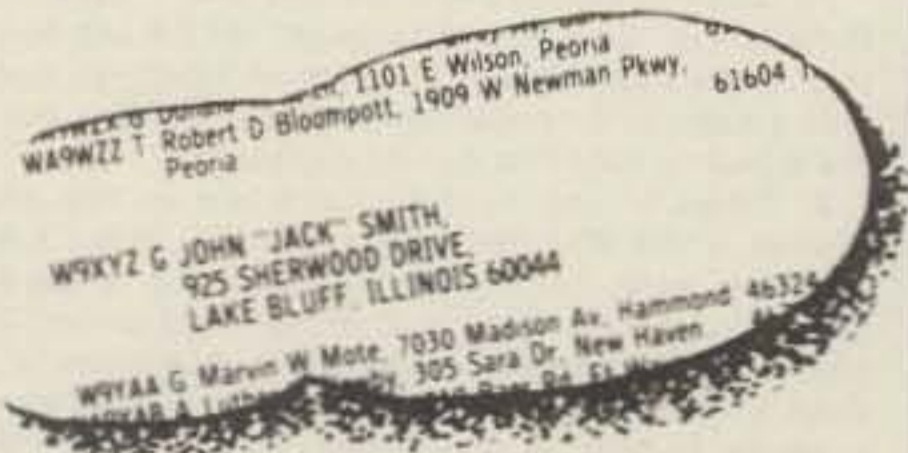
5. The charts are based upon a transmitted power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain 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.

**September 15 - October 15, 1990
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:**

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	08-10 (1) 10-11 (2) 11-13 (3) 13-15 (2) 15-16 (1) 09-11 (1)*	08-09 (1) 09-11 (2) 11-14 (4) 14-15 (3) 15-17 (2) 17-19 (1)	02-04 (1) 04-06 (2) 06-10 (3) 10-12 (2) 12-15 (3) 15-17 (4) 17-21 (3) 21-02 (2)	18-19 (1) 19-21 (2) 21-23 (3) 23-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 20-22 (1)* 22-01 (2)* 01-04 (1)*
Northern Europe & European USSR	09-10 (1) 10-13 (2) 13-14 (1)	08-09 (1) 09-10 (2) 10-13 (3) 13-14 (2) 14-16 (1)	03-06 (1) 06-08 (2) 08-11 (3) 11-13 (2) 13-17 (3) 17-19 (2) 19-21 (1)	18-20 (1) 20-04 (2) 04-06 (1) 21-04 (1)*
Eastern Mediteranean & Middle East	09-10 (1) 10-12 (2) 12-14 (1)	08-09 (1) 09-12 (2) 12-14 (3) 14-16 (2) 16-18 (1)	07-09 (2) 09-15 (1) 15-17 (2) 17-21 (3) 21-23 (2) 23-01 (3) 01-03 (2) 03-07 (1)	19-21 (1) 21-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	09-12 (1) 12-14 (2) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 09-12 (1)*	07-09 (1) 09-13 (2) 13-15 (3) 15-17 (4) 17-19 (3) 19-20 (2) 20-22 (1)	05-08 (2) 08-15 (1) 15-17 (2) 17-21 (4) 21-00 (3) 00-03 (2) 03-05 (1)	20-23 (1) 23-02 (2) 02-04 (1) 00-03 (1)*
Eastern & Central Africa	10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1) 09-11 (1)*	08-10 (1) 10-13 (2) 13-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	12-14 (1) 14-17 (2) 17-22 (3) 22-02 (2) 02-03 (1)	20-02 (1) 00-01 (1)*
Southern Africa	09-11 (1) 11-12 (2) 12-13 (3) 13-14 (2) 14-15 (1) 10-12 (1)*	08-11 (1) 11-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-08 (2) 08-15 (1) 15-16 (2) 16-19 (3) 19-00 (2) 00-03 (3) 03-04 (2) 04-06 (1)	19-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*
Central & South Asia	09-11 (1) 19-22 (1)	08-09 (1) 09-12 (2) 12-13 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-22 (2) 22-01 (1)	05-07 (1) 20-23 (1)

CALLBOOK SPECIAL LISTINGS



BE OUTSTANDING!

Do you have special requirements for your Callbook listing? Would you like to include your nickname, the clubs you've joined, or the former calls you've held? Do you have more than one postal address, say one in the summer and a different address in the winter? Would you like to add a slogan to your listing, or include the many awards you've won? All these, and more, can be accommodated in a Callbook Special Listing.

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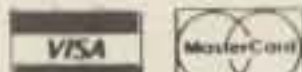
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Please note: The deadline for this service in the 1991 Callbook is October 1, 1990. Your order and payment in U.S. funds must be in our hands by that date. Mail early to avoid disappointment.

RADIO AMATEUR
callbook INC.



Dept. RACM0002
925 Sherwood Dr., Box 247
Lake Bluff, IL 60044 USA



Southeast Asia	11-14 (1) 18-21 (1)	08-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-10 (2) 10-12 (1) 15-18 (1) 20-21 (1) 21-00 (2) 00-02 (1)	06-08 (1)
Far East	09-11 (1) 18-20 (1)	08-09 (1) 09-11 (2) 11-13 (1) 16-18 (1) 18-20 (2) 20-22 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (1) 18-20 (1) 20-22 (2) 22-00 (1) 00-03 (2) 03-04 (1)	05-08 (1) 18-19 (1) 05-07 (1)*
South Pacific & New Zealand	09-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 16-18 (1)*	08-09 (1) 09-11 (2) 11-14 (1) 14-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-00 (1)	12-20 (1) 20-22 (2) 22-00 (3) 00-02 (4) 02-04 (3) 04-08 (2) 08-10 (3) 10-12 (2)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 03-05 (1)* 05-07 (2)* 07-08 (1)*
Australasia	10-12 (1) 14-16 (2) 17-18 (3) 18-19 (2) 19-21 (1) 17-19 (1)*	08-09 (1) 09-10 (2) 10-12 (3) 12-14 (2) 14-17 (1) 17-18 (2) 18-20 (4) 20-21 (2) 21-23 (1)	07-09 (2) 09-11 (3) 11-13 (2) 13-16 (1) 16-18 (2) 18-21 (1) 04-05 (1) 23-02 (3) 02-04 (2) 04-07 (1)	02-04 (1) 04-06 (2) 06-07 (3) 07-08 (2) 08-09 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-10 (2) 10-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 09-12 (1)*	06-07 (1) 07-08 (2) 08-11 (4) 11-13 (3) 13-18 (4) 18-20 (3) 20-21 (2) 21-22 (1)	03-05 (2) 05-07 (3) 07-10 (4) 10-14 (2) 14-16 (3) 16-23 (4) 23-03 (3)	19-20 (1) 20-21 (2) 21-04 (4) 04-06 (3) 06-07 (2) 07-08 (1) 21-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-09 (1) 09-12 (2) 12-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (2) 19-20 (1) 09-16 (1)*	07-08 (1) 08-09 (2) 09-11 (3) 11-15 (2) 15-16 (3) 16-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	11-16 (1) 16-17 (2) 17-20 (3) 20-01 (4) 01-04 (3) 04-06 (2) 06-08 (3) 08-11 (2)	21-00 (1) 00-05 (2) 05-07 (1) 01-06 (1)*
McMurdo Sound, Antarctica	16-19 (1)	12-15 (1) 15-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	16-18 (1) 18-22 (2) 22-01 (3) 01-04 (2) 04-08 (1) 08-10 (2) 10-11 (1)	23-01 (1) 01-05 (2) 05-07 (1) 05-07 (1)*

Time Zones: CDT & MDT (24-Hour Time) CENTRAL USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	09-11 (1) 11-13 (2) 13-14 (1) 10-11 (1)*	08-10 (1) 10-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-16 (4) 16-18 (3) 18-23 (2) 23-03 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 21-23 (1)* 23-01 (2)* 01-02 (1)*
Northern & Central Europe & European USSR	09-13 (1)	08-09 (1) 09-11 (2) 11-12 (3) 12-13 (2) 13-15 (1)	06-07 (1) 07-10 (2) 10-12 (1) 12-13 (2) 13-17 (3) 17-19 (2) 19-21 (1) 23-04 (1)	20-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)
Eastern Mediterranean & Middle East	10-13 (1)	08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-16 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-20 (3) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1)	20-23 (1) 21-23 (1)*
Western Africa	10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1) 09-11 (1)*	07-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	05-08 (2) 08-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-02 (2) 02-05 (1)	20-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Eastern & Central Africa	11-13 (1) 13-14 (2) 16-17 (1) 09-11 (1)*	09-10 (1) 10-13 (2) 13-17 (3) 17-18 (2) 18-19 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-23 (2) 23-00 (1) 07-09 (1)	21-00 (1)
Southern Africa	09-11 (1) 11-12 (2) 12-13 (3) 13-14 (2) 13-15 (1) 10-13 (1)*	07-09 (1) 09-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-08 (2) 08-14 (1) 14-16 (2) 16-19 (3) 19-22 (2) 22-01 (3) 01-05 (1)	20-21 (1) 21-23 (2) 23-01 (1) 21-23 (1)*

Central & South Asia	09-11 (1) 19-21 (1)	09-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-22 (2) 22-01 (1)	06-08 (1) 19-21 (1)
Southeast Asia	10-12 (1) 12-13 (2) 13-15 (1) 17-18 (1) 18-19 (2) 19-20 (1)	09-11 (1) 11-13 (2) 13-15 (1) 18-19 (1) 19-20 (2) 20-22 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-13 (1) 16-20 (1) 20-23 (2) 23-02 (1)	05-09 (1)
Far East	15-17 (1) 17-19 (2) 19-20 (1)	10-16 (1) 16-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-16 (1) 16-19 (2) 19-21 (1) 21-23 (2) 23-00 (3) 00-01 (2) 01-03 (1)	03-05 (1) 05-08 (2) 08-09 (1) 06-08 (1)
South Pacific & New Zealand	11-13 (1) 13-14 (2) 14-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 11-14 (1)* 16-18 (1)*	08-09 (1) 09-15 (2) 15-17 (3) 17-20 (4) 20-21 (3) 21-22 (2) 22-00 (1)	04-08 (2) 08-11 (3) 11-13 (2) 13-18 (1) 18-20 (2) 20-22 (3) 22-02 (4) 02-04 (3)	00-01 (1) 01-06 (3) 06-08 (4) 08-09 (2) 09-10 (1) 02-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 16-18 (1)*	08-09 (1) 09-11 (2) 11-15 (1) 15-16 (2) 16-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	06-06 (2) 08-11 (3) 11-13 (2) 13-16 (1) 16-18 (2) 18-20 (2) 20-22 (2) 22-00 (3) 00-02 (4) 02-04 (3)	02-03 (1) 03-05 (2) 05-07 (3) 07-08 (2) 08-09 (1) 05-06 (1)* 06-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-10 (2) 10-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 09-12 (1)*	07-08 (1) 08-09 (2) 09-11 (4) 11-14 (3) 14-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	07-10 (4) 10-12 (3) 12-14 (2) 14-16 (3) 16-23 (4) 23-03 (3) 03-05 (2) 05-07 (3)	19-20 (1) 20-21 (2) 21-22 (3) 22-05 (4) 05-06 (3) 06-07 (2) 07-08 (1) 20-23 (1)* 23-05 (2)* 05-07 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-09 (1) 09-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 09-15 (1)*	06-07 (1) 07-08 (2) 08-11 (3) 11-15 (2) 15-16 (3) 16-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	10-16 (1) 16-17 (2) 17-18 (3) 18-00 (4) 00-03 (3) 03-05 (2) 05-07 (3) 07-10 (2)	21-00 (1) 00-04 (2) 04-06 (1) 01-05 (1)*
McMurdo Sound, Antarctica	15-19 (1)	11-15 (1) 15-17 (2) 17-21 (3) 21-22 (2) 22-23 (1)	16-17 (1) 17-20 (2) 20-03 (3) 03-05 (2) 05-07 (1) 07-09 (2) 09-10 (1)	23-01 (1) 01-05 (2) 05-07 (1) 04-06 (1)*

Time Zone: PDT (24-Hour Time) WESTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	09-12 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-15 (1) 22-00 (1)	06-07 (1) 07-10 (2) 10-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-21 (1) 23-01 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Central & Northern Europe & European USSR	09-11 (1)	08-09 (1) 09-11 (2) 11-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-17 (2) 17-18 (1) 21-23 (1)	20-21 (1) 21-22 (2) 22-23 (1)* 21-22 (1)*
Eastern Mediterranean & Middle East	09-11 (1)	08-09 (1) 09-10 (2) 10-11 (3) 11-12 (2) 12-13 (1) 20-22 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (3) 16-20 (1) 20-23 (2) 23-01 (1)	20-23 (1)
Western & Central Africa	09-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	08-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	01-07 (1) 07-09 (2) 09-14 (1) 14-15 (2) 15-16 (3) 16-20 (4) 20-23 (3) 23-01 (2)	21-00 (1)
Eastern Africa	11-13 (1) 13-15 (2) 15-16 (1)	09-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	07-09 (1) 12-15 (1) 15-17 (2) 17-19 (3) 19-21 (2) 21-23 (1)	20-23 (1)

Southern Africa	09-10 (1) 10-12 (2) 12-14 (1)	07-09 (1) 09-11 (2) 11-14 (3) 14-16 (2) 16-17 (1)	01-07 (1) 07-09 (2) 09-10 (1) 12-16 (2) 16-20 (3) 20-01 (2)	19-22 (1)
Central & South Asia	09-11 (1) 17-19 (1)	08-11 (1) 16-17 (1) 17-18 (2) 18-19 (3) 19-20 (2) 20-01 (1)	02-08 (2) 08-10 (3) 10-12 (2) 12-17 (1) 17-21 (2) 21-02 (1)	06-08 (1) 19-21 (1)
Southeast Asia	09-10 (1) 10-11 (2) 11-12 (2) 16-17 (1) 17-18 (2) 18-19 (1) 15-17 (1)*	07-10 (1) 10-13 (2) 13-16 (1) 16-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	03-07 (2) 07-09 (3) 09-12 (2) 12-13 (1) 21-22 (1) 22-01 (2) 01-03 (3)	01-03 (1) 03-06 (2) 06-08 (1)
Far East	15-16 (1) 16-17 (2) 17-18 (3) 18-19 (2) 19-20 (1) 14-16 (1)*	09-11 (1) 14-15 (1) 15-18 (2) 18-19 (3) 19-20 (4) 20-21 (2) 21-22 (1)	04-07 (2) 07-10 (4) 10-13 (3) 13-15 (2) 15-20 (1) 20-22 (2) 22-00 (3) 00-02 (4) 02-04 (3)	01-03 (1) 03-07 (2) 07-08 (3) 08-09 (1) 03-05 (1)* 05-07 (2)* 07-08 (1)*
South Pacific & New Zealand	10-12 (1) 12-13 (2) 13-14 (3) 14-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 10-13 (1)* 15-18 (1)*	07-09 (1) 09-10 (2) 10-12 (3) 12-14 (2) 14-16 (3) 16-21 (4) 21-23 (3) 23-01 (2) 01-02 (1)	14-17 (1) 17-19 (2) 19-21 (3) 21-02 (4) 02-04 (3) 04-08 (2) 08-09 (3) 09-11 (4) 11-12 (3) 12-14 (2)	21-22 (1) 22-23 (2) 23-00 (3) 00-05 (4) 05-07 (3) 07-08 (2) 08-09 (1) 23-02 (1)* 02-06 (2)* 06-07 (1)*
Australasia	09-12 (1) 12-14 (2) 14-15 (3) 15-18 (4) 18-19 (3) 19-21 (2) 21-22 (1) 15-17 (1)*	07-08 (1) 08-11 (2) 11-14 (1) 14-15 (2) 15-17 (3) 17-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	08-10 (4) 10-12 (3) 12-13 (2) 13-15 (1) 15-18 (2) 18-20 (1) 20-22 (2) 22-23 (3) 23-02 (4) 02-04 (3) 04-08 (2)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-10 (2) 10-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-19 (1) 09-12 (1)*	07-08 (1) 08-09 (3) 09-11 (4) 11-13 (3) 13-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-23 (4) 23-02 (3) 02-06 (2)	19-20 (1) 20-21 (2) 21-22 (3) 22-04 (4) 04-05 (3) 05-06 (2) 06-08 (1) 20-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-09 (2) 09-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 09-14 (1)*	06-07 (1) 07-08 (2) 08-10 (3) 10-15 (2) 15-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-23 (1)	09-15 (1) 15-17 (2) 17-18 (3) 18-23 (4) 23-03 (3) 03-05 (2) 05-07 (3) 07-09 (1)	21-23 (1) 23-03 (2) 03-05 (1) 00-03 (1)*
McMurdo Sound, Antarctica	14-16 (1) 16-18 (2) 18-19 (1)	10-14 (1) 14-16 (2) 16-20 (3) 20-21 (2) 21-23 (1)	08-10 (1) 15-17 (1) 17-19 (2) 19-22 (3) 22-00 (4) 00-03 (3) 03-08 (2)	22-00 (1) 00-05 (2) 05-06 (1) 03-05 (1)*

*Indicates best time 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. **Indicates best times to listen for F-2 layer openings on 6 meters.
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.

wards the southwest and west for an hour or two before sunset. These openings should result from F-2 layer reflection, and signal levels may be relatively strong at times. Inter-hemispheric openings are also likely to occur on 6 meters as a result of the equinoctial propagation conditions. Later in the evening check the 6 meter band for an expected improvement in trans-equatorial (TE) type openings. These are openings that cross the geomagnetic equator at an approximate right angle, and they usually peak during

late September and early October. The best time for TE openings is between 8 and 11 PM local daylight time, but signals are usually weak and are often accompanied by flutter fading. TE openings towards South America from the USA favor locations in the southern tier states, although openings farther north can also occur.

Although the seasonal peak for 6 meter sporadic-E openings has already passed, an occasional 6 meter short-skip opening may still be possible over distances ranging between 1000 and 1300 miles. The best time to check for sporadic-E openings is before noon and again during the early evening.

Auroral activity usually increases sharply during equinoctial periods. This should result in increased auroral-type short-skip openings of both 6 and 2 meters during September and early October. The best possibilities for such openings should coincide with periods of expected radio storminess. Check the "Last Minute Forecast" at the beginning of this column for those days during September that are expected to be Below Normal or Disturbed.

No major meteor showers are expected during September, but a minor one may permit meteor-scatter-type openings on the VHF bands between September 19th and 21st.
73, George, W3ASK

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REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

King Hussein, George Bush Intercede For Handicapped Ham Disabled Amateurs Can Now Forego Code Tests

With the help of King Hussein, JY1, of Jordan and President Bush, Johnstown, Pennsylvania amateur Tom McMillen, WB3HGW, has obtained a dramatic reversal of FCC policy towards the handicapped. Effective immediately, amateurs with mental or physical handicaps can qualify for a complete waiver of the 13 and 20 WPM Morse code examinations required for upgrade to the General, Advanced, and Extra class. Disabled applicants requiring 5 WPM need only identify certain phrases or characters.

McMillen, a Technician class licensee for 15 years, has epilepsy and is paralyzed and confined to a wheelchair. Though he is an active DXer and net control op—recently honored with a plaque for service to his local club (Hilltop Repeater Association)—WB3HGW has been unable to achieve his goal of upgrading to General class. According to his doctor, McMillen's disability and the effects of medication have prevented him from raising his Morse code speed to the required 13 WPM, even after extended study and practice. In light of this difficulty, he asked the FCC last year to waive the code exam.

The FCC declined McMillen's request, in keeping with its long-time traditional policy that the requirements for amateur licenses are the same for everyone. Volunteer examiners have had some flexibility to modify their procedures to meet special needs; for example, a visually handicapped applicant may dictate answers to test questions.

McMillen did not feel that these limited adjustments would be worthwhile: "For an epileptic, it doesn't matter how the code test is given," he said. "There may be epileptics who have passed 20 WPM. But it doesn't affect everyone the same. It is affected by the speed that the brain will process the information, and where the damage to the brain is." He supplied the FCC with a letter from his physician documenting his disability.

Don't Rock The Boat

He told us that at one point an FCC staff

*National Volunteer Examiner Coordinator,
P.O. Box 565101, Dallas, TX 75356-5101*

member advised him that the "... ARRL was against it," implying that changes in the policy would be hard to obtain. Another FCC official allegedly urged him not to "... rock the boat." The ARRL told McMillen in a letter that he should contact the Handi-Hams organization, which assists handicapped amateurs.

Instead, McMillen wrote about his situation to Jordan's King Hussein, who holds the JY1 callsign recognized around the world. A Jordanian official replied sympathetically, and wrote that the king had contacted President George Bush to request intervention on McMillen's behalf.

President Bush then referred Hussein's letter to the State Department, where officials responsible for Jordanian affairs reviewed the case together with members of the National Security Council staff. Last February King Hussein himself wrote to WB3HGW, stating that Bush had replied that the government would try to help McMillen and others with similar disabilities.

Although Commission staff did not describe to us exactly how McMillen's case was handled, it appears that the State Department, or President Bush's office, or both, contacted top leadership at the FCC, who then told amateur radio regulators to change their policy right away. On June 13 McMillen received a phone call from the FCC to tell him that his request for waiver of the 13 WPM requirement was granted. A letter of confirmation arrived soon thereafter.

Policy Now in Effect

At the Volunteer Examiner Coordinators Conference held on June 15th in Gettysburg, Pennsylvania, FCC Personal Radio Branch Chief John Johnston, W3BE, announced the grant of a waiver to McMillen. However, he provided significant additional information. Interim procedures are now in effect for handicapped applicants who wish to request a waiver of the code requirements in order to upgrade. Also, VEs are instructed to improve code testing for handicapped applicants for new amateur licenses.

W3BE said, "The interest on Capitol Hill for handicapped persons is also be-

ing felt at the Commission. There is a renewed concern about the degree of accommodation provided in your operator license examinations.

"The impetus for this concern is coming from two sources. One source was expected. We have always had to deal with requests for waiver of the telegraphy examinations from persons who claimed their handicap put them at a disadvantage in obtaining an amateur operator license. Lately, however, the number of such requests seem to be picking up. Three persons have filed discrimination complaints under the disability and rehabilitation legislation.

"The other source may surprise you. It is coming from your own ranks: your VEs. I suppose that when you only encounter the handicap examination issue from a distance, it is easy to rigidly insist—as many of the commenters in the Communicator proposal are insisting—"I passed the code test. That proves that any fool can do it!"

"Most amateurs held a similar view until the VE system came along. Before then you didn't have to give the heartbreaking news to persons who have a severe handicap that keeps them out of amateur radio. Our examiners did that nasty little job for you. But now it is the VEs who have to do it. They are on the firing line. More and more, they are becoming sensitized to the very real problems some handicapped persons have in passing the code tests.

"In many cases, these persons would be an asset to your service. In practically all cases, moreover, the pleasure they would receive from amateur radio would greatly improve the quality of their lives. As a result, the Commission found itself in the uncomfortable bureaucratic position of having to defend the amateur community's position regarding the Morse code against concerned, caring, amateur operators.

"We are asking you to implement two new procedures. The first is to make additional accommodations for handicapped examinees who have a special problem in proving that they have mastered the required code speed. I hope you will work with the Handi-Ham people. . . . Whatever accommodations you decide upon, all VEs—regardless of their VEC affiliation—should employ the same procedures."

Character At A Time

"Where it is warranted, handicapped examinees should be able to take the code exam one sentence, or one phrase, or one word, or even one character at a time. Where it is warranted, a sending test should be substituted for the receiving test. Hopefully, you can come up with other accommodations.

"The second procedure we are asking you to implement is in response to interim policy directions we have received from the Commissioners. The Private Radio Bureau will grant a request for waiver of Element 1B (13 WPM telegraphy) or 1C (20 WPM) wherever:

"1. The examinee now holds at least a Novice class operator license; and

"2. The examinee requests a waiver of Section §97.511 for Element 1B or 1C; and

"3. The examinee submits a physician's certificate stating that, due to a severe handicap under the 1988 Developmental Disabilities Act, 29 USC §706(15) (A)(III), the examinee is unable to meet the 13 or 20 WPM requirement." (Exact wording of 706(15)A appears later in this article.)

A waiver of a Commission rule cannot be granted by a VE or VEC! "The procedure we have in mind is for the handicapped examinee to submit a package to the administering VEs consisting of the waiver request and the physician's certificate attached to the form 610." (Sample FCC approved wording of Request for Telegraphy Waiver and Physician's Certification are included later.)

"The VEs administer the necessary written tests, and if successful, submit the package to the coordinating VEC. The VEs do not issue a CSCE (Certificate of Successful Completion of Examination) for the telegraphy element for which the individual requests a waiver. You (VECs) submit the package to Gettysburg, where the waiver request will be acted upon.

"We understand your concern for cheating. Maybe you or the VEs will want to verify that the certificate is not fraudulent. You can check to make sure that the physician actually exists, or that the physician actually issued the certificate. You are not being asked, however, to be medical experts. We do not expect you or your VEs to make medical judgments. You must not engage in disputing the physician's certification that, due to the person's severe handicap, the person cannot meet the telegraphy speed requirement. . . .

"We will be initiating a rulemaking proceeding to implement the new policy directly into Section §97.505, Element Credit, so that the waiver request step will be unnecessary."

Background of Testing The Handicapped

The new telegraphy testing rules are an absolutely shocking reversal of previously stated FCC policy. We thought you would be interested in a little history about disabled ham testing. It all started back in 1978.

In response to two petitions (RM-2567 and RM-3138), the FCC began a rulemaking proceeding (Docket #78-250) looking toward reducing or eliminating the telegraphy requirements for handicapped

persons seeking licenses in the Amateur Service.

Amateurs were flabbergasted, however, when the Commission surprisingly added, "If it creates a class of amateur radio operator license with no telegraphy requirement, the class will be available to any applicant . . . not limited to those with certain disabilities."

Many amateurs interpreted that statement to mean that the Commission would be using the disabled person as their justification for the long rumored and awaited no-code "Communicator" license, first discussed in 1974 as part of Docket #20282. The ARRL objected profusely to



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allowing the shortcomings of the handicapped to be employed as the grounds for a no-code amateur ticket for everyone. Even disabled persons protested—especially those who had already struggled to pass the telegraphy requirements.

On March 11, 1982 the FCC was persuaded to think better of their approach to no-code and completely killed the proposal. They did it on the basis that FCC examiners couldn't determine who was indeed disabled. "The rule change contemplated . . . is unnecessary and selecting a particular group of applicants for favored treatment in terms of less stringent amateur operator requirements would not be sound licensing policy. Such a policy," the FCC said, "could lead to the necessity for FCC personnel to determine whether applicants were qualified for exemption, something they are not trained to do."

"Basic FCC policy provides that no qualified person should be denied an amateur license solely because of a handicap," the Commission ruled. "FCC testing policy which permits handicapped applicants to demonstrate their qualifications in ways that accommodate their disabilities is more effectively applied flexibly and case-by-case than by rule," it said. "A blind applicant may use a Braille printer, and a deaf applicant may use a vibrating surface or a flashing light for the telegraphy examination. FCC field examiners provide for examinations in the homes of persons who are not able to travel. The same qualification standards are applied to all," the FCC stated in 1982.

"Many handicapped applicants have contended the telegraphy exams discriminate against them and have asked for waivers. The FCC denies waivers because the United States is bound by an International Telecommunication Union regulation to require code proficiency of all amateur radio operators except those operating exclusively at frequencies above 144 MHz. Upon ratification of the 1979 ITU World Administrative Radio Conference agreements, the limit will become 30 MHz." The WARC accord was, of course, ratified some time later.

In 1983 the FCC began turning over amateur testing to the amateur service itself, but their handicapped testing rules remained in place. Even the new (1989) update of Part 97 Amateur Service Rules continued the policy that administering VEs must accommodate an examinee whose physical disabilities require a special examination procedure (§97.509(h)). No waivers of the code requirements were permitted.

The decision to abruptly amend this long-standing policy was a political rather than a regulatory decision. The FCC's Private Radio Bureau was extremely surprised that the new procedures were wished on them by the Bush administration. They had no alternative but to adopt them.

Reactions To New Policy

We were curious about how the new policy would be received by persons familiar with problems of handicapped participation in amateur radio. Peyton Moncure of Clifton, Virginia is pursuing various discrimination complaints against the FCC and the ITU. Moncure wants all code requirements to be waived for new applicants who have certified handicaps.

He says the FCC's telegraphy rules are contrary to civil rights laws that bar discrimination against handicapped citizens. Moncure also wrote President Bush, whose office referred the complaint to James Turner, Acting Assistant Attorney General in the Civil Rights Division at the Department of Justice.

Turner looked into Moncure's civil rights complaints against the FCC and determined that the Commission was not complying with federal rehabilitation laws and its own rules about discrimination complaints. Turner discovered a Handicapped Coordinator at the FCC, Mr. Harry Shockro, and referred the complaints to him, with the request that the Justice Department be informed of the results.

Moncure described the new FCC policy as a "back-door maneuver" that will not absolve the FCC of its responsibilities. When the Americans in Disabilities Act of 1989 fully becomes law, he will refile his complaint and take the FCC to court if necessary. Unlike prior laws, this legislation specifically prohibits discrimination against the handicapped in communications. "If the Disabilities Act dies, then these FCC changes will be very helpful," he said. "But everything I read says that the Disabilities Act will pass, and then by Christmas I expect that somebody will have to rule against the Morse code."

We also spoke with Richard Barth, W3HWN, who has worked extensively with handicapped amateurs as a member of the Amateur Radio Research and Development Corporation (AMRAD). Barth is a government radio engineer who operates the Handicapped Education Exchange (HEX) computer bulletin board. He said he believes that the new FCC policy will be good for those who want to upgrade but who have physical impediments:

"I know a number of handicapped hams who have passed the 5 WPM test by looking at flashing lights or even using their fingers to feel the vibrations of speaker cones. But these methods become difficult if not impossible at higher speeds. If the only thing that is keeping someone from their upgrade is reading code at higher speeds, what with all this talk of no-code, why should we prevent someone from getting ahead?" (HEX was the first TDD-compatible microcomputer BBS. It is available at 301/593-7033 for

TDD and 300 bps ASCII; 301/593-7357 for 300 and 1200 bps ASCII.)

We emphasize that the changed policy for upgrades is available now to those who can qualify. Improved accommodations for new applicants for amateur licenses will be developed by a committee of Volunteer Examiner Coordinators appointed at the recent VEC Conference. Your author, Fred Maia, W5YI, sits on that committee.

A Notice of Proposed Rulemaking to codify the new procedures will be forthcoming from the FCC, but the NPRM will not ask for opinion about whether disabled amateurs should be able to waive the code tests. That decision has already been made—with a little persuasion from two heads of state.

Telegraphy Waiver Request

The FCC has supplied us with a format of a letter which must be attached to FCC Form 610 by the handicapped applicant. It is initially submitted to the administering volunteer examiner team.

Name
Address
Date

Licensing Division
Private Radio Bureau
Federal Communications Commission
P.O. Box 1020
Gettysburg, PA 17326

Subject: Waiver of Telegraphy Requirement Section 97.501(c)*

I request a waiver of Section 97.501(c)* of the Commission's Rules, 47 C.F.R. §97.501(c) because I am an individual with severe handicaps under the 1988 Developmental Disabilities Act, 29 USC 706(15)(iii) and the handicap(s) is (are) such that I am unable to pass the 13 (or 20) words-per-minute telegraphy examination required for the class of amateur operator license that I am seeking. In support of my request, I submit the following:

1. I hold a Commission-issued amateur operator license. The station call sign is _____, and the expiration date is _____.

2. Attached is a physician's certificate stating that, due to my severe handicap, I am unable to meet the 13 (or 20) words-per-minute requirement.

Signature

**This sample request is in connection with a General operator license. For an Advanced class operator license the request must be for a waiver of Section 97.501(b). For an amateur Extra class operator license the request must be for a waiver of Section 97.501(a).*

Physician's Certification

The following certification on the physician's letterhead must be attached to the Request for Telegraphy Waiver.

Physician's Letterhead

Date

Licensing Division
Private Radio Bureau
Federal Communications Commission
P.O. Box 1020
Gettysburg, PA 17326

This is to certify that _____ has been under my care. He (she) is an individual with permanent severe handicaps as defined by the 1988 Developmental Disabilities Act, 29 USC 706(15)(a) (III). These handicaps are such that he (she) is unable to pass the 13 (or 20) words-per-minute telegraphy examination required for the class of amateur operator license that he (she) is seeking.

Doctor's signature

Title

1988 Developmental Disabilities Act

The following is the exact wording of what constitutes a severe disability.

Section 706

(15)(A) Except as provided in subparagraph (B) the term "individual with severe handicaps" means an individual with handicaps [as defined in paragraph (8). See note below:]

(i) who has a severe physical or mental disability which seriously limits one or more functional capacities (such as mobility, communication, self-care, self-direction, interpersonal skills, work tolerance, or work skills) in terms of employability.

(ii) whose vocational rehabilitation can be expected to require multiple vocational rehabilitation services over an extended period of time; and

(iii) who has one or more physical or mental disabilities resulting from amputation, arthritis, autism, blindness, burn injury, cancer, cerebral palsy, cystic fibrosis, deafness, head injury, heart disease, hemiplegia, hemophilia, respiratory or pulmonary dysfunction, mental retardation, mental illness, multiple sclerosis, muscular dystrophy, musculo-skeletal disorders, neurological disorders (including stroke and epilepsy), paraplegia, quadriplegia and other spinal cord conditions, sickle cell anemia, specific learning disability, end-stage renal disease, or another disability or combination of disabilities determined on the basis of an evaluation or rehabilitation potential to cause comparable substantial functional limitation.

[Note: Paragraph 8 clarifies that such handicapped individuals (1) have physical or mental disabilities resulting in a substantial handicap to employment; or

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(2) degree of impairment substantially limits one or more of such person's major life activities. Specifically exempted are alcohol and drug abusers.]

There were several comments heard at the VEC Conference concerning the broadness of the severe disability definition. Many in attendance believe a potential exists for abuse of the telegraphy waiver procedure. In any event, the above ruling constitutes a major change in testing of the handicapped and is in effect right now.

A View from Handi-Hams

The write-up from the FCC suggested that the VECs work with the Courage Handi-Ham System, a Minnesota-based nationwide rehab group specializing in helping persons with disabilities enter the amateur radio hobby. We telephoned them

for guidance. I spoke with Sister Alverna O'Laughlin, WA0SGJ, who heads up Handi-Hams, and to Bruce Humphrys, K0HR, who is Courage Center's Director of Rehabilitation Technology.

Sister Alverna said she was aware of the new policy and had some misgivings about it. "No one ever contacted us. I would like to see individuals such as those handicapped who cannot write fast enough granted waivers, but I agree the potential exists for misuse."

"What makes a handicapped individual different? Is it that they cannot learn, or they don't want to learn. I think that if there are waivers available for the handicapped, then there should be waivers for the non-handicapped person as well. Nine times out of ten their mind is equally as good as the non-disabled."

I asked Sister Alverna if Handi-Hams would be willing to set up some sort of waiver screening board. She said she thought they would, but questioned the

legality of such a procedure.

"This whole thing is a slap in the face for a lot of handicapped persons who have worked very hard to achieve the telegraphy requirement. You can walk into most any doctor's office and say I want to get my amateur license and I am blind and I just really can't get that code. The doctor will agree that amateur radio would be a good activity for you and would give you a letter. We have four blind/deaf Handi-Ham members who are very active on CW. No seeing, no hearing at all. I think just because we feel sorry for people does not necessarily help them. Waivers may be contrary to therapy."

Bruce Humphrys, K0HR, said he had grave reservations about how the FCC policy came about. "I can understand the Capitol Hill politics, particularly in light of the overwhelming vote in favor of the American Disabilities Act. It is a sweeping piece of legislation which has just been passed by both Houses and has Executive approval. It is an Act which has been in the making for a number of years mandating public accommodations for persons with disabilities"

"The awareness of disabled people around the country has been heightened. There has been a great deal of lobbying and pressure on Capitol Hill. It looks as though the Congressional awareness of the rights of disabled folks has been intensified dramatically. I believe this is the backdrop for the new handicapped amateur radio policies. The time is right for something like this to attract a lot of attention. It would not be constructive of me to comment on how this all came about."

"My major difficulty with this whole decision rests with using the 1988 definition of disabled. The 1988 Developmental Disabilities Act addresses employability. None of the definitions address functional disorders. A person can be blind as a bat and be perfectly capable of copying code at 50 words per minute."

"A person can be mentally capable, have a high cognizance of functioning, and be dead as a doornail from the nose down, and still be able to copy, transcribe, and use Morse code in a fully functional way. There are a number of narrowly defined, legitimate neuromuscular disabilities which have a functional limitation causing certain individuals (to have) a slowness of processing. This could cause some inability to copy code at a higher rate of speed. It is almost a travesty of the intent of the law to include in blanket fashion literally everybody who has a chronic disability."

"What we would like to do is to advise the Commission about the difference between a medical and a functional disability. The FCC will then, with some medical rehabilitation advice on our part, be able to make some judgments about which functional disabilities constitute a legitimate cause for a waiver."

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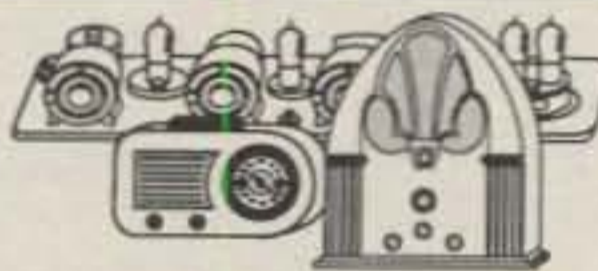
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NEWS/VIEWS OF ON-THE-AIR COMPETITION

Contest Expeditions and Other Potpourri

The past few months have been a DXer's/Contester's dream as rare countries such as 7O, A51, XW8, 1S, and S2 have come on the air. DXpedition schedules will sometimes overlap our favorite contests, while a few are designed just for the competition. This month we have the pleasure of reading about the excitement and hard work of the 1990 ARRL DX Contest team from T70A.

T70A—Contest Expedition To San Marino Republic

The following was written by Paolo Cortese, I2UIY.

"Legend says that San Marino was founded in 301 A.D. by a Dalmatian refugee, stonemason Marino, who, escaping from the Roman Emperor persecutions, fled to Mount Titano. Through the centuries the small community lived in peace, developed its democratic institutions, and maintained its independence and liberty. It wasn't until 885 A.D. that the first written document speaking of the independence of San Marino was discovered. The tiny Republic of San Marino covers an area of only 61 square kilometers and has a population of about 22,000 divided into nine small centres called 'castles.'

"You may question our definition of a 'real' DXpedition if you awaken only a few hours before your departure, start your car, and arrive 3 hours later in a different country, where you find an antenna waiting for you on the top of a tower. My story follows this plot, so I cannot describe an adventure with stories of shipwrecks and difficult island approaches! In fact, San Marino has several active hams who are often working large pile-ups.

"San Marino has been always been viewed with envy by contesters in Italy. There are no customs officers or real borders, and you can come and go as you please. It's Italy . . . almost! Operating under the UNICEF flag, a team of Italians operated as 9A1ONU during the 1980 WPX Phone contest, setting a new world record in the multi-single class. Since that time no other 'foreigners' have been given permission to operate on HF.

"Like John, K1AR, I am a contributing

Calendar of Events

Aug. 25-26	All Asian CW Contest
Aug. 25-26	New Mexico QSO Party
Sept. 1-2	Canary Islands World Contest
Sept. 2	Bulgarian DX Contest
Sept. 5-6	YLRL Howdy Days
Sept. 8-9	Worked All Europe SSB
Sept. 8-10	ARRL VHF QSO Party
Sept. 9	North American CW Sprint
Sept. 15-16	Scandinavia CW Contest
Sept. 16	North American SSB Sprint
Sept. 22-23	Scandinavia SSB Contest
Sept. 29-30	CQ WW RTTY Contest
Sept. 29-30	Idaho QSO Party
Sep.30-Oct.1	Fall Classic Radio Exchange
Oct. 6-7	California QSO Party
Oct. 6-7	Iberoamerica DX Contest
Oct. 14-15	Illinois QSO Party
Oct. 27-28	CQ WW SSB DX Contest
Nov. 3-5	ARRL CW Sweepstakes
Nov. 10	A.L.A.R.A. Contest
Nov. 10-11	OK-DX Contest
Nov. 17-19	ARRL SSB Sweepstakes
Nov. 24-25	CQ WW CW DX Contest

editor for the official Italian amateur magazine *Radio Rivista* and have the pleasure to meet with Mario, I2MQP, almost weekly. Earlier this year Mario told me about the progress of the ITAMSAT satel-

lite program. It's a project to launch a communications satellite exclusively by a group of Italian amateurs headed by I2KBD. The program is very expansive with several 'sponsors' helping our radio league (ARI), including the Radioamateurs' League of San Marino (ARRSM). With that came our idea: 'Why we don't ask them if it is possible get a license to operate in a contest? It would be a good reason to celebrate the cooperation between our two leagues in ITAMSAT project and the little Republic will probably print a stamp to commemorate the event.'

"We immediately decided to ask the authorities for permission to operate during both legs of the 1990 ARRL contest. Although we had not received final permission, the initial reaction to Mario's request was positive and I began to look for operators at once. The goal was to build a team that could maximize our competitiveness on both modes.

"For the CW contest we planned on using three operators plus another to help with the antennas and station. Ivan, IK2DVG, an outstanding CW operator, quickly accepted the invitation. He also has a lot of experience with wire antennas for the low bands, and could visit several weeks in advance to start on the an-



Many of the people who made T70A possible from ARRSM Headquarters. Back (left to right): I2UIY, T72BC, T77G, T77FT, I2YSB, T77U. Front (left to right): T77M, T77GM, T77T, IK2BTI.

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Outside view of ARRSM Headquarters. On the 9 meter tower is the TH6DXX, inverted delta loop for 7 MHz, and the inverted Vee for 3.7 MHz.

tenna work. Sil, I2YSB, is a non-commissioned officer in the Italian Air Force assigned to radar station maintenance. For years he had been an SSB-only operator eventually reaching DXCC Honor Roll. After I taught him CW, he spent 90% of his operating time on CW, crossing 305 countries off his DXCC CW list. For Sil to make the trip he had to gain permission from two authorities—the Italian Air Force and his wife, Carla.

"Finally, I became the third member of the group. Even though I had only operated a contest once outside of Italy, it was from a common QTH using the callsign OK8AFM in 1987. I like contesting, and over the past 2 years I have used numerous special contest prefixes including IU2A, IR2ITU, and IY2A.

"Marcello, IK2DIA, completed the crew. Even though he is not an active contester, Marcello was a tremendous addition, as he was a really good fellow who helped with the antenna work and cooking.

"I2MQP was a key member of the SSB crew. We don't need to spend a lot of time describing Mario, as he is well known around the world for being an outstanding operator and one of the fastest QSL managers. And last but not least was Franco, IK2BTI. Although Franco is a real contest enthusiast, he unfortunately lives in a deep valley that doesn't permit serious contest operations with 9000 foot mountains surrounding his QTH.

"With our plans in place, we eagerly awaited our final operating permission. Unfortunately, the positive answer didn't arrive in time, and we decided to cancel the CW operation. Soon thereafter Mario

confirmed some good news from San Marino. Our license was to be approved by the General Assembly of the local league. The Assembly meeting was finally scheduled for February 23rd, only 8 days before the SSB section even as we began to mentally prepare ourselves for canceling that operation, too.

"Mario returned from a trip to Japan on February 25th, and was very busy. Fortunately, he had time to continue to work with the authorities and called my toy shop on the 28th to inform me that our license arrived at ARI Headquarters in Milano. With just a few days to go before the contest, he asked, 'What you want to do?' There of course was no question . . . off to San Marino!

"Two hours later I found Sil at home. He had to work at the Radar Base during the contest weekend, but he told me that he would do his best to change duty with one of his fellow-officers. Fearing we would cancel the SSB operation, Franco took a week of holiday and built a 4 over 4 stacked array in anticipation of a serious single-band 10 meter effort from Italy. He'll never know if he lost an occasion for a great result or not, because my phone call made him take down the new antenna and immediately leave for San Marino. Unfortunately, IK2DVG and IK2DIA had more difficult problems that made their participation impossible.

"Sil arrived at my home at 10 AM on the Friday of the contest. We stored all the necessary gear in his car and were on the road in only 15 minutes. The trip took about 3½ hours, and we were eagerly met by Franco in San Marino. Franco had already visited the local league headquar-

ters, where he was warmly welcomed by Beppe, T77G, the president of ARRSM. Franco took us to a fantastic location where we found a beautiful prefabricated house with three large rooms plus a bathroom and kitchen. The house was 1200 feet above sea level with a stunning view of a very long tract of the Adriatic sea coast.

"We found the house equipped with several VHF antennas and a 9 meter tall tower holding a TH6DXX and several damaged inverted Vees for 40/80/160. Sil immediately climbed the tower to attach a rope for an inverted 7 MHz delta loop. Then he scaled a nearby tree to attach the second rope. However, the tree didn't seem to like its new inhabitant, and it took the good advise of Paolo, T77T, to make it give Sil back to us. While Sil, Franco, and T77T were working to repair an inverted Vee for 80, I prepared the shack and began operating on 10 meters. At last we were on the air from San Marino. The call-sign was T70A, assigned to the local radio club but rarely used, as everyone prefers to use their own callsign. The first contester I worked was Bob, KW8N, who assured me that he would begin advertising our operation on packet.

"So we were ready for the contest. The station consisted of a pair of TS440s, a TL922, and an L4B. Due to interference we were not able to operate with two stations simultaneously, so we decided to operate the contest as a multi-single. Sil started the contest on 80 meters and after the first half hour logged only W3LPL and K8UR/1, so we quickly moved to 40 meters. Forty meters was much better, and we soon had a good pile-up. The inverted delta loop wasn't a 3-element full-size Yagi, but our country and prefix were a great help!

"During the day, the high bands were fantastic, and the QSO rate was always around 200-220 QSO/hour. During the contest we were visited by several local hams, including several novices who were very interested to see how a contest really works.

"We were extremely satisfied after the first half of the contest. The multiplier check sheet was full of crosses in the 10/15/20 columns, an average amount on 40, and only MD and MA were marked on 80. During the second night I did more activity on 80 meters, but our signal was just not strong enough to generate a serious pile-up. I was surprised at being called by W7OM during a poor time for the West Coast. In the end we missed only VY1 on 10/15/20 and VE8 on 10.

"Our final QSO total was 4979 with only 199 dupes (3.84%); a final score of 3,405,636 points. I think it was a pretty good effort considering our marginal antennas. It was very satisfying to listen to dozens of W's thanking us for a multi-band new one. For the most part, the big-guns worked us on all five bands, but a lot

of stations with more conservative gear logged T70A on at least three or four bands.

"Franco and his XYL, Mariella, left early on Sunday night to return to their valley. Sil completely lost his voice near the end, forcing me to complete the contest by myself. Five minutes after the contest concluded I had a sked on 14025 with Andy, CF1DX, to give him the new prefix on CW. After logging 25 more stations on 20 CW, I closed the affairs at T70A. After 55 hours of non-stop operations and about 6350 QSOs, we slept until 7 AM, when we got up and dismantled the shack and our 40 meter delta loop.

"After many years of contest operating from a country with thousands of active stations it is easy to understand the problems a serious DXpedition must solve before and during their operation.

"It is fitting to thank the ARRL crew for the special permission we received to operate from their beautiful land and for their careful and priceless cooperation. They were incomparable hosts. In addition, we are thankful for the ITAMSAT project, which provided the only key that was able to open this contest door. Finally, special thanks to I2MQP for his efforts with the licensing and to IK2DIA for his TS440. During the next contest we'll be back home, so please look for us even if we are no longer in a rare country. If all the 5200 WVE's we worked from San Ma-

rino will call me to say 'thank you for the T70A QSO,' I will probably be able to make a great score from Italy!"

T70A High-Claimed Score 1990 ARRL SSB DX Contest

Band	QSOs	Multipliers
160	—	—
80	35	16
40	350	39
20	1731	58
15	1358	58
10	1505	57
Total	4979	228
Final Score: 3,405,636		

CQ WW 1962—One More Time

Several months ago I developed an analysis of operating the CQ WW in 1962 from the perspective of 5A1TW's winning world-high score. This month I received a letter from Dave Thompson, K4JRB, who by good fortune was the USA winner that same year as K5MDX. He felt that adding a USA perspective to the analysis would prove interesting and I agree!

Dave's leading Single-Operator USA line score in the 1962 CQ WW SSB Contest was 349 QSOs/81 Zones/150 Countries for a total of 208,517 points. His score was not only the highest in the United States, but number 8 in the world!

Competition that year was tough as Dave faced challenges from #2, W1ONK (207,540), and #3, K3UDX (204,820).

I was intrigued by Dave's station, which he described as:

Receiver: Hammarlund HQ-110 and HC-10.

Transmitter: 6C4 Driver, 6146 Exciter, Single 4-400A Amplifier with an SB-10 SSB adapter running 1KW PEP on SSB, 500W CW, and 400-500 watts on AM.

Antennas: Gonset Tribander at 50 feet, various dipoles on 80 and 40 meters.

Microphone: D-104 with VOX on SSB, TR switching on CW, and a manual switch on AM.

Many of the operators in those days used regular logbooks during contests and transferred the information to contest log sheets after the contest. Dave's operation was fairly sophisticated, as he used a dupesheet and multiplier checklist during the contest (although the task was mediated by the fact that he only made 349 QSOs).

During the K5MDX operation Dave operated only 30 hours. His highest hourly rate was 23 QSOs in the first hour. I can just imagine the sweat pouring off his brow after a screaming hour like that one. Dave never did break the 20 QSO/hour barrier again that weekend, with the next highest rate being a scorching 18 in the second hour. There were 8 hours with rates of 15 to 18 QSOs, 11 hours with 10



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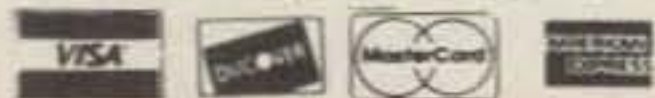
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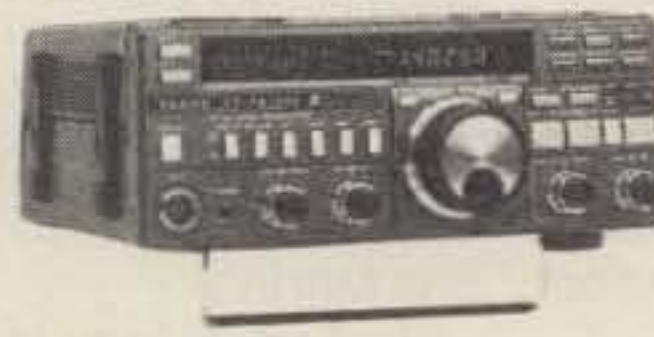
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to 14, 9 with 5 to 9, and 1 lone hour with less than 5 contacts. Dave reports that 234 of his total QSOs were on SSB and the remainder on AM. Consider the logistics of running guys on SSB (such as a "run" was in those days) and switching to AM when a VQ4 calls you!

Some of the familiar call signs in the K5MDX log included: JA2BAY (40 meters), HC1DC (now N4IN), XE1AE, K6EXO, VU2NR, VE3PN, VK2AVA, and ZL1AGO to name a few. Most of Dave's QSOs were with Africa, South America, and Oceania. There were only 11 Asian contacts (1 on 40 and 15, 9 on 20 meters) and an amazing 20 European QSOs (11 on 20 and 9 on 15 meters). Remember, this was the winning score for the USA Single-Operator category! I'd say it's fair to assume times have changed.

K5MDX 1962 CQ WW SSB Breakdown

Band	QSOs	Countries
3.8	8	4
7	19	15
14	179	66
21	91	40
28	52	25
Total	349	150

Closing Thoughts

This past June I had the pleasure of attending the 1990 HAM-COM Convention

in Dallas. It was especially exciting to speak at the contest forum, and I must admit I was smiling a bit when I played an audio tape of an East Coast 80 meter European run from K1EA's station. During my visit Trey Garlough, WN4KKN, gave me a suggestion that I would like to offer to you. Within the next few months I would like to run a feature entitled "The Great Moments in Sport." Specifically, I am looking for your story, anecdote, or "one-liner," that summarizes some of the amazing accomplishments you've seen or enjoyed personally in our sport of contesting. Try to think of new records, accomplishments under adversity, highest hours, or times when geographical disadvantages have been conquered. When I receive enough input, I'll run the story in one of my future columns, so keep your thoughts coming!

As always, the deadline for input into the December column is October 1st.

73, John, K1AR

Canary Islands World Contest

1600Z Sat. to 1600Z Sun., Sept. 1-2

This special contest commemorates the sailing of Christopher Columbus to America and his arrival at Spanish Island. There are special awards available including travel for the winners, so be sure to read on.

Classes: Single Operator, All Bands SSB only.

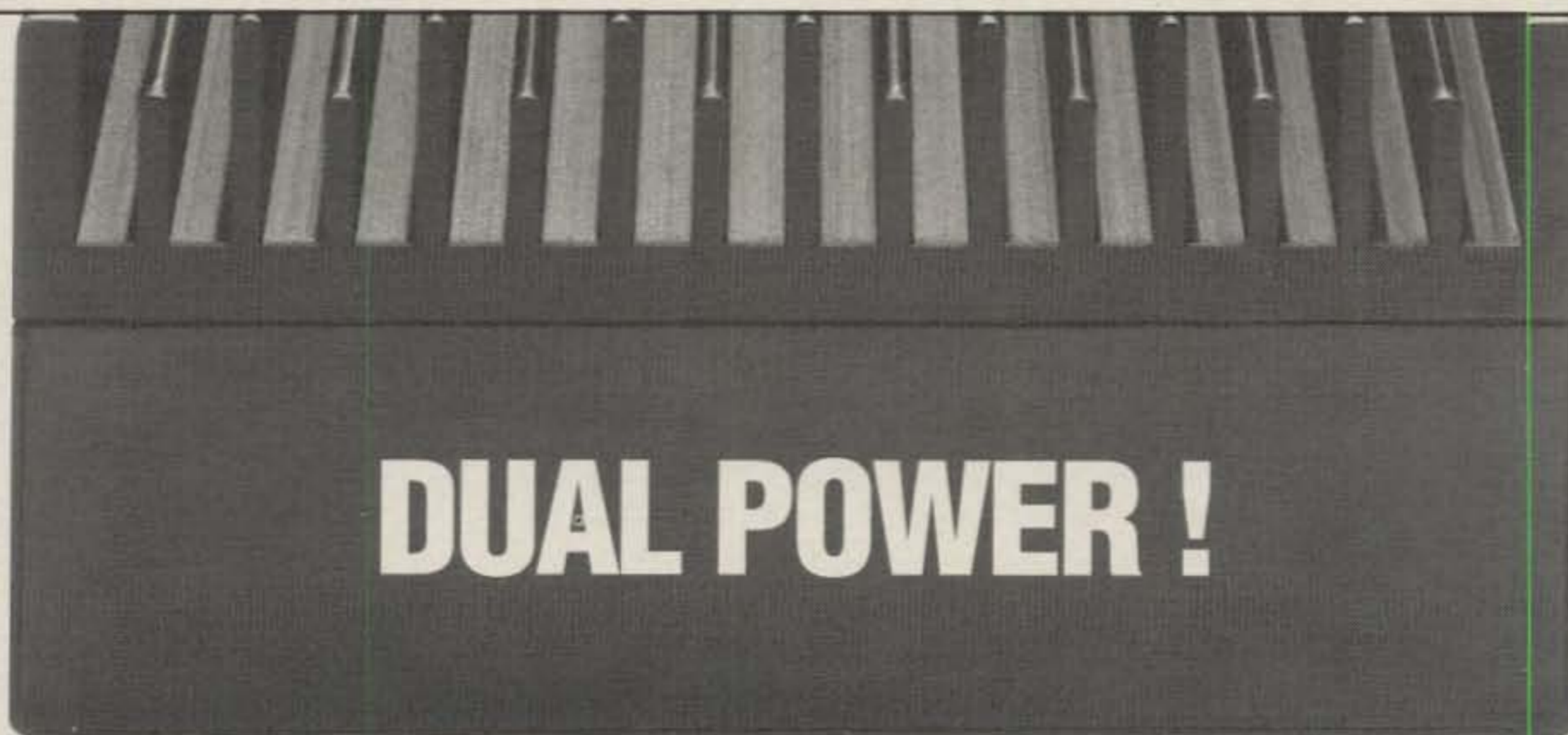
Exchange: RS plus serial number. Columbus, Ohio stations add the designate "CO."

Frequencies: 80, 40, 20, 15, 10 meters using frequencies recommended by the IARU.

Scoring: There is an elaborate scoring system that works as follows: Same country—1 point; other country, same continent—2 points; other country, different continent—3 points; American continent and America to Europe—4 points; Columbus, OH—6 points; Republic of Santa Domingo—6 points; Special event stations Santa Domingo—6 points; Canary Island stations—6 points; Island of Gomera (ED8, EF8)—6 points; Special event stations ED8GIC and ED8URE—6 points.

Multipliers: There is an equally elaborate multiplier system that works as follows: Same country—0 multiplier; other country, same continent—1 multiplier; other country, different continent—2 multipliers; American continent and America to Europe—4 multipliers; Columbus, OH—6 multipliers; Republic of Santa Domingo—8 multipliers; Special event stations Santa Domingo—10 multipliers; Canary Island stations—7 multipliers; Island of Gomera (ED8, EF8)—8 multipliers; Special event stations ED8GIC and ED8URE—10 multipliers.

Final Score: Final score is calculated



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by multiplying the sum of QSO points and multipliers.

Awards: The awards are fairly complicated, but the major categories include the following. World Champion receives silver trophy and expenses-paid trip to Gomera Island (EA8) for one week. Canary Island winner receives the same. Dominican Champion receives a silver trophy and diploma. The Columbus Champion receives silver trophy. In addition, there are numerous other diplomas for various operating categories.

Logs must be postmarked no later than November 1, 1990 and sent to: Comision V Centenario, Apdo. 9, 38800 San Sebastian, Isla de La Gomera, Tenerife, Islas Canarias, ESPANA. Because of the nature of the awards, I suggest you contact the sponsors directly for more information. If you prefer, their FAX number is 922-223822.

Bulgarian DX Contest

0000Z to 2400Z Sunday, Sept. 2

The Bulgarian Federation of Radio Amateurs holds this activity the first Sunday in September each year. It's on CW only, all five bands, 10-80 meters, using the IARU Region 1 band plan.

Classes: "A"—Single operator, all band. "B"—Single operator, single

band. "C"—Multi-operator, all band, single transmitter. "D"—SWL.

Exchange: RST and ITU Zone.

Points: QSOs with LZ stations, 6 points. With other stations in the same continent, 1 point. In other continents, 3 points.

SWLs must show calls of both stations heard. Score 3 points if both exchange numbers are copied; 1 point if only 1 is copied.

Multiplier: Total ITU Zones worked on each band.

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

Awards: Classes "A" and "C"—cups and medals to the three top world scorers and medals to the three continental leaders in each continent. Class "B"—medals to the top three scorers on each band in the world. Class "D"—medals to top three.

Logs: Use a separate sheet for each band, a summary sheet showing the scoring, and the usual signed declaration.

Mailing deadline is 30 days after the end of the contest to: Central Radio Club, P.O. Box 830, 100 Sofia, Bulgaria.

Logs may also include applications for the many BFRA awards: NRB, W-100-LZ, 5 Bands LZ, W-28-Z, Black Sea, and Sofia awards.

YLRL "Howdy Days"

1400Z Wed. to 1359Z Thurs., Sept. 5-6

This event is sponsored by the YLRL and is open to all women operators worldwide. All bands and modes are allowed and a station may be worked once on each band/mode for credit.

Exchange: YLRL or non-YLRL member.

Points: Two points for member stations and one point for non-members. There are no multipliers. Logs must indicate date, time, band, call signs worked, and operating breaks.

Bands: CW—3540-3570, 7040-7070, 14040-14070, 21120-21150, 28180-28210. SSB—3940-3970, 7240-7270, 14250-14280, 21380-21410, 28380-21410.

Awards: Top-scoring YLRL member will receive her choice of a YLRL pin, charm, or stationery. Non-YLRL members will receive a one-year membership in the YLRL.

The usual contest disqualification criteria apply. Logs must be sent by October 6, 1990 to: Dana Tramba, NØFYQ, RR 1, Box 213, Peck, KS 67120.

ARRL VHF QSO Party

1800Z Sat. to 0300Z Mon., Sept. 8-10

All bands 50 MHz and up can be used for this one. The August issue of *QST* should have had all the details.

It is recommended that you send for official summary and log sheets. A large SASE will get you a supply. Address your request to the ARRL VHF Party, 225 Main St., Newington, CT 06111.

North American "Sprint"

CW: Sept. 9 SSB: Sept. 16
Sunday 0000Z to 0359Z (Sat. night)

This is the fall edition of the "Sprint" run by the National Contest Journal. As the name implies, it's a shorty, only four hours long.

North Americans will be contacting other North American stations as well as stations in other countries, single operator only. North American boundaries are as defined by the rules used in the CQ WW DX Contest.

Exchange: Call, QSO no., name, and QTH (state, Canadian area, or country).

Scoring: Multiply total QSOs by the sum of states, Canadian areas, and other North American countries worked for your final score. (U.S. and VE not countries; KH6 not a state.) There are eight Canadian multipliers: VE1/VO1/VO2, VE2-VE7, VY1/VE8. Non-North American countries do not count as a multiplier.

Frequencies: Three bands only: 80, 40, and 20 meters. CW—3540, 7040, 14040. SSB—3850, 7225, 14250. (Plus or minus QRM.)

Awards: A trophy to the highest scoring entrant. Certificates to the top scorer in each U.S. call area, Canada, and other North American country. Also to the ten top scores, to each member of the winning team, and the highest scoring entrant on each team.

Team competition is limited to a maximum of 10 operators as a single unit. Pre-contest registration is required for each team before the start of the contest—with WN4KKN for CW and K7GM for SSB.

There are other detailed rules, a special QSY rule, disqualifying penalties, etc. I suggest you write to WN4KKN or K7GM if you do not have a copy of the NCJ.

Entries must be received no later than 30 days after the end of each "Sprint." The CW go to: Trey Garlough, WN4KKN, Route 1, Box 99, Thrall, TX 76578. The SSB go to: Rick Niswander, K7GM, Box 2857, College Station, TX 77840.

Scandinavian Contest

C.W.: Sept. 15-16 Phone: Sept. 22-23
1500Z Saturday to 1800Z Sunday

It's the world working the Scandinavians in this the 31st Scandinavian Activity Contest (SAC). The same station may be worked on each band for QSO and multiplier credit.

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Bands: 3.5, 7, 14, 21, 28 MHz according to IARU band plans; 3560/3600, 3650/3700, 14060/14125, and 14300/14350 kHz should be kept free of contest activity.

Classes: Single operator and multi-operator single transmitter, all band only. Multi-operator must remain on the same band for at least 10 minutes. Also QRP single operator (maximum of 10 watts output) and SWL (only SAC stations may be logged).

Exchange: RS(T) plus a QSO number starting with 001.

Points: European stations score 1 point for each SAC contact. Non-Europeans score 1 point on 14, 21, and 28 MHz, and 3 points on 3.5 and 7 MHz.

Multiplier: Each call area in the above list of SAC countries worked on each band (call areas, *not* prefixes).

Final Score: The sum of QSO points from all bands times the sum of the multiplier from each band. Scoring for SWL's same as above.

Awards: Certificates to the winning station in each class, both CW and phone, in each country and each U.S.A. call area. QRP stations will be listed in one common list. The non-SAC SWL winner will be awarded. Plaques to the top-scoring station in each continent.

The usual disqualification criteria will be observed. Include a summary sheet and a dupe sheet for logs with more than 200 QSOs, and a signed declaration. Mailing deadline is October 30th and this year logs go to Heinrich Thomsen, OZ7HT, Adelvadvej 2, Solsted, 6270 Tonder, Denmark.

Idaho State QSO Party

1800Z Sat. to 1759Z Sun., Sept. 29-30

The Idaho State QSO Party, sponsored by the Eagle Rock Amateur Radio Club, is an excellent operating event designed to promote activity from this rare state. Non-Idaho stations work Idaho operators. Idaho stations may work anyone. Stations may be worked once per band/mode and mobiles/portables that change counties may be worked again for QSO credit.

Exchange: RS(T) and QTH (County for ID stations, State/Province/DXCC country for others).

Frequencies: SSB—3875, 7230, 14280, 21325, 28400 kHz. CW—1810, 3550, 7050, 7125, 14050, 21150, 28050, 28350 kHz.

Scoring: Each Idaho county is a multiplier (44 total). Score 2 points for a CW QSO, 1 point for SSB, and 5 points for any

Novice/Technician contact regardless of mode. Final score is total QSO points times multiplier.

Awards: Certificates will be awarded to the high scorer from Idaho, U.S. State, and DXCC Country. In addition there will be a plaque to the overall high scorer. Logs are to be postmarked by October 27, 1990 and should be sent to: Doug Jensen, N7JAM, Eagle Rock Amateur Radio Club, P.O. Box 2415, Idaho Falls, ID 83402. If you want the final results, include an SASE with your entry.

CQ WW RTTY Contest

0000Z Sat. to 2400Z Sun., Sept. 29-30

This is the fourth annual RTTY Contest organized by CQ, and from the response to last year's contest, it has become one of the major RTTY competitions.

Bands: All five bands, 10 through 80 meters.

Classes: Single operator, single and all band, and a new single-op assisted category. Multi-operator, single transmitter, all band only.

Keep in mind that single operators are limited to 30 hours out of the 48-hour contest period. Offtimes may not be less than 3 hours in length. Multi-operator stations can operate the full 48 hours.

Exchange: RST, state or VE area, and

CQ zone for stations within the 48 continental U.S. states and 13 Canadian areas. All others send RST and CQ zone.

Points: One for contacts within own country. Two for contacts outside own country but same continent. Three for contacts outside own continent.

Multiplier: One for each state (48) and VE area (13). One for each DX country. (ARRL and WAE list). One for each CQ zone (40). All of the above on each band.

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

Awards: Plaques to the first-place winners in each class and areas. Certificates to second and third place. And certificates to the top scorers in each U.S. and Canadian call area, and DX country.

Complete and detailed rules were published in the July issue of CQ and should be reviewed for more detailed information.

The standard CQ log and summary sheets are recommended. It will make you scoring much easier. Sample forms are available from CQ. Include a large SASE (or IRC) with your request.

All entries must be postmarked no later than December 1st. An extension may be given upon a written request.

Logs go to: CQ RTTY Contest, ATT: Roy Gould KT1N, P.O. Box DX, Stow, MA 01775 USA. Requests for log forms go to: CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

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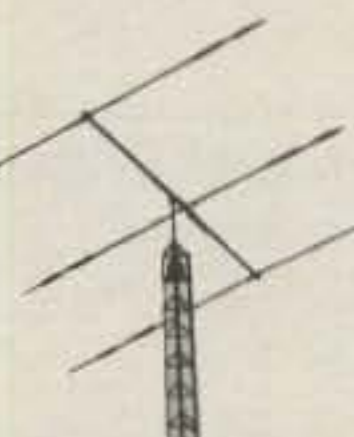
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Classic Radio Exchange

2000Z Sun. to 0400Z Mon., Sep. 30–Oct. 1

This is the fall edition of this unusual event. The format is still the same as it has been for the past years. Object is to restore and operate older equipment with like-minded hams, not required in the exchange, but a distinct advantage in the scoring.

A classic radio is any equipment at least 10 years old.

The same station may be worked on each band and each mode, and with different equipment combinations. Non-contesters may be worked for credit also.

Exchange: Name, RS(T), QTH, receiver and transmitter type, and other interesting conversation.

Scoring: Multiply total QSOs by total number of receivers, transmitters, state/provinces/countries worked on each

band and mode. Multiply that total by your Classic Multiplier, the total age of all receivers and transmitters used. Three QSOs minimum per unit. Multiply age by two if gear is a transceiver. If equipment is homebrew, count it as a minimum of 25 years old, unless its actual construction date is older.

Frequencies: CW—60 kHz up from low edge of band. Phone—3880, 7290, 14280, 21380, 28320. Novice/Tech.—3720, 7120, 21120, 28120, 28320.

Awards: Certificates and appropriate memorabilia are awarded for highest scores, longest DX, exotic equipment, best excuses, and other unusual achievements.

Send logs, comments, anecdotes, pictures to Jim Hanlon, W8KGI, P.O. Box 581, Sandia Park, NM 87047. Include a large SASE for copy of newsletter with results.

California QSO Party

1600Z Sat. to 2200Z Sun., Oct. 6–7

This year's party is again being sponsored by the Northern California Contest Club. All efforts are being made to activate all CA counties and make this the most successful of all state parties.

Operating time is limited to 24 out of the 30-hour contest period for single operator stations. Multi-operators may use the full 30 hours. Off times must be at least 15 minutes and clearly indicated in the log.

The same station may be worked on each band and mode, and CA stations may contact other in-state stations for QSO and multiplier credit. CA mobiles may be worked in each county change.

Exchange: QSO no. and QTH. County for CA stations; state, province, or DX country for others.

Scoring: Two points for phone contacts; 3 points on CW.

Multiplier: CA stations use states (50) and VE call areas (8). VO/VE1–7 and VY1/VE8. Out-of-state use CA counties (maximum of 58).

Final Score: Total QSO points times the sum of the multiplier.

Frequencies: 160 meters through 2 meters, except WARC bands. CW—1805 and 40 kHz up from band edge. Phone—1815, 3850, 7230, 14250, 21300, 28450. Novice—10 kHz up from edge of Novice bands and 28450.

Try CW on the half hours, 147.54 at 2000, 0000, 0400Z, 160 at 0500Z, and 80 at 0300 and 0700Z.

Awards: Certificates to the highest scoring single operator in each state, province, and country. Also each CA county and stations scoring 100 or more QSOs.

Trophies galore. Single operator, top three out-of-state, and CA top three. Also CA county expedition, and a special award for the CA and out-of-state stations making the most CW QSOs. Multi-single and multi-multi winners in CA and county expedition. The CA mobile team making the most QSOs. And the top scorer outside the United States and Canada, high-scoring low-power entry (less than 200 watts). A Special Award of a refreshing local product goes to the top 20 single operators in CA and 20 out of state. And to the top-scoring Novice/Tech entry, both in CA and out of state.

Include a summary sheet showing the scoring, etc., a dupe sheet if you make more than 200 QSOs, and a large SASE for a copy of the results.

Mailing deadline is November 15th and entries go to: NCCC c/o Jim Duffy, WA6AUE, P.O. Box 8820, Truckee, CA 95737.

A contest paperwork packet containing log, summary sheet, contest records, county abbreviations, and Special Awards List is available by sending a large SASE to WA6AUE.










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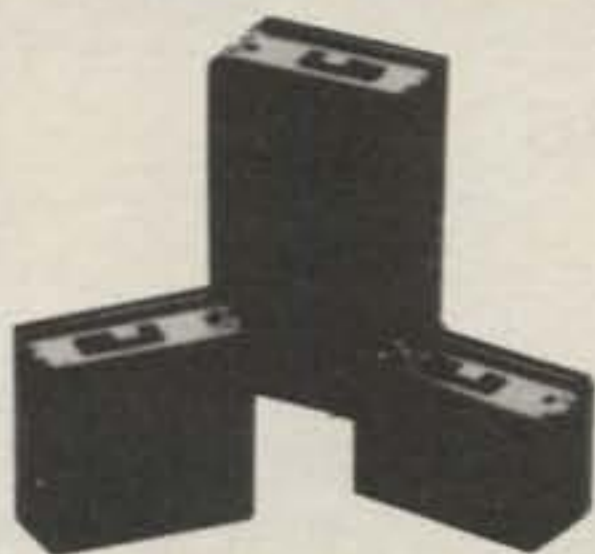
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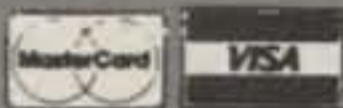
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Two (More) New Country Petitions

Just as DXers thought they could catch their breath after a rush of new DXCC countries, on came two more petitions for same. In June the DX Advisory Committee (DXAC) received requests to add the Penguin Islands off the coast of Namibia and Grosse-Ile in the St. Lawrence River to the DXCC countries list.

Penguin Islands

The Penguin Islands are a group of thirteen tiny islands within a few miles of the coast of Namibia, along the Diamond coast, between Dranjemundi and Walvis Bay. They are too small and close to the Namibian coast to appear on most maps.

The petition for separate DXCC country status was filed by Bill Shipp, KC1AG, Hans Hannappel, DK9KX, and Ian Sutherland, ZS9A. (Bill Shipp produced the excellent petition for separate country status for Walvis Bay ZS9, which was added to the DXCC country list on June 1, 1990.)

The basis for the Penguin Islands petition is that the islands are recognized as territories of South Africa, and they are separated from the rest of South Africa by the different DXCC country of Namibia by more than the required 75 miles.

Bill Shipp came across references to the Penguin Islands while he was preparing the petition to add Walvis Bay to the DXCC list. While in Walvis Bay last year for the first major DXpedition from the new DXCC country, he assembled more documentation. He also learned that Hans Hannappel had noticed the islands and was also considering filing a new country petition. They joined forces with Ian Sutherland in Walvis Bay to produce the petition.

There is no question that Namibia is a separate DXCC country from South Africa, as the DXAC made that determination when they recommended that Walvis Bay be added to the list. There is also no question that none of the islands lie within 75 miles of either South Africa or Walvis Bay. (If they were within 75 miles of Walvis Bay, they would form part of that DXCC entity.) The real question the DXAC members will have to consider is whether the islands are actually part of South Africa. Bill Shipp's carefully done petition



Pierino (Peter) De Nardo, IV3YYK, on the left, recently snagged his 5-Band Worked All Zones award.



Rick Roderick, K5UR, chairman of the DX Advisory Committee, keeps the DXAC rolling despite a heavy workload.

provides good evidence that they are South African territory.

The islands were annexed by England in the 1860s, and became part of the Cape of Good Hope Province of South Africa when the Union of South Africa was formed in 1910. Among the evidence that these islands are still recognized as

South African territory are US Defense Mapping Agency charts that identify them as such, and a letter from the South African embassy in West Germany that the islands "are officially and according to international law a part of the Republic of South Africa."

Before DXers race to put these islands on the air, they should consider that the Diamond coast of Namibia is not a hospitable place. In addition to high waves and winds, and few good harbors, the area is under the close scrutiny of the Namibian diamond detectives, who guard the mineral-rich region very closely. Motorists are warned not to stray off the road leading to Luderitz, to avoid being considered a diamond thief.

The petition to add the Penguin Islands to the DXCC countries list looks very good. Don't miss any operation from this spot.

Grosse-Ile

On the other hand, the petition to add Grosse-Ile in the St. Lawrence river to the DXCC countries list appears to have little chance of success. The island of Grosse-Ile lies in the St. Lawrence river, about 30 miles downstream from Quebec city. It is about 2 miles long, and 1/2 mile wide, and is administered by the Canadian government as an animal quarantine center and historical site. Access to the island is tightly controlled.

Martin Benoit, VE2EDK, and Dany Balanger, VE2EBK, prepared the petition for separate DXCC status, based on the similarity between Grosse-Ile and Sable CY0 and St. Paul CY9 islands off the coast of Nova Scotia.

Sable island was added to the DXCC countries list in 1976, under the "distinctly separate administration" rule. The island is administered by the Canadian government directly, and is not considered part of the province of Nova Scotia. Hence the determination that it qualified as a separate DXCC entity. (St. Paul island, under similar administration to Sable, was added to the DXCC list as it is separated from Sable by "foreign land," in this case, the Canadian province of Nova Scotia.)

Many DXers were upset that islands clearly under the control of Canada could be considered separate "countries" for

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357 I1ZEU 358 I6XGZ

15 Meter SSB

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340 JE3LKC 343 JABRJE
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799 JA7HMZ 802 OK3YEB
800 I1ZEU 803 ON4ADO

10 Meter CW

84 AB6R

15 Meter CW

183 W2FV 185 I1ZEU
184 KQ8J

20 Meter CW

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370 AB6R 373 AA5BT
371 I3ASE

80 Meter CW

27 K1MEM

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6809 DL1AAU (CW) 6819 IK2FSS (CW)
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6811 IK2GNY (CW) 6821 WA8MEM
6812 K8TDJ (CW)

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DXCC. They argued that adding "cheap" countries to the DXCC list damaged the prestige of the internationally recognized award. This backlash intensified when Desecheo KP5 was added to the DXCC countries list in 1978 under the same "distinctly separate administration" rule. Bob Locher, W9KNI, then chairman of the DXAC, convinced the DXAC that the separate administration rule was too big a loophole to remain in the DXCC country criteria, and the DXAC eliminated the phrase in 1979.

However, elimination of the rule did not bump Desecheo, nor Sable and St. Paul,

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CW: 350 YU2HF, OK1AXV, F5AM, 400 I2MQP, YU2HF, OK1AXV, F5AM, 450 I2MQP, YU2HF, OK1AXV, F5AM, 500 JE3CYH, YU2HF, OK1AXV, F5AM, 550 AH6JF, F5AM, 600 AH6JF, F5AM, 750 W4UW, IK0ADY, F5AM, 700 IK0ADY, F5AM, 750 W9IAL, WA2EYA, 850 VS6UW, I1EEW, 1000 GM3YTS, 1050 IK5DEY, 1400 KL7AF, 1600 IT9VDQ.

10 Meters: WA4SFN, IK2LEY
15 Meters: KB4GID
20 Meters: W9GCH
40 Meters: VS6UW
80 Meters: VE1RJ, OK1DTC, OK1AXV

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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.

off the DXCC list. DXers have frequently voiced their strong opinion that DXCC entities should not be deleted from the list simply because the DXCC country criteria change. The DXAC has agreed, and many countries that have no basis for separate status under current country criteria remain on the DXCC list.

These "orphan" countries are anomalies on the DXCC list. They enjoy separate DXCC status despite not meeting current country criteria. The important question as far as Grosse-Ile is concerned is whether these "orphan" countries retain enough of their original status as a separate country "by reason of government" to be used to add a new country to the DXCC list.

The Quebec petitioners argue that Grosse-Ile enjoys the same status under the Canadian government as Sable and St. Paul. The island is administered directly by the Canadian government, and is not part of the province of Quebec. Since Grosse-Ile is separated from Sable and St. Paul by more than 490 miles, and a line drawn between Grosse-Ile and Sable or St. Paul passes through the separ-

ate DXCC countries of Canada and the USA, they state that Grosse-Ile should be a new country. In other words, Grosse-Ile is part of the same "distinctly separate administration" as Sable and St. Paul, and should have been added to the DXCC list at the same time.

However, a subcommittee of the DXAC is currently reviewing the entire DXCC country list to determine which entities meet which country criteria. (This determination is important to the DXAC, to help them evaluate new country petitions, such as these two.) They have called the "orphan" countries "point 0" entities to indicate that they do not qualify as separate countries under current country criteria. The DXAC will probably not add a new country to the list based on a point 0 country, including Sable and St. Paul.

This decision may appear inconsistent with leaving Sable and St. Paul on the DXCC list, but consistency has never been a strong point of the DXCC program. The absurdity of having a DXCC entity count as a "separate country" for country totals, but not for determining whether to add a new entity to the DXCC list, will

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| 5. K6YRA, 199 | 18. W0PGI, 198 |
| 6. K5UC, 199 | 19. SM6AHS, 198 |
| 7. LA4HW, 199 | 20. HA0MM, 198 |
| 8. PY7ZZ, 199 | 21. K1ST, 198 |
| 9. DL9WW, 199 | 22. KB8DB, 198 |
| 10. K0CS, 199 | 23. ZS6BCR, 198 |
| 11. KB0G, 199 | 24. SV1JA, 198 |
| 12. DJ7RD, 199 | 25. VE6OU/6, 198 |
| 13. F6BKI, 199 | |

666 Stations have attained the 150 zone level as of June 1, 1990.

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probably not bother the majority of DXAC members.

DX Advisory Committee Report

Rick Roderick, K5UR, is the current chairman of the DX Advisory Committee.

During an address made to a large gathering of DXers at the DX forum of the ARRL National Convention, Rick discussed the numerous "open items" on the DXAC's increasingly crowded agenda.

Basis and Purpose of DXCC: The DXAC is discussing whether to add a basis and purpose clause to the DXCC rules, and if so, how that clause should be worded. Some DXAC members are concerned that even as innocuous a wording as "promote DX activity" could be interpreted in the future to mean that the DXCC program should continually add new countries to the DXCC list. And how can one argue that "promoting international goodwill" is the purpose of DXCC, when the existence of the award leads to the kind of mess that accompanied the early parts of the 3Y5X and 7O1AA DXpeditions.

New Country Petition Format: In the past couple of years, the DXAC has received some petitions for new DXCC countries that did not include enough information for the committee to make up its mind. The DXAC is thus producing an outline of what a new country petition should include, as a guideline for DXers seeking future new ones.

Point 3B Clarification: When the DXCC rules were rewritten in 1988, the wording of Point 3B of the country criteria covering islands separated by an intervening DXCC country was not adequately considered. As written, any two islands separated by another DXCC country would count as separate DXCC entities. Tad Cook, KT7H, even submitted a petition to add Guemes island off the coast of Washington state to the DXCC list, under



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In addition to the above items, the DXAC has considered almost a dozen petitions for new DXCC countries in the past two years, and voted to add five to the list: M-V Island 4J, Rotuma 3D, Conway 3D, Banaba T33, and Walvis Bay ZS9. Among those which didn't make it were Frederick Reef off of Australia; The Austral and Marquesas Islands of French Polynesia; The Payallup Tribe of Indians in Tacoma, Washington; Okino Torishima 7J; and Guemes Island.

Rick pointed out that this heavy workload is too much for some of the volunteer DXAC members. Two members had to resign from the committee because they couldn't do justice to the large volume of correspondence. DXAC mail more than doubled in the past year, not counting the internal memos and subcommittee work.

Still, the committee would rather hear from DXers than operate in a vacuum. If you have an opinion or suggestion on any of the topics outlined above, or any other DX-related topic, send it to the DX Advisory Committee, c/o ARRL Headquarters, 225 Main Street, Newington, CT 06111. Your comments will be copied and distributed to all DXAC members in a few weeks.

Of Interest to WPXers

Forwarded to Norm Koch, K6ZDL, manager of the WPX Award program, was the following information from UK WPXers G3VQO and G4SSH.

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320	VE3MRS/321	150	N4QOG/155
310	VE7DX/319	28 MHz	N5001
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310	G4GED/310		

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320	YU1HA/322	200	I8YRK/227
310	DL3RK/319	200	HASNK/207
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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.

ileges on certain bands below 30 MHz, and some phone at VHF.

"Current UK Class B (VHF only) licensees will be allowed HF CW privileges equivalent to the new Novice license after passing a 5 wpm CW test from the same date. This will mean that G, GB, GD, GI, GJ, GM, GU, GW prefixes with the numerals 1 to 7 will be valid on HF for CW only, and also the new GC, GH, GN, GP, GS, GT, GX series.

"It has been proposed that G club sta-

tions may use optionally GC, GH, GP, GS, GT, GP, GX for normal contacts, but mandatory for 'third party' traffic."

The Novice class opens the 2A-2Z blocks for the prefix hunter, just as our early Novice class (KN/WN) licensees did on HF. The new assignments could increase WPX scores dramatically, especially for the very active WPXer, and could put Honor Roll totals well over the 4000 level.

QSL Notes

Roy Clayton, G4SSH, reports that he handles QSLs for the following Sovereign Base stations: **ZC4CZ, ZC4EE, ZC4JA, ZC4HMS,** and **ZC4RSJ.** Roy's address is 9 Green Island, Irton, Scarborough, North Yorkshire YO12 4RN, England.

Nicj Amenitsky, UB5YBW, P.O. Box 150, Chernovtsy 274013, USSR, reports that he will QSL the **UZ8V/UB4YXD** and **UA8V/UB5YBW** Oblast 175 DXpedition from May 1990.

Peter, OH1RY, says OH3GZ has mailed all direct cards for OH1RY, OH2BGD, and OH2VB's 1989 Pacific DXpedition.

Serge, UB5QMO, QSLs direct or via AA5HP.

Two new QSL bureau addresses: The **W0 QSL Bureau** is now handled by the Kansas City DX Club, P.O. Box 4798, Overland Park, KS 66204. And the **Radio Society of Great Britain** has moved its QSL bureau to P.O. Box 1773, Potters Bar, Herts EN6 3EP, England.

Christian Hohenwallner, OE2CHN, says he handles his own cards for the following operations in 1987-90: **9V1OK, VK6BAS, 5W1GE, XX9CH, /KH6, /CP5AA, /LU, /CX1AA,** and **/ZP5.** QSL **3D2IC, J79CH,** and **9N1MM/2** via OE2VLN, **A35CH** via OE2DYL, **OE2CHN/KH8** and **OE2CHN/6Y5** via OE2VEL, **ZK1XI** (Sept-Oct. 1987 only!) and OE2CHN/J6L via OE2GEN, **V2/OE2CHN** via OE2EJN, and **V47CHN** via OE2LCM.

QSL **A43KM/0** on Kuria Maria Island to the Royal Omani Radio Society, Box 981, Muscat, Oman.

Valery Matousin, UA9NN, handles cards for **EO9AMO, RM9M (1983)** and **RZ9MWA.** Address: Box 359, Omsk 644099, USSR.

Charles "Sig" Signer, **9Q5EE,** has a new QSL manager: Ralph Hirsch, K1RH. Ralph will also handle cards for Sig's contest operations as **9T5E,** and his previous **SU1EE** operation.

Jean-Pierre Frossard, KB4GID, handles cards for **FM5CY** and **FM5WO.** Address: 119-4 Ashley Circle, Athens, GA 30605.

N5FTR is QSL manager for **P29BT, Z21BA,** and **A41KJ.**

YU4XA provides the following QSL routes: **4U5ITU** in May 1990 to DF1SD; **4N1S** to the YU1 bureau, and **4N7N** and **4N7S** to the YU7 bureau.

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1990 CQ WPX SSB Contest

High-Claimed Scores

The following scores are early-bird high-claimed scores as of 12 June 1990. These are raw scores subject to verification.

UNITED STATES SINGLE OPERATOR ALL BAND

KC1F	4,526,879
N5RZ	4,317,060
K3ZO	4,251,924
K7RI	4,015,616
NW3B	3,886,266
AI7B	3,694,588
KA5W	3,589,740
NN7L	3,371,140
AD1C	3,226,536
KY2J	2,301,481
K6HNZ	2,286,295
W0CG	1,967,880
WX4G	1,828,843
WF5E	1,760,487
AA5B	1,726,494
KR0B	1,559,025
K13V/7	1,512,320
KF2O	1,502,026
NM3E	1,433,124
NO9F	1,248,051
AA5OR	1,193,192
K5ZD/3	1,162,000
NM3U	1,152,699
K1TO	1,077,895
K2PS	1,005,480

28 MHz

WN4KKN/5	1,883,125
NU6S	1,675,228
W5WMU	1,561,506
KW6J	1,276,572
NB1H	1,264,809
K1ZM	1,185,030
N0BSH/9	945,615
KA1JJR/T	939,979
WX6M	856,375
WA3LFY	816,202

21 MHz

NX1H	1,695,316
AA5JF	1,146,829
KG5VK	701,760
WA6FGV	614,380
WA4QM	260,756
K1DWQ	250,274
WD5DMD	237,336

14 MHz

KK9A	2,436,904
W5FO	811,530
K1KJT	776,250
KS2M	319,631
AG9S	177,012
WB2ABD	117,195
W9HNI	10,008

7 MHz

WB9Z	595,864
N3HHE	114,342
WQ2M	113,542
KJ0B	109,564
WD8PAQ	74,240
WB5YLT	15,688
KG6AO	6,052

3.7 MHz

KE5FI	227,632
KQ3V	163,552
KE4BM	26,664
N2WK	12,688

1.8 MHz

AA4MM	32,928
-------	--------

QRP/p

KR2Q	A	964,429
N1AFC	A	426,725
KN1M	A	378,998
WA2UUK	28	144,000
W5VGX	28	64,680
N7NKG	21	146,720
WI8W	21	103,774
KA1UJ	14	61,686
KH6CP/WW1	7	226

MULTI-OPERATOR SINGLE TRANSMITTER

WC4E	8,133,076
AA7CM	4,374,720
W1FEA	4,345,055
WU7Q	4,344,624
WD1K	3,940,992
W9NQ	3,386,186
NU1P	3,243,680
NM9H	3,213,361
NZ4K/8	3,037,216
NE8T	3,025,800

MULTI-OPERATOR MULTI-TRANSMITTER

WZ6Z	17,745,825
WO0G	10,691,849
NB6L	3,235,470
N8BJQ	1,883,637

DX SINGLE OPERATOR ALL BAND

P40V	17,498,562
PJ4A	16,962,036
KP2A	15,178,725
FG5R	14,502,720
ZW5B	13,055,012
HD1T	10,517,381
EA8AGD	8,696,920
6I7CQ	8,647,716
CT4NH	6,984,450
EL2CX	6,826,621

ZY0FX	6,663,703
J37DX	6,546,537
F6CQU	5,760,594
K4YT/DU8	5,501,820
ZK1XN	5,154,520
OB4ZV	5,122,182
EX9S	4,757,275
ZS6A00	4,652,648
WL7E	3,953,425
XX9TDM	3,804,423

28 MHz

ZX5C	11,945,466
YW1A	7,870,500
LU9FDG	5,414,547
PJ9V	4,770,322
DL8FBD	2,666,331
LP3F	2,173,914
LS6E	1,944,576
VK4KRP	1,856,876
PA0COR	1,786,895
IQ9W	1,776,476

21 MHz

ZP0Y	12,089,576
PT5T	11,381,010
HU1A	7,004,374
TR1G	6,788,925
CQ7A	5,349,050
HA8IE	4,190,202
ZZ5JR	3,966,796
8P6SH	3,553,408
G4CNY	3,281,607
OK3KAG	2,675,946

14 MHz

ID1V	4,729,488
KG6DX	4,558,527
CE6EZ	4,386,380
YZ1E	3,896,723
GB8FX	3,870,435
IE8A	3,635,940
GW4BLE	3,487,605
4M5Y	2,796,244
OH2IW	2,711,423
KH6FKG	2,244,000

7 MHz

IO4VEQ	3,878,928
T32AF	3,363,840
PA3DWD	1,405,360
LU1IV	1,180,300
UT5UGR	1,042,296
K6GSS/WH6	961,048
OH2HE	902,055
F6EZV	849,648
OH6XY/OH0	614,952
UZ6LZL	523,446

3.5 MHz

CF6OU/3	1,741,368
4N1A	1,073,520
DL8PC	778,928
ES5RY	378,120
4M5E	260,236

1.8 MHz

UL7ACI	147,368
LZ6A	138,474
LZ1KWZ	77,376
IV3WMP	31,824
UP2BSD	15,996

QRP/p

VP2EXX	A	6,790,224
PO2DX	A	4,959,045
4X6IF	A	997,149
NP4CC	28	2,165,940
JR3RWB	28	400,788
SP3RBI	21	173,259
SM5CCT	21	9,052
UM8MDX	3.5	4,320

MULTI-OPERATOR SINGLE TRANSMITTER

LZ9A	14,795,138
IZ4C	13,715,416
S01EA	12,533,858
HI500UD	12,344,385
HG5A	11,707,208
FV1O	11,676,864
LU4FM	11,062,688
PT7FX	10,859,940
HG1S	10,273,984
5Z4BI	9,523,155
3DA0DX	9,179,380
OL4A	9,160,840
HG0X	9,130,341
CE7ON	8,522,235
TM5A	8,323,785
PP5ZYZ	8,055,600
ZZ4Y	7,853,111
UL8LYA	7,441,724
CI7U	6,744,853
FF6KRC	6,714,120

MULTI-OPERATOR MULTI-TRANSMITTER

T32T	18,941,288
CZ7Z	17,791,848
JE2YRD	13,618,840
YT2B	10,106,832
4M9X	8,504,410
KL7RA	8,306,557
ED4VPM	4,356,947
SN6O	3,547,764

Note: Queries pertaining to the WPX Contest should be sent to N8BJQ at 4121 Gardenview Dr., Beavercreek, OH 45431.





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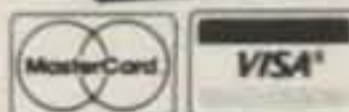
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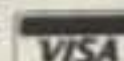
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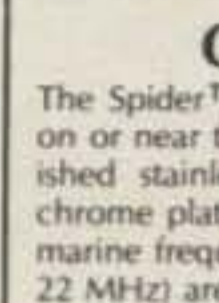
On Land



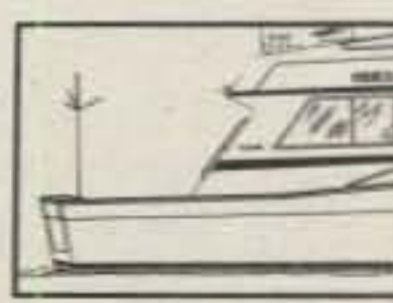
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A carefully designed Pi-L output tank using the optimum Q for each band gives you exceptionally smooth tuning, extremely wide range load impedance matching and full band coverage -- even on 160 and 80 meters -- *plus* you get an extra 10 to 15 dB of harmonic suppression.

You also get peak performance at different power levels from one end of the band to the other.

Ball bearing vernier reductions drives on both the plate and load control makes tuning precise and easy.

3-500Z Tube in shielded RF compartment gives you nearly 70% efficiency

You get the rugged time proven 3-500Z tube with an estimated life of 20,000 hours ICAS. That's nearly 20 years operating 20 hours a week -- you may never have to replace your tube.

The AL-80A is built on a rugged steel chassis. It has a separate RF compartment that's fully shielded to keep unwanted RF from leaking out. This keeps RFI and TVI to an absolute minimum.

A superb RF design and layout, a Hi-Q tank circuit and commercially rated RF power components give you nearly 70% plate efficiency over the entire operating range. This puts maximum power into your antenna instead of heating up your amplifier.

A whisper quiet internal computer style fan draws in cool air over the power supply components and blows it around the 3-500Z tube. This removes excessive heat and gives you reliable performance.

Built-in adjustable ALC circuit keeps your exciter from overdriving your AL-80A. The result? A clean signal without flat-topping.

A standby switch prevents harmful thermal shock to your 3-500Z filaments by keeping them lighted when you're operating barefoot.

Gutsy Heavy Duty Power Supply

The guts of the AL-80A is its heavy

heavy duty power supply.

A husky 22 pound power transformer using a high silicone steel core, computer grade filter capacitors totaling 26 ufd, heavy duty bleeders and ten 3 amp, 1000 V power rectifiers give a stiff 2700 volts fully loaded.

Some competing high priced amplifiers using *two* 3-500Zs *can't* give you much more power output than the AL-80A. Why? Because their lightweight power supplies can't deliver enough high voltage for the tubes.

Step-Start Inrush Protection™

When you first turn on your amplifier, a massive inrush current flows.

Your house lights flicker as you hear a loud "thump" from your amplifier. This terrible inrush current stresses *all* your power supply components to their limits. Your cold tube filament suffers abusive thermal shock.

Eventually, this massive inrush current will damage your amplifier.

The AL-80A special *Step-Start Inrush*

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Protection™ stops damaging inrush current.

By starting your AL-80A through a 10 ohm current limiting resistor, then shorting the resistor with a relay, the AL-80A gives you a start up sequence that is *easy* on your tube and power supply components.

Don't consider a linear amplifier without this critical protection.

Multi-Voltage Primary protects your amplifier and gives you peak performance

Too high a line voltage stresses components and causes them to wear out and fail. Too low line voltage causes a "soft-tube" effect -- low output and signal distortion.

The Multi-Voltage Primary in the AL-80A transformer lets you compensate for too high or too low line voltage.

With the AL-80A you get the longest component life and peak operating efficiency -- regardless of your line voltage.

Before you buy an amplifier make sure it has a multi-voltage primary.

Dual Illuminated Meters

Two large meters give you a complete

picture of the operating condition of your AL-80A. They let you know right away if there is a problem.

Grid current of the 3-500Z is monitored continuously by one meter. Grid Current indicates proper amplifier operation better than any other parameter.

You also get a multi-meter that measures plate voltage, plate current, *peak* RF watts output and drive power/ALC detector voltage.

Comes completely factory built, tested and guaranteed to work . . .

. . . *not a kit you have to build*

You get a full kilowatt out of the box -- ready to plug in and bust through QRM in minutes.

A kit could actually end up costing you more than your best price on the AL-80A -- and leave you frustrated if you can't get it to work.

A factory built AL-80A has much higher resale and trade-in value than a kit. Why? Because Ameritron's reputation for consistent quality and workmanship is known by hams everywhere.

Two Year Warranty: Twice the protection of our nearest competitor

No other kilowatt amplifier comes with a 2 year warranty. In the unlikely event that there are defects in materials or workmanship, we'll fix it free for 2 full years from the date of purchase.

The 3-500Z is covered by the tube manufacturer's warranty.

Commitment to Service

Even after the 2 year warranty period, Ameritron Customer Service Technicians are available to help you keep your AL-80A performing flawlessly -- no matter how long you have it. Just call 419-531-3024.

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Bust through QRM with a full kilowatt from the Ameritron AL-80A -- right out of the box. Call your favorite dealer for your *best* price and order today!

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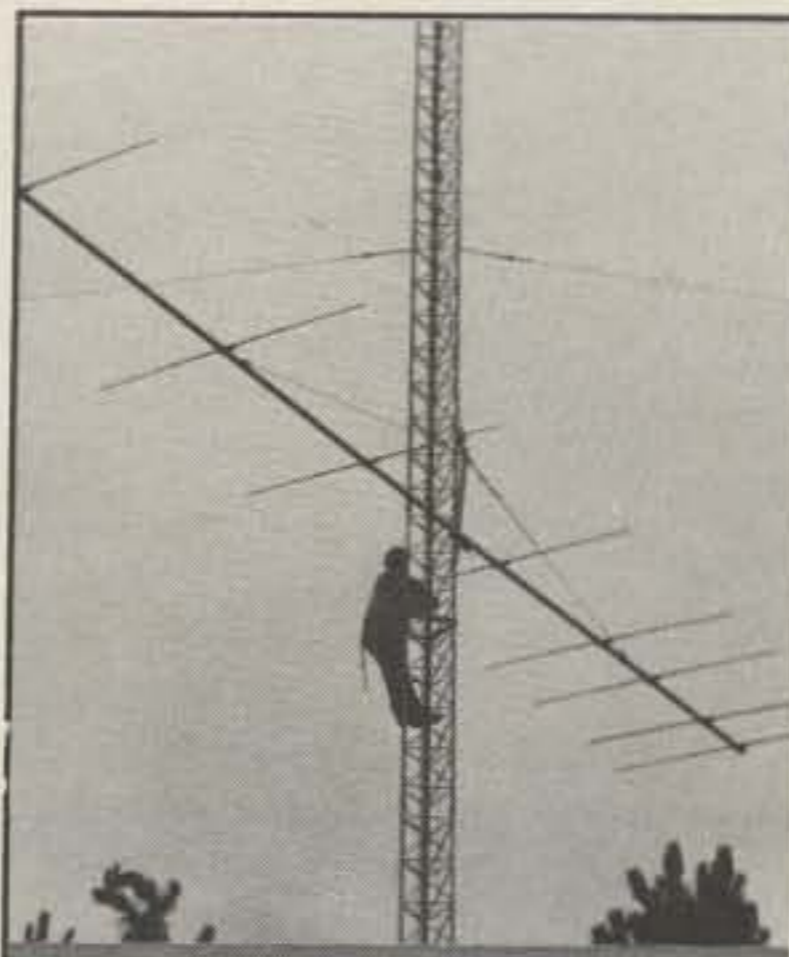
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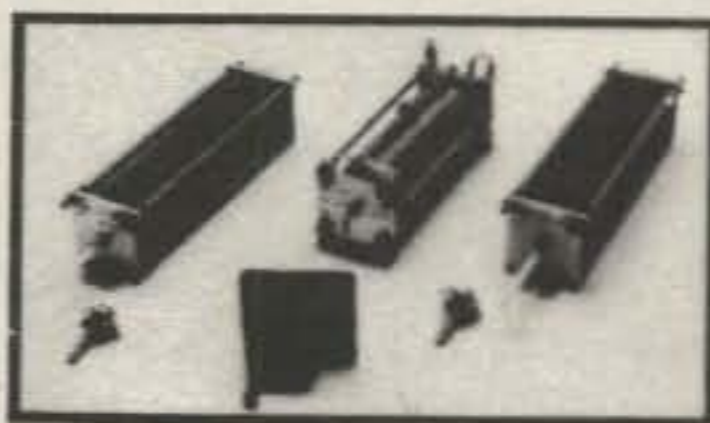
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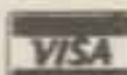


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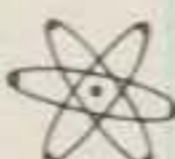
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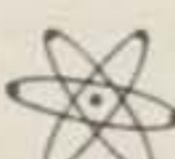
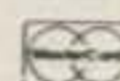
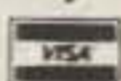
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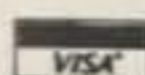
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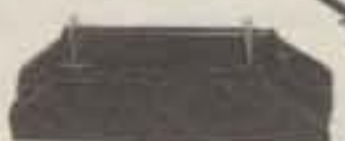
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SWBC CRYSTAL PACK for DRAKE R-4 series, \$95. C-4 console, \$395. Don Bishop, N0EA, Box 4075, Overland Park, KS 66204-0075.

MINT "JOHNSON" KILOWATT Matchbox with meter and coupler, manual, includes shipping, \$299. K3UKW, Tony Musero, 1609 So. Iseminger Street, Philadelphia, PA 19148-1010 (215-271-8898).

FOR SALE: R/S DX 300 SW Receiver \$125. Xerox 16/8 CPM computer with 10 megs of HD. More info send SASE to P.O. Box 518, Whitehouse, FL 32220.

SELL: Yaesu FT-901 DM, mike, manual, in warranty, alignment, \$500. Dick, K85BBU, 512-258-7128.

TRADE: My mint Uniden HR-2600 (factory realigned) or Epson RX-80F/T printer toward 2M mobile rig or best offers. K1LEC, 802-886-8121.

TS-940S OWNERS: Select memory banks from front panel with my modification. Send SASE and quarter to Ralph Cabanillas, Jr., W6IL, 2359 Creston Dr., Los Angeles, CA 90068.

FOR SALE: Rare Hammarlund Receiver, HQ-215 in near mint condition, with matching speaker and 500 Hz Collins filter, \$325. SSB adapter SB-10 \$65. WANTED: Information on the HQX-300 transceiver. Call Charlie, KD4AJ, 404-396-0276.

FOR SALE: TANDY 1000 w/5.25, keyboard, 128K, \$195. Also RS VM-2 Monitor \$75. WQ4Z, George Griebie, 650 Chestnut Grove, Parksville, KY 40464-9624 (606-236-6510).

CRYSTALS: SASE for my list. K8LJQ, 2023 Lannen Rd., Howell, MI 48843.

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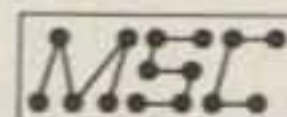
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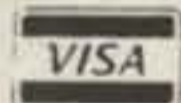
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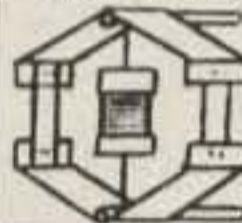
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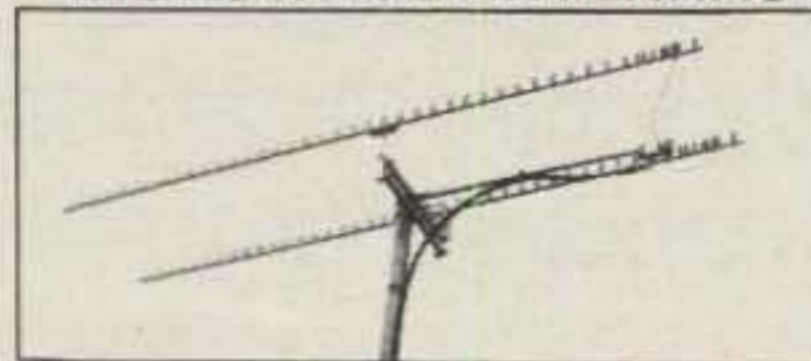
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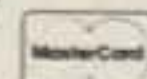
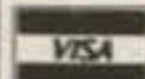
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SASE for list of radio publications, Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550. HAMMARLUND HQ-170A receiver for sale. This unit covers the 160 to 6 meter bands and is in near mint condition, \$150. Call Charlie, KD4AJ, 404-396-0276. BUY: Amateur radio equipment, good/bad. For large list/\$1 and SASE. Joe Bedlovics, 241 Dover Street, Bridgeport, CT 06610.

HELP: Junior High School radio program needs your unwanted equipment, parts, books, etc. Please help. G. Skloot, JHS 180, 320 B. 104 Street, Rockaway Park, NY 11694.

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WANTED: RYCOM R-2174/URR voltmeter, C-868 and C-626/RC-27 controls. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883 (419-448-0007).

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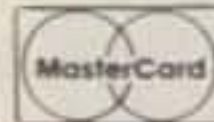
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WANTED: SWAN M-45 Mobile Antenna. Brownie, W3CJI, 2705 Andrea Dr., Allentown, PA 18103 (215-433-4485).

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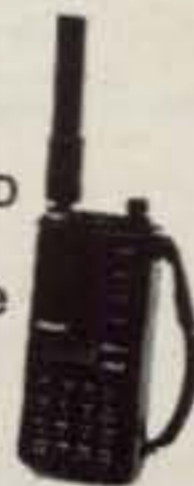
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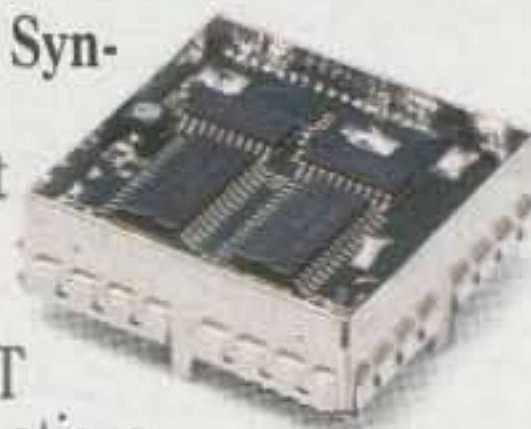
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