Amateur Radio

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CQ

A CQ Exclusive Interview With: Mr. Ralph A. Haller, N4RH Chief, Private Radio Bureau, FCC

Springtime is Antenna Time in Dayton, Ohio at W8OK

74820 08241 04

THE RADIO AMATEUR'S JOURNAL

KENWOOD

...pacesetter in Amateur Radio

ALL NEW!

Double Vision

ACTUAL SIZE FRONT PANEL

TM-721A

Deluxe FM dual bander

The Kenwood TM-721A re-defines the original Kenwood "Dual Bander" concept. The wide range of innovative features includes a dual channel watch function, selectable full duplex operation, 30 memory channels, extended frequency coverage, large multi-color dual digital LCD displays, programmable scanning, and more with 45 watts of output on VHF and 35 watts on UHF. TM-721A—Truly the finest full- featured FM Dual Band mobile transceiver!

- **Extended receiver range** (138.000-173.995 MHz) on 2 meters; 70 cm coverage is 438.000-449.995 MHz. (Specifications guaranteed on Amateur bands only. Two meter transmit range is 144-148 MHz. Modifiable for MARS/CAP. Permits required.)
- **30 multi-function memory channels.** 14 memory channels and one call channel for each band store frequency, repeater offset, CTCSS, and reverse. Channels "A" and "b" establish upper and lower limits for programmable band scan. Channels "C" and "d" store transmit and receive frequencies independently for "odd splits."
- **Separate frequency display for "main" and "sub-band."**
- **45 Watts on 2 meters, 35 watts on 70 cm.** Approx. 5 watts low power.
- **Call channel function.** A special memory channel for each band stores frequency, offset, and sub-tone of your favorite channel. Simply press the CALL key, and your favorite channel is selected!
- **Automatic Band Change (A.B.C.)** Automatically changes between main and sub-band when a signal is present.
- **Dual watch function allows VHF and UHF receive simultaneously.**
- **CTCSS encode/decode selectable from front panel** or UP/DWN keys on microphone. (Encode built-in, optional TSU-6 needed for decode.)
- **Balance control and separate squelch controls for each band.**
- **Dual antenna ports.**
- **Full duplex operation.**
- **Programmable memory and band scanning, with memory channel lock-out and priority watch function.**
- **Each function key has a unique tone for positive feedback.**
- **Illuminated front panel controls and keys.**
- **Dimmer control.**
- **16 key DTMF mic. included.**
- **Handset/remote control option (RC-10).**
- **Frequency (dial) lock.**
- **Supplied accessories:** 16-key DTMF hand mic., mounting bracket, DC cable.

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

TM-721A shown with optional RC-10.

Optional Accessories:
• **RC-10** Multi-function handset/remote controller • **PS-430** Power supply • **TSU-6** CTCSS decode unit • **SW-100B** Compact SWR/power/volt meter • **SW-200B** Deluxe SWR/power meter • **SWT-1** 2m antenna tuner • **SWT-2** 70 cm antenna tuner • **SP-40** Compact mobile speaker • **SP-50B** Deluxe mobile speaker • **PG-2N** DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MA-4000** Dual band mobile antenna (mount not supplied) • **MB-11** Mobile bracket • **MC-43S** UP/DWN hand mic. • **MC-48B** 16-key DTMF hand mic.

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New 220 MHz

220: FM for All!

Kenwood brings you a wide range of 220 MHz gear designed for every need. Choose from two types of mobile and two types of HT. The TH-315A is a full-featured HT covering 220–225 MHz. Ten memory channels and 2.5 watts of power. (5 W with PB-1 or 12 V DC.) Uses the same accessories as the TH-215A for 2 meters or TH-415A 440 MHz. For truly "pocket portability," choose the TH-31BT, a thumb-wheel programmable, 1 watt unit. For mobile use, select the TM-321A or TM-3530A.

The TM-321A is the 25 W, 220 MHz, 14-memory version of the super popular, super compact TM-221A. The 25-watt TM-3530A has 23 memories, a 15 telephone number memory and auto dialer. Direct keyboard frequency entry and front panel DTMF pad enhances operating convenience. Novice to Amateur Extra, these transceivers will put everyone on the air "Kenwood Style"!

TH-315A
Full-featured HT

TM-321A
Compact mobile transceiver

New

TH-31BT/31A
Pocket-held HT

TM-3530A
Full-featured mobile transceiver

New

The TM-321A comes with 16-key DTMF mic.
A complete line of accessories is available for all models.

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

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DX-cellen

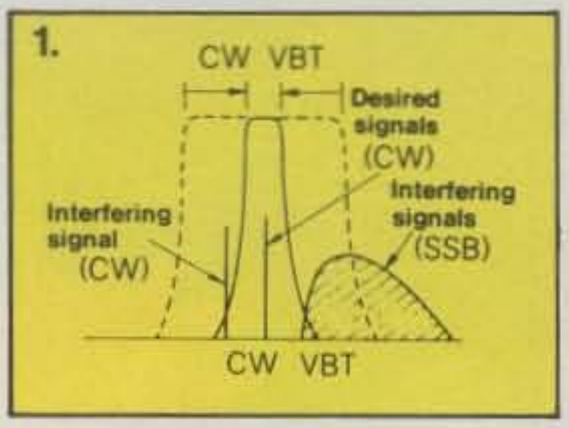
#1 Rated HF!

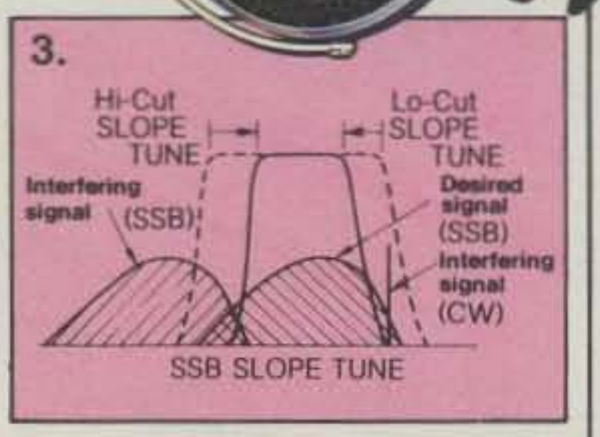
TS-940S

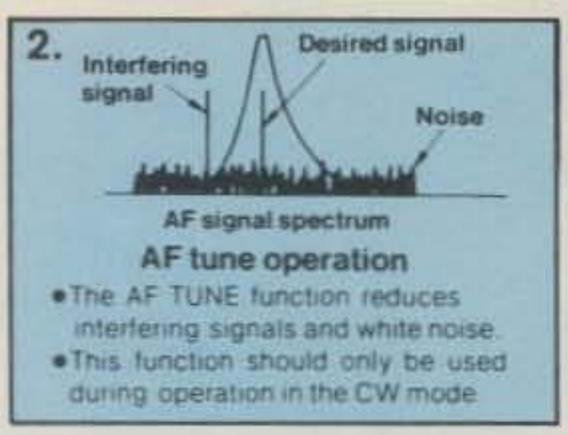
Competition class HF transceiver

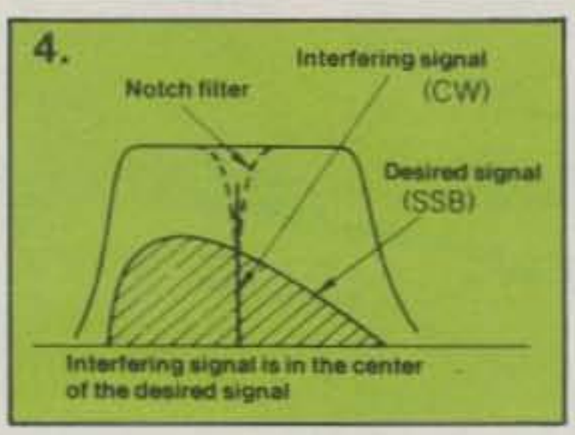
TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance shows that the TS-940S is "The Number One Rated HF Transceiver!"

- **100% duty cycle transmitter.** Kenwood specifies transmit duty cycle ***time.*** The TS-940S is guaranteed to operate at full power output for periods ***exceeding one hour.*** (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in ***parts per million!***









1) CW Variable Bandwidth Tuning. Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.

2) AF Tune. Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.

3) SSB Slope Tuning. Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.

4) IF Notch Filter. The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940 a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory sca

Optional accessories:
• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-43S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL-922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters • IF-232C/IF-10B computer interface.

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

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CQ The Radio Amateur's Journal

ON THE COVER: Frank Schwab, W8OK, of Dayton, Ohio, reminds us that it's antenna weather once again. Judging from the size of the arrays, it's a good thing he's starting early. Photo by Larry Mulvehill, WB2ZPI.

APRIL 1988 **VOL. 44, NO. 4**

FEATURES

DEPARTMENTS

Zero Bias AN EDITORIAL

There is one word in the amateur radio lexicon that can start our adrenaline coursing and our imagination soaring and can get us packing our suitcases faster than a free spot on an exotic DXpedition —*Dayton.* That's all you really have to say to any amateur—Dayton. One word says it all. I know that it doesn't appear on any amateur license exam, and it certainly is no secret, but what it means exactly could probably fill several books. Perhaps there should be a question or two on Dayton in our amateur exams. It's probably more relevant than an abstract formula.

Hugh Cassidy, WA6AUD, our DX Editor, has a famous line that is oft quoted—"DX is." Well, Dayton is. Those who have been there know, and those who haven't been there plan toward the day when they too can say "I've been to Dayton." The meaning is excitement. Some folks have taken to wearing sweatshirts, T-shirts, and badges that have "Are we having fun yet?" printed on them. It is supposed to imply that what we are experiencing is a drudge, a tedious bore, and a time period to get through in order to have fun or get to the fun part. I bought one of the badges and wear it occasionally at shows. People ask the question, and I answer yes. That's what we're all here for.

At Dayton you really don't have to ask the question. It's the one place that is universally recognized as where it's all happening. It's total saturation in amateur radio. Whether it is a product that you've only seen advertised or heard about or the most esoteric item imaginable in the fleamarket, it's there. It's three days of total immersion, of hospitality suites, parties, and sensory overload. If you want to show folks having a good time with amateur radio, take them to Dayton. The perfect sales tool for amateur radio would be a videotape of Dayton. People go to have a good time, to have fun. For some reason, most of the people who go to Dayton forget for a fleeting weekend that they are involved in a very serious, heavy endeavor called amateur radio. You can even hear laughter, see smiles, and witness real excitement at a treasure found or the wonderment of it all.

These are the feelings most of us say we had when we first got started in amateur radio. It was a new world filled with the thrill of possibility. Dayton makes us feel like that kid again. It has absolutely nothing to do with license class, code proficiency, or how much traffic we handled last month. It's the joy and anticipation of being able to do it all over again, only better. And, it happens every year. Wow!

Novice Enhancement

Is the number of new amateurs going up? Yes, but some folks say not fast enough. Are we getting a new surge of Novices? Well, that's hard to say. I think that our Novice Editor, Bill Welsh, W6DDB, hit it on the head some time ago when he told me that his experience was showing that more new people were going straight to Technician class. At first I didn't see it, but I have come around to that view, too. The Novice and the Technician tests are not that significantly different now, so someone studying for a Novice license need only keep at it for a while longer to learn enough to pass the Technician test. The code is the same, and there aren't that many more questions to learn. I would therefore keep my eye on the combined totals of Novices and Technicians to see how it's working. To help make sure the program does work involves letting people know about it. It may be wonderful and terrific that we know about Novice Enhancement, but let's spread the word to new people.

This Month

This month we're pleased to present an interview with the new Chief of the FCC's Private Radio Bureau, Ralph Haller, N4RH. Mr. Haller is obviously familiar with amateur radio and has had an extensive career with the FCC.

This month we also begin a two-part series on RFI written by Lew McCoy, W1ICP. Lew probably has done more research and writing on the subject over the years than anyone else. We live in an era in which almost every device in the home is microprocessor controlled and almost everything in the home (including our rigs) radiates some sort of energy. We'd like to keep our amateur radio radiation strictly in the antenna and out of harm's way.

There are a lot of things we can do to clean up interference that are not all that difficult. It's really a study in frustration to try to tell a neighbor that his home entertainment device or whatever may be at fault or be contributing to the problem, however true it may be. Always remember the all important word, though, in dealing with RFI situations—TACT.

A Mast Is A Tree Is A Pylon

On the way home from work each day I pass a little shop where the specialty is *trompe l'oeil.* No, it's not a bakery or a restaurant. *Trompe l'oeil* is a French word that means "to fool the eye." The shop is owned by an artist who paints objects to look like something else. It can be as simple as painting a table to look like marble or some exotic wood, or as difficult as doing a mural in someone's home so that a room looks like it faces a garden or even opens into another room. Every so often I enjoy stopping to see some of the furniture that's been redone in the shop. It certainly looks real. The thought occurred to me that perhaps some enterprising amateurs and amateur antenna manufacturers could make use of this service. Why not create a "tree" (a monoband or triband oak)? It would be a thin "tree," but perhaps someone could come up with an object that could pass muster as being indigenous. Think about it.

Travels With CQ

The first official show of the season, Miami, is over, and it was a big one. Those of us from the north expected to bask in the warmth for a weekend at least, but the weather was cold and damp. Dick, Arnie, Peter, and I took turns manning the booth and checking out the new gear on display. The fleamarket was as big as ever, and I picked up a few bargains along the way. We had a surprise visitor show up on Sunday morning—Ade Weiss, K8EEG/WØRSP, our QRP Editor. Ade is spending some time in Florida as part of a sabbatical from his normal teaching job. I guess we can look for him signing portable four for a while. Leo Haijsman, W4KA, our WAZ Award manager, and Larry Mulvehill, WB2ZPI, our contributing photographer, spent time at the booth.

How was the food? Well, the stuff I saw for general sale was the typical grease dogs and chips. There was a concession offering Greek food, but I didn't get a chance to see it up close. The exhibitors ate pretty well, though. The hamfest committee sets up a lounge with food facilities. There is a very hard-working committee that makes sandwiches, coffee, and snacks for the exhibitors. For those exhibitors who cannot leave their booth, the committee provides box lunches which are very good and hit the spot. Some of us may not have had a chance to thank the committee for their efforts, so on behalf of all the exhibitors, let me thank all of the workers. We do appreciate it.

The following week found us at the winter LIMARC fleamarket. I got a chance to see some old friends, check out the "good stuff," and exchange some views with our ARRL Director, Steve Mendelsohn, WA2HDF. As usual, this event starts early in the morning, and the LIMARC group does provide a good touch in the way of victuals. They have doughnuts, bagels, and rolls to go along with coffee or tea. Since it was Valentine's Day, I suppose a lot of amateurs were looking for that last-minute gift to bring home to their loved one.

There are still a lot of hamfests to go in the 1988 season, so there's still time for you to get to a few. Bring somebody with you and share the fun.

73, Alan, K2EEK

New PK-232 Breakthrough

Six Digital Modes - Including Weather FAX

A new software enhancement makes the AEA PK-232 the only amateur data controller to offer six transmit/receive modes in a single unit.

* **Morse Code**
* **Baudot (RTTY)**
* **ASCII**
* **AMTOR**
* **Packet**
* **Weather FAX**

$319.95 AMATEUR NET
$379.95 AEA RETAIL

Your home computer (or even a simple terminal) can be used for radio data communication in six different modes. Any RS-232 compatible computer or terminal can be connected directly to the PK-232, which interfaces with your transceiver. The only program needed is a simple terminal program, like those used with telephone modems, allowing the computer to be used as a data terminal. All signal processing, protocol, and decoding software is in ROM in the PK-232.

The PK-232 also includes a no compromise VHF/HF/CW modem with an eight pole bandpass filter, four pole discriminator, and 5 pole post detection low pass filter. Experienced HF Packeteers are reporting the PK-232 to have the best Packet modem available.

Operation of the PK-232 is a breeze, with twenty-one front panel indicators for constant status and mode indication. The 240 page manual includes a "quick start" section for easy connection and complete documentation including schematics. Two identical back panel radio ports mean either your VHF or HF radio can be selected with a front panel switch. Other back panel connections include external modem disconnect, FSK and Scope Outputs, CW keying jacks, and RS-232 terminal interface.

The RS-232 connector is also used for attaching any Epson graphics compatible parallel printer for printing Weather Fax. Weather maps and satellite photos, like the one in this ad, can be printed in your shack.

Contact your local AEA dealer today for more information about the one unit that gives you six modes for one low price, the PK-232.

AEA Brings you the Breakthrough

2006-196th St. SW
Lynnwood, WA 98036
(206) 775-7373

Our Readers Say

A Bit of the Hound In Us All

I always enjoy Larry Mulvehill's cover photos and vote for the December 1987 cover as his best yet. He reminds us that we all have a little of the DX hound in us. That's probably why we became interested in ham radio in the first place.

Bob King, W1UBG
Dover, NH

71 Years Young

Editor, *CQ*:

Well, this is the first letter that I have written to *CQ*, but I must tell you people how much I enjoyed "How Radio Acquired Its Voice" by Phillip Duncan (January 1988 issue).

Of course, I read *CQ* from cover to cover and am a 25-year man, so I have been around for some time. The article was very interesting because I had always wondered about but never went out of my way to research or look up the references, which Phil did.

Yes, many years ago I had a Globe King 500, and as far as I was concerned, it was the "cat's pajamas." Those days are gone now, and about the only letters you will get are from guys who played with AM and went through all kinds of modulation techniques.

Anyway, of all the articles that I have read, this one hit me and I thoroughly enjoyed it. Even though Fessenden didn't get the full worth of his invention, look what a tempest he started. Where would any of us be if it weren't for the Old Timers, of which I am one.

One last thing. I enjoy ALL of the new equipment ads and always look at the specs of the new gear coming on the market. THEN I read all the articles. I have renewed for another year, because it gives me an incentive to go on for another year. Age here is 71, and I hate to admit it, but I can still copy and send CW, and I try to keep up with all the new electronics.

Jack Golden, KK2W
Portville, NY

Resonant Circuit Values

Editor, *CQ*:

As I read the article in the January '88 issue by Mark Clark, WB4CSK ("Conquering Front-End Overload in the TS-940"), I was reminded of some equations I last saw in the *Radio Handbook* by Bill Orr (19th edition, 1975). They do not appear in more recent editions. Given F and C or F and L, these equations make finding the unknown value for a resonant circuit easier, since one doesn't have to remember powers of 10 or how many places to the right of the decimal a picoFarad or microHenry is.

Given F and C, $25330/F^2C = L$ or given F and L, $25330/F^2L = C$ for F in megaHertz, C in picoFarad, and L in microHenries. Also, given L and C, $F^2 = 25330/LC$. As an example, suppose a circuit resonant at 7 MHz is needed and a 5 microHenry coil is available: $25330/(7)(7)(5) = 25330/245 = 103$. 103 picoFarad will resonate the coil at 7 MHz.

As can be seen by the example, these formulas are easier to deal with than the conventional formulas, especially if you do not have a calculator handy.

Bob Alexander, W5AH
Irving, TX

"They said I couldn't work DX with just 100 watts. Especially with a radio that has less than 1000 switches on the front panel.

But the truth is, I'm working lots of DX, more than some of these blockbuster types, thanks to my Yaesu FT-747GX.

You see, my no-nonsense FT-747GX was designed with me in mind, so I can hop around the band fast to nail those DX stations. While the other guys are warming up their amplifiers, I'm working the new country!

My FT-747GX has a super receiver, with a directly-driven mixer for great overload protection. And, Yaesu included the CW filter in the purchase price (I used the money I saved on postage for the QSL cards!).

And my FT-747GX is loaded with other features. The receiver works from 100 kHz straight through to 30 MHz, and it's a fantastic shortwave broadcast receiver. I can use all twenty memories for that alone! Plus it's got dual VFOs. A noise blanker. Split frequency operation for the pile-ups. And scanning up the band helps me check out openings as they happen.

I just put in the optional crystal oven, and next month I'm going to pick up the FM board. I can't wait to tell my buddies I worked England on a repeater!

And with the money I saved when I bought my FT-747GX, I got a second ten-meter antenna for satellite work on the high end of the band. I use my personal computer to tell me what satellites are going by, and the computer even sets the frequencies on the radio for me.

Now my friends are getting FT-747GX rigs, too. I knew they'd figure out my secret weapon sooner or later. But now I'm setting the pace!

Thanks, Yaesu. You've made a rig that makes sense."

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847. Prices and specifications subject to change without notice.

YAESU

CIRCLE 145 ON READER SERVICE CARD

"They laughed when they saw my radio. Then they saw my logbook."

Announcing

• **Dayton, OH** – The Dayton Amateur Radio Association is accepting applications for its 1988 Scholarship Program. The program is open to any licensed amateur graduating from high school in 1988 and going on to higher education. Those working toward associate degrees or planning to attend accredited technical institutions will also be considered. All entries must be postmarked no later than May 15, 1988. For information and application forms, write to Scholarship Committee, 317 Ernst Avenue, Dayton OH 45405.

• **Washington, DC** – The Foundation for Amateur Radio plans to award 28 scholarships for the academic year 1988–89 to assist licensed amateur radio operators. Licensed radio amateurs may compete for these awards if they plan to pursue a full-time course of studies beyond high school and are enrolled or have been accepted for enrollment at an accredited university, college, or technical school. Additional information and applications can be obtained from FAR Scholarships, 6903 Rhode Island Ave., College Park, MD 20740.

• **MENSA**, the high IQ organization, has formed a special interest group of members who are also amateurs. Called "hamsig," the group presently has 50 members. All MENSA ama-

(continued on page 73)

Magnetic Attraction

Tired of paying higher and higher prices for V.H.F. magnetic mount antennas? Hustler has the solution. Two new series of antennas at suprisingly affordable prices. Built with the same quality and performance you expect from a Hustler product. Designed to offer you years of trouble-free operation. Priced to **save you money.**

FX SERIES (pictured mounted)

- 3.4 db gain | 5/8 wave
- 200 watt rating
- 15 foot coax
  PL-259 connector installed
- Magnetic mount holds to
  100 mph

Model FX-2 — 2 Meter, black & chrome
Model FX-220 — 220 MHz, black and chrome

24.95 ea.

Also Available in Black
Model FX-2B, 2 Meter
Model FX-220B, 220 MHz ..... **29.95** ea.

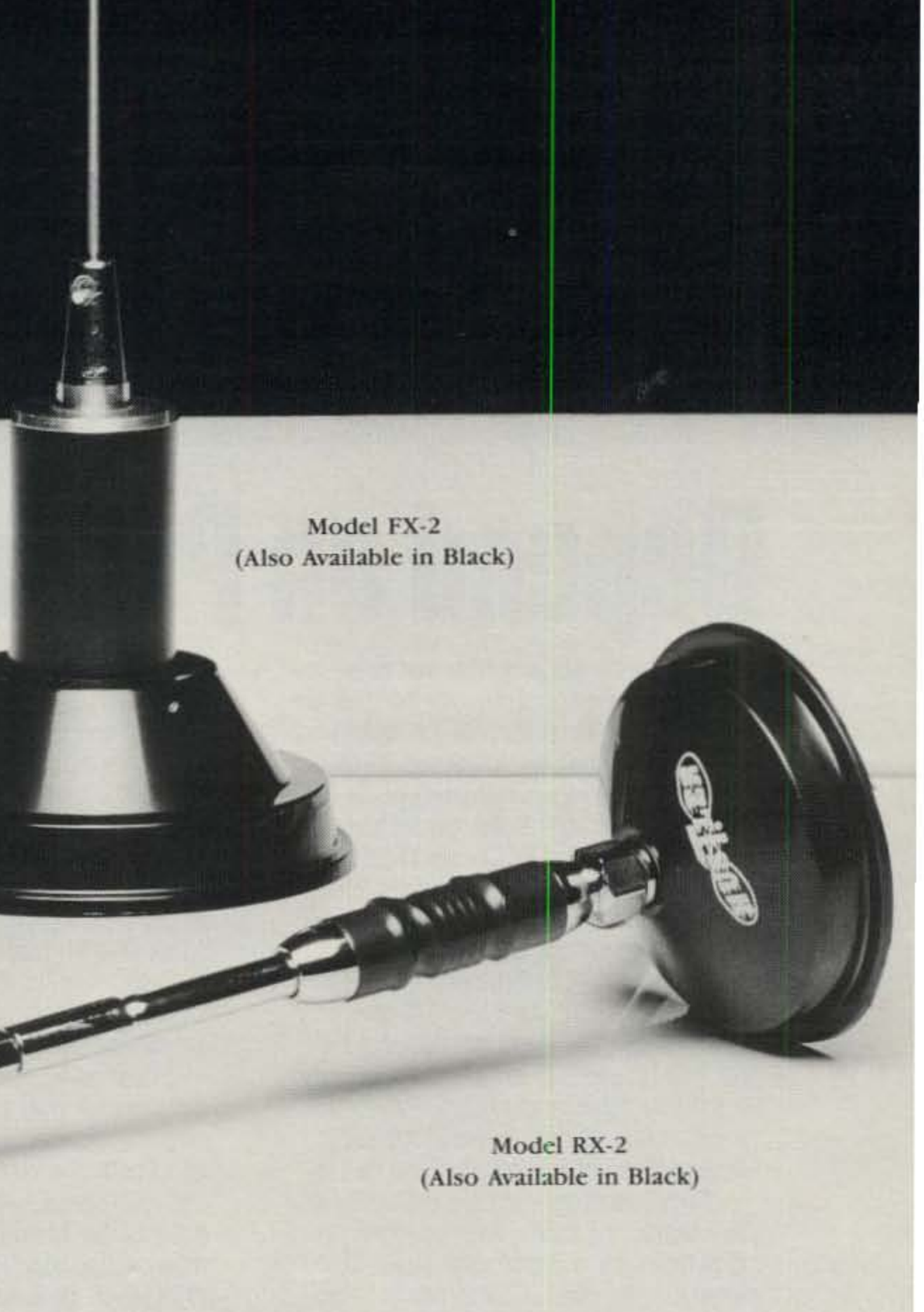
RX SERIES (pictured lying down)

- 3.4 db gain | 5/8 wave
- 100 watt rating
- 15 foot coax
  PL-259 connector installed
- Magnetic mount holds to 75 mph

Model RX-2, 2 meter black and chrome
Model RX-220, 220 MHz, black & chrome

19.95 ea.

Also Available in Black
Model RX-2B, 2 meter
Model RX-220B, 220 MHz ..... **24.95** ea.



Model FX-2
(Also Available in Black)

Model RX-2
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The Titan has been the subject of two "product review" magazine articles. See QST, April 1986; CQ February 1986.

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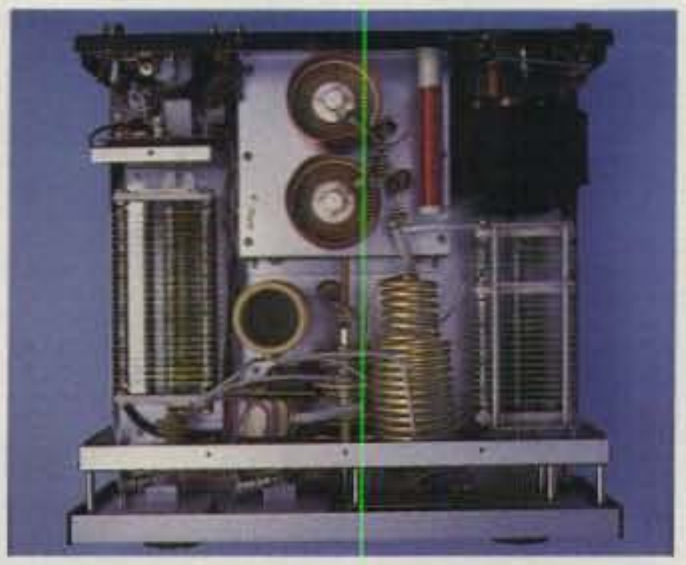

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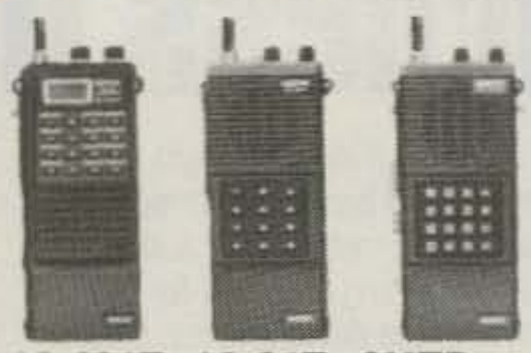

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A CQ Exclusive Interview With:

Mr. Ralph A. Haller*, N4RH

Chief, Private Radio Bureau, FCC

BY THEODORE J. COHEN†, N4XX

Mr. Ralph A. Haller, the newly appointed Chief of the Private Radio Bureau (PRB), is no stranger to amateur radio. He holds an Amateur Extra class license (N4RH) and has been licensed for almost 30 years. A graduate of the University of Kansas (BSEE, 1971), Ralph began his communications career working as an engineer and disc jockey at a radio station in Topeka. He went on to work as a broadcast engineering consultant to over 150 AM, FM, and TV stations in the midwest before joining the FCC in 1971 as a radio inspector in the Los Angeles District Office. Since then he has held several positions with the Commission in Washington, DC, including Chief of Technical Research; Chief Engineer of the Mass Media Bureau; Deputy Chief of the Policy and Rules Division, Mass Media Bureau; and Deputy Chief of the PRB.

In addition to amateur radio, Ralph counts flying as his other major hobby. A licensed, instrument-rated pilot, he has logged over 1,000 hour of flight time. Together with his wife, Mary, Ralph makes his home in Fairfax County, Virginia.

Ralph A. Haller, Chief, Private Radio Bureau, FCC. (All photos appearing in this interview were taken by Gene Thomson.)

CQ: Ralph, the last interview with you was published jin the November 1983 edition of *CQ*. At that time you were Chief of Technical Research at the FCC's laboratory. Now you are Chief of the Private Radio Bureau. What's been happening with you in the interim?

Haller: Actually, I've made several moves around the FCC. After leaving the lab in 1984, I became Chief of the Technical and International Branch of the Mass Media Bureau. In 1985 I accepted the position of Deputy Chief, Policy and Rules Division, Mass Media Bureau. Both of these positions involved formulating rules and regulations for the broadcast and cable television services. Then, in late 1986, I was appointed Deputy Chief of the Private Radio Bureau and late in 1987, Chief of that bureau.

CQ: That's quite an unlikely career path. Considering that your experience before joining the Commission was in broadcasting, what made you decide to leave the mass media work and join the Private Radio Bureau?

Haller: I saw the move as a tremendous opportunity and challenge. The Private Radio Bureau administers nearly 50 different radio services, whose users operate essentially "from DC to light." In addition to the Amateur Radio service, the PRB is responsible for the aviation, marine, public safety, business, special industrial, and numerous microwave radio services. These are the radio services that keep industry moving, help keep us safe, and provide mobile personal communications. They also create opportunities for specialized and often, more economic communications circuits than can be provided by the tariffed common carriers.

CQ: Do you find that being a ham helps or hinders you in your work?

Haller: I was first licensed as a Novice around age ten. Amateur radio has offered me the opportunity to learn about, to work with, and to enjoy communications technologies. Ted, I can say without a doubt that my early exposure to amateur radio shaped my career. Amateur radio led me to an interest in broadcasting, and that led to the FCC. The experiences I have had in amateur radio, and the people I have met, continue to help me make informed decisions. But, even given my high regard for amateur radio, official decisions that I make must be based on the "public interest, convenience, and necessity." That means balancing the needs of all spectrum users. Amateurs may not be the winners in every decision I make, but they can be assured that their needs and views have been fully considered.

"I can say without a doubt that my early exposure to amateur radio shaped my career."

CQ: Before we get into specific issues in amateur radio, would you please tell us a bit about how the Private Radio Bureau is organized?

Haller: Perhaps I should start by telling you how the PRB fits into the Commission. There are normally five Commissioners at the FCC who are appointed by the President with approval from the Senate. The Commissioners ultimately decide the major regulatory issues. Several bureaus and offices report to the Commissioners or, more specifically, to the Chairman. These bureaus and offices develop policy recommendations and perform licensing func-

**The views expressed are those of the interviewee, and they do not necessarily reflect the views of the Commission.*

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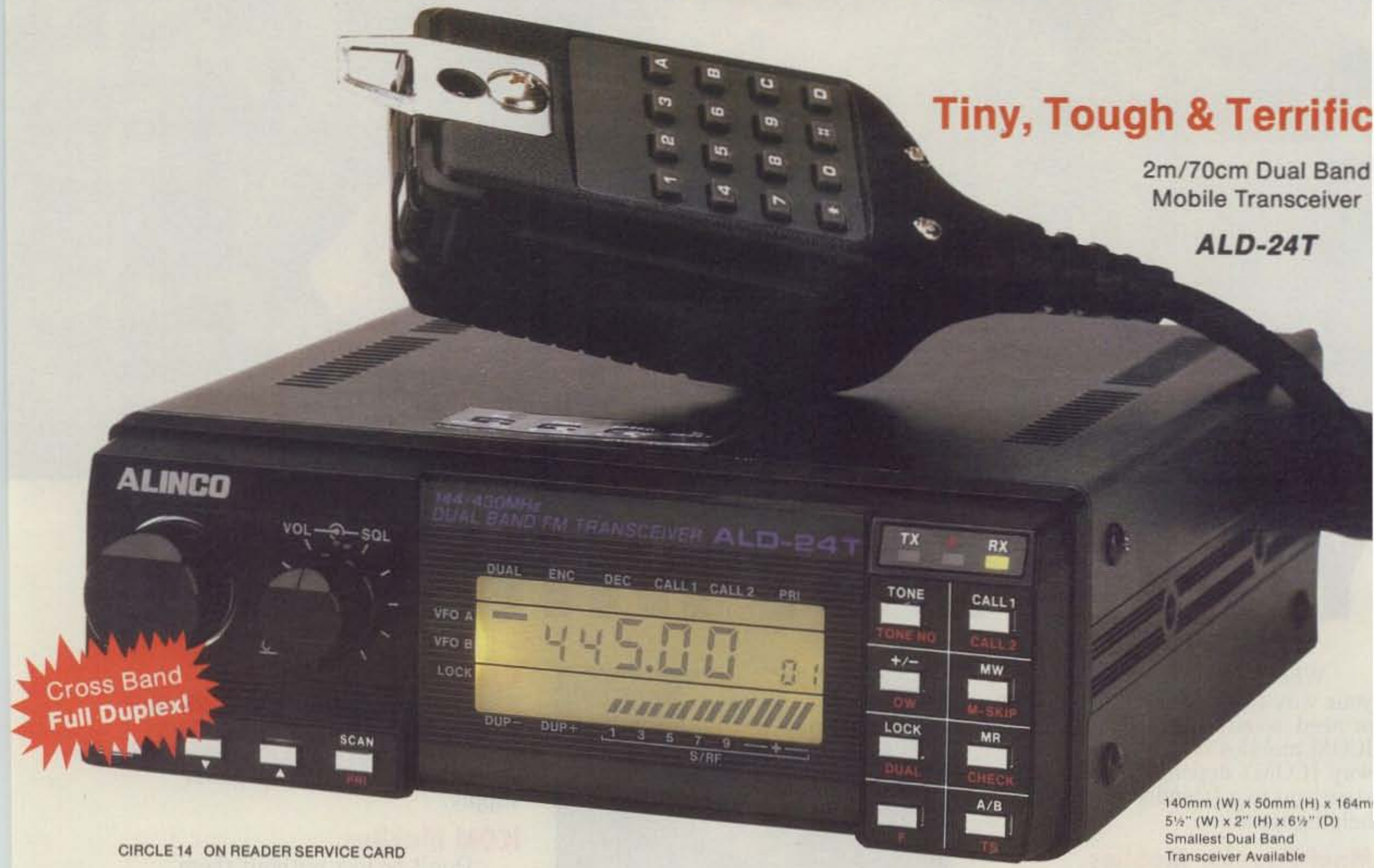

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(Left to right) Gary Stanford, Chief, Licensing Division; John Johnston, Chief, Personal Radio Branch; and Robert McNamara, Chief, Special Services Division, confer on amateur radio license processing.

tions. There are three major licensing bureaus: the Common Carrier Bureau, the Mass Media Bureau, and the Private Radio Bureau.

Within the PRB we have three divisions: the Land Mobile and Microwave Division, the Special Services Division, and the Licensing Division in Gettysburg, Pennsylvania. Policy decisions concerning the aviation, marine, personal, and Amateur Radio services are handled by the Special Services Division. The remaining "business-related" services are handled by the Land Mobile and Microwave Division. All PRB licensing is done at Gettysburg.

Haller: Amateur radio rules and policies come out of our Personal Radio Branch, a part of the Special Services Division. I suspect many of your readers already know the Chief of that branch, Johnny Johnston, W3BE. He's a longtime ham and remains very active on the air. The Chief of the Special Services Division is Bob McNamara. Although he's not involved in amateur radio, he understands the issues well and is a friend to ham radio.

CQ: Can you tell us a little more about Gettysburg?

Haller: Certainly. We are very proud of our Gettysburg operation. We believe it is the most efficient licensing operation in government. For example, last year Gettysburg processed over 900,000 requests with a licensing staff of just over 100 people. That translates, on the average, to just 15 minutes processing time per application. Obviously, that doesn't mean that licenses appear 15 minutes after the postman arrives; there are several steps in each process, with transit times between steps. For the Amateur Radio service, processing time is only about 20 days between receipt of an application to issuance of a license.

Our staff at Gettysburg takes its job very seriously. The people know how much a license means to an individual amateur or to a business. Whether it's answering a telephone inquiry or printing a license, you won't find a more dedicated group of individuals anywhere! Gary Stanford, Chief of the Licensing Division, deserves particular credit for keeping operations running smoothly. I should also mention that Gary, W4FDP, has been licensed for almost 35 years.

"Our staff at Gettysburg takes its job very seriously."

CQ: How do you anticipate that the current budget restrictions will affect your bureau?

Haller: My goal is for any budget reductions to be transparent to the people who deal with the bureau, but that may not be possible. I've already mentioned the tremendously hig productivity at Gettysburg. There really is no slack to compensate for lost work, should someone leave and not be replaced. However, I have a very capable assistant bureau chief, Jennifer Bush, who will be keeping up with budget changes and shifting available resources to minimize any negative impact. I have complete confidence in her ability to develop creative solutions to budget problems. We don't know what the full impact will be of this year's budget; however, any adverse impact would first be noticed by an increase in processing times for licenses or rule-making proceedings.

CQ: We've talked a fair amount about bureau operations in general. Let's turn to matters directly affecting amateur radio. How are the volunteer examiner systems operating?

Haller: They can only be characterized as a great success. Admittedly, there have been some problems. We know that in isolated instances exams have been administered improperly. We have already taken enforcement action in many of those cases. But we are talking about only a handful of problems, given the thousands of examinations administered each year.

The Volunteer Examination Coordinator system has resulted in more examinations being given each year, at more convenient locations, as compared to when the exams were administered by FCC examiners. Also, the Volunteer Examination Coordinators, or VECs, have taken over the function of revising and maintaining the examination pools. This should keep the tests current with new technology and rules. Overall, the program has produced very positive results, and I expect that to continue.

CQ: Do you foresee making any changes in the VEC program?

(Left to right) Jennifer Bush, Assistant Chief, Private Radio Bureau; Ralph Haller; and Gary Stanford discuss the 1988 budget.

(Left to right) John Borkowski, Monty DuPont, John Johnston, and Tom Fitz-Gibbon, members of the Personal Radio Branch, review comments in a pending rule-making.

Haller: The concept of volunteer examiners continues to evolve as the process matures. VECs meet regularly to discuss issues and to develop more efficient procedures. Although I don't have any specific changes in mind, I am sure the VECs will continue to improve the program.

CQ: Is deregulation still a popular concept at the Commission?
Haller: Deregulation is alive and well. The idea boils down to getting the government out of decision-making that can best be performed by the citizens. Generally, this means letting the economic forces in the market find the right answers. Some argue, however, that amateur radio is not profit-driven, and thus, no market exists. It's a hobby, with decisions often based on personal goals, preferences, and emotions.

"Deregulation is alive and well."

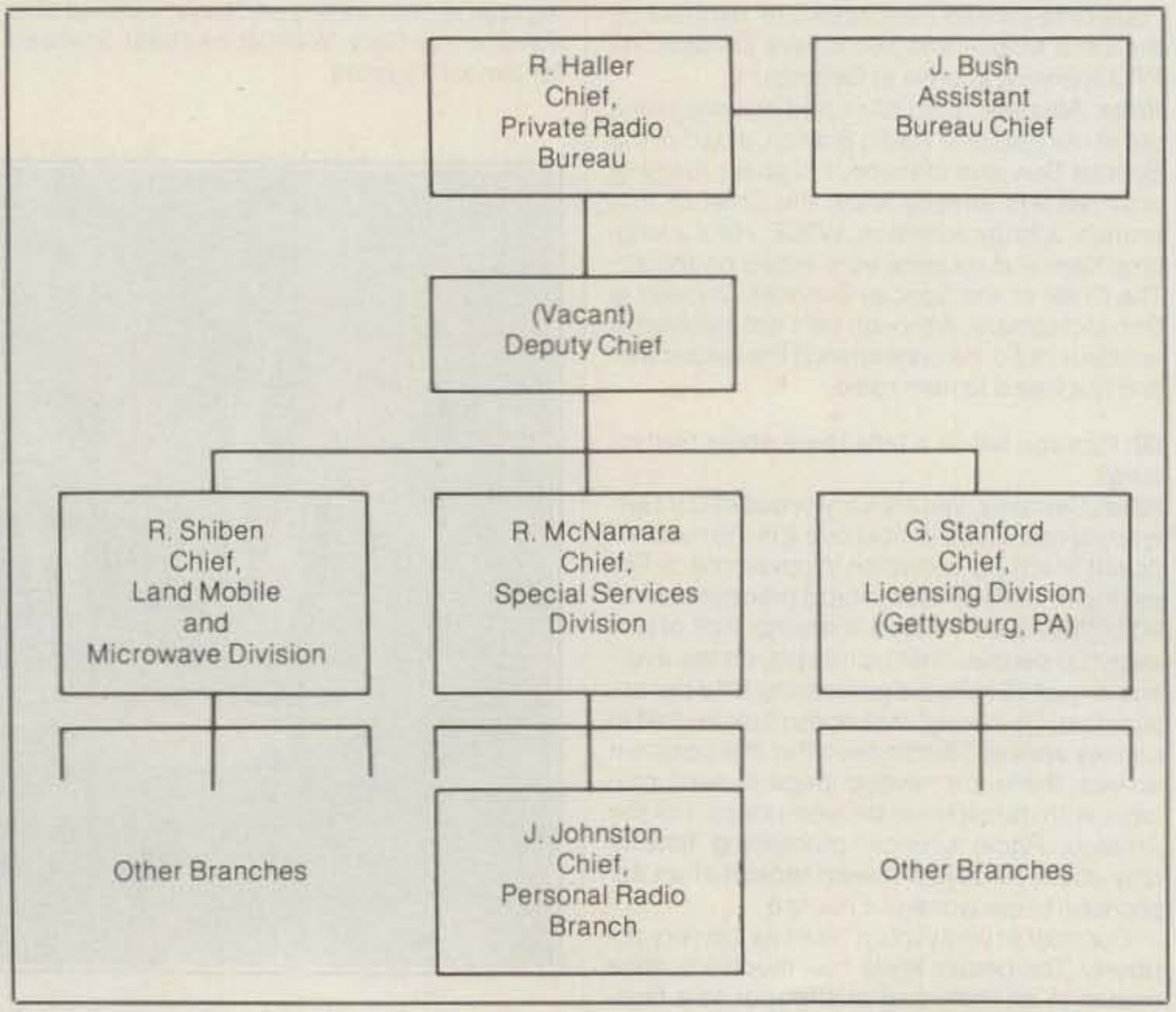
Although I essentially agree that economic forces may be weak, I nevertheless believe that the Commission should have only those regulations absolutely necessary to form a framework for the service. Beyond that, amateurs should have complete freedom of choice in how they operate their stations. Spectrum management policies, operator requirements, license issuance, and interference criteria must remain primary responsibilities of the Commission. Any rules not meeting one or more of those criteria are highly suspect.

CQ: The Bureau opened a new inquiry concerning specialized amateur call signs during 1987. Where does "PRB-3" stand?
Haller: Let me start by providing a little background. Up until about 12 years ago, the Commission would issue a specific, unassigned "1 × 2" call sign to an Amateur Extra class operator licensed for 25 or more years. Such applications were extremely time consuming to process, considering that almost all processing was done manually. As the Commission began to automate operations at Gettysburg, it became clear that specialized call signs had to be eliminated. This was done in 1976–77 by a "phasing-out" process that essentially allowed any amateur Extra class operator to select a "1 × 2" call sign. Since that time the Commission has issued all amateur call signs by using our computer to assign the next sequential call sign, based on location and license class.

We know that some interest exists among amateurs to have some type of personalized call sign selection process reinstituted. One option being considered is to develop a system that would allow a private, special call sign coordinator to assign specific available call signs. We had twelve individuals and organizations indicate a desire to perform this function. However, many of the commenters expressed reservations about having previously assigned call signs reassigned. They pointed out how a call sign is so closely associated with an individual in the Amateur Radio service. We are currently analyzing the comments and the possible impact on the Commission. I hope we have a decision within the next few weeks.

"I hope we have a decision (on special call signs) within the next few weeks."

CQ: The Commission recently took a strong stand against the broadcasting of obscene or indecent material. I'm sure most amateurs support that position and would like further action. But, we still hear indecent language on the air. What do you plan to do about the problem?
Haller: Any action we take must be consistent with the First Amendment to the Constitution.



The Private Radio Bureau (January 1988).

Bob McNamara pondering a difficult rule waiver request.

Beverly Baker, legal assistant to Haller, responds to a telephone inquiry.

Free speech is, and will remain, a basic right. The government must overcome a high hurdle to justify any restriction of speech. Given that condition, we have to differentiate between speech that one simply finds offensive versus indecent speech. Remember that any action the Commission takes will likely be reviewed by the courts to determine if the action complies with the First Amendment.

We have some cases now under review. I suspect we will address some enforcement actions in this area before the end of the year. It simply takes time to develop legally defensible cases.

CQ: In your opinion, Ralph, is deliberate interference on the rise?
Haller: I don't think so. As with most issues, there are only a few individuals who cause most of the trouble. The amateur bands are crowded, so every signal potentially causes interference to someone else. Many of the complaints we receive concern net operations. Some people like nets; others do not. We have had complaints from nets that others would not clear the frequency for the net to begin. Similarly, we hear from non-net operators that nets simply begin operations on top of existing conversations. My suggestion is that more operators should spend more time trying to cooperate in frequency use and less time trying to point fingers.

"My suggestion is that more operators should spend more time trying to cooperate in frequency use and less time trying to point fingers."

CQ: Amateurs are again threatened with loss of some of the 220 MHz band. Why is that the case, and what can be done to preserve the bands?
Haller: The intense demand for spectrum by the commercial services naturally leads to a search for new spectrum. In this case, proponents of a new technology known as Amplitude Compandored Single Sideband, or ACSSB, were looking for available spectrum as a home for ACSSB. In their analysis, the 220 MHz band appeared to be under-utilized by amateurs and is perfect for ACSSB. The Commission was petitioned to initiate a rule-making to reallocate the spectrum. That led to the current proceeding.

Although I can't speculate on the outcome of the 220 MHz issue, Ted, I would encourage amateurs to use the bands they have effectively. Spectrum becomes more valuable every day, but it's relatively easy to justify spectrum for development of a new packet protocol or for assistance in emergencies. I would ask each amateur to evaluate his or her own use of the spectrum and to decide whether such operations would justify continued assignment of a valuable national resource to amateur radio. Meaningful contributions by each amateur will do more than anything else to preserve the spectrum.

CQ: Novices were recently granted increased privileges, especially voice privileges at 220 MHz and on 10 meters. That appears to have generated new interest in amateur radio. What are your reactions?
Haller: The basis for the Novice enhanced privileges was the concern that almost as many Novice operators were dropping out of amateur radio as were advancing to higher grades. Apparently, the Novice operator experience was not sufficiently rewarding. The new privileges have seemingly corrected that problem, as evidenced by the current eight percent annual growth rate in Technician operators. Moreover, new Novice operators are remaining. Nearly 25,000 persons entered the Amateur Radio service last year in the United States. These are positive signs for the health of the service.

(Left to right) Ed Jacobs, engineering assistant to Haller, and John Johnston consider an enforcement action.

CQ: Do you have any new rule-making issues planned that will affect amateur radio?
Haller: We have two major plans for 1988. First, we would like to rewrite our amateur radio rules—that is, Part 97 of the FCC Rules and Regulations. This effort is directed at assuring consistency and eliminating unnecessary regulations. The second rule-making activity is to develop rules to cover digital and packet operations. In particular, packet pushes the limits of traditional definitions. For example, what constitutes third-party traffic in a store-and-forward system? We need a total evaluation of the issues to make the rules more flexible and to make them accommodate today's complex operations.

CQ: Another issue that seems to remain unclear is exactly what is permitted on amateur radio with regard to communications for public events like marathons.
Haller: This is an area in which an amateur operator could inadvertently violate the "no-business" rules. As an example, consider a marathon foot race. Amateur radio can be used to coordinate emergency activities or the public's safe observation of the race, such as supplying communications for unforeseen medical emergencies. However, amateur radio may not be used in lieu of commercial two-way equipment for providing logistical support or position reports to a public-address announcer or a broadcast station. The sponsor of the event should use commercial or public-safety channels for relaying such information. I understand that amateurs want to be helpful, but I urge amateurs to be very careful when participating in such events.

CQ: Ralph, what do you see as the major strengths in amateur radio?
Haller: Amateur radio provides a pool of trained communicators who can respond to the needs of the community, especially in major disasters. It provides opportunities to learn about electronic communication technologies and methods. This can lead young people to choose communications as a career or older people to change careers. Amateurs also have a unique opportunity to promote international goodwill through contacts with amateur operators in other countries.

CQ: Any weaknesses?
Haller: One. I think an attitude of trying to exercise one's rights without regard for others is growing among amateurs. Amateur frequencies are shared, and that puts an obligation to cooperate on everyone. If that cooperation breaks down, so will the service.

CQ: Any closing thoughts?
Haller: Just a challenge. That challenge is to bring in and keep new amateur radio operators. Go out and actively tell others about the wonderful world of amateur radio. Help newer amateurs to advance and learn. This kind of effort will keep amateur radio alive and strong.

CQ: Ralph, thanks for taking the time to be with us.
Haller: My pleasure! CQ

Looking for something new and different?
KD9BS found it at last year's Dayton Hamfest.
Instant tower—now you see it, now you don't.

A Pneumatic Antenna Tower

BY M.F. KLAES, D.C.*, KD9BS

This product was first shown to the amateur market at the 1987 Dayton Hamfest. The author, KD9BS, saw it and was impressed enough to order one and have it installed. The model he describes is a commercial version designed for remote broadcasting, flood-lights for emergency vehicles, military vehicles and other heavy duty use. The telescoping mast allows antennas to be lowered to a base height of approximately 7′ when not in use, and extends, unguyed, to a height of 30′ when on the air.

The TMD telescoping mast is made by the Will-Burt Company or Orrville, Ohio. It is a series of graduated extruded aluminum tubes that nest one inside the other. Each tube has a seal at the bottom to contain air pressure, and a collar at the top to limit extension of the tube inside it. The masts are extended from their compact nestled height by approximately 10 PSIG pneumatic pressure supplied by air compressors, hand pumps or compressed air bottles. Other models with larger collapsed heights are available for use up to 55′. The telescoping mast assembly can be readily removed from a home QTH and quickly installed on a recreational vehicle for mobile of field activities. Top load capabilities range from 40 to 150 lbs. for up to 10 square feet of sail area.

The commercial version described costs about $4,000 factory installed. An additional compressor would raise the price about $600.00. A new amateur version to be shown at this year's Dayton Hamfest is tentatively priced about half that of the commercial version.

The Amateur Radio Chapter (ARC) of the Family Motor Coach Association (FMCA) now boasts 346 Motor Home members that are also amateurs. Members are always looking for new ideas or products to enhance radio capabilities of their Coaches to facilitate checking into the daily FMCA/ARC RTTY and SSB *etc*. For this reason, a TMD mast seemed to be a product worthy of investigation after we obtained a TMD brochure at the Dayton Hamfest this year.

We felt a mast installation on our Blue Bird Motor Home would give us a tower/antenna combination which would operate from a stationary location, as well as augment the resonator whips used for mobile operation. A call put us in contact with TMD's Sales Manager, Donald Barlow, to discuss the feasibility of amateur application and use of the mast. Barlow was very intrigued with the possibility of mounting a TMD mast on the back of our Coach, and after several ensuing calls, arrangments were made to drive our Coach to the plant location in Orrville, Ohio, to inspect the mast and make a final decision of purchase.

My son Bill and I arrived at the plant early one morning in July, and promptly at 7:00 AM the plant door was opened by installation technician, Gary Cassidy. We were taken for a tour of the plant facilities, and then introduced to Don Barlow the Sales Manager, Plant Superintendent Bill Varney, Engineering Manager Andy Brooker, and Production Control Manager Scott Carter. The thorough and dedicated TMD staff (an employee owned corporation) made an immediate surveillance of our Coach for feasible installa-

The neat, compact, operating position of KD9BS in his motor home.

*Box 747, Seymour, IN 47274

The nested pneumatic mast on the rear of the RV. The coil of cable at the top is the antenna coax. It will spiral up the mast as it is raised.

tion procedures, and Andy Brooker drew a line blue-print of his plan of action.

A proposal was made and accepted, and we also decided to include the optional Alliance HD-73-1 Heavy Duty Rotator. In our opinion the rotator would better serve our needs for operating inside the coach than the manual turning handles offered as the standard means to rotate the antenna.

The bumper mounting bracket for our coach was a special adaptation from previous TMD installations made on electronic news gathering vehicles. The problem of a penumatic supply to raise the mast was easily solved since our Coach is equipped with an air compressor. TMD provided a small regulator and gauge to supply the proper air pressure necessary to raise the mast.

A full working day was required to install the mast, with a major portion of the time being consumed by designing, building, and installing the top mounting bracket. It was quite late in the evening when we waved good-bye to Plant Manager Dave Davis and his crew, with our new 'mobile tower' completely installed on the rear bumper of our coach. I would be remiss in my remarks, if I failed to comment that we have never received more attention to detail and concern for customer satisfaction, than was received from the staff of TMD.

Little time was available for actual antenna considerations for the new tower, due to an immediate planned trip with the coach. The decision was made to temporarily use a 'whip-dipole' antenna which had performed quite satisfactorily on a recent fishing trip to Michigan; at that time the antenna was mounted on four sections of Radio Shack stacking poles. The 'whip-dipole' was fashioned after an article printed in the April 1987 *CQ* magazine, by Bob Norloff, W4GEX.

The 20 and 80 meter whips, mounting hardware, and quick dis-connects were obtained for W4GEX's project, from the Mobile Antenna And Accessories Division of AC/DC Electronics, Burlington, NC. The quick disconnect feature works extremely well, as we have to climb up and down the rear ladder of the Coach to install or change whips to other bands. The quick dis-connects are equally appreciated for easy removal and storage of the antenna in our coach when we are underway.

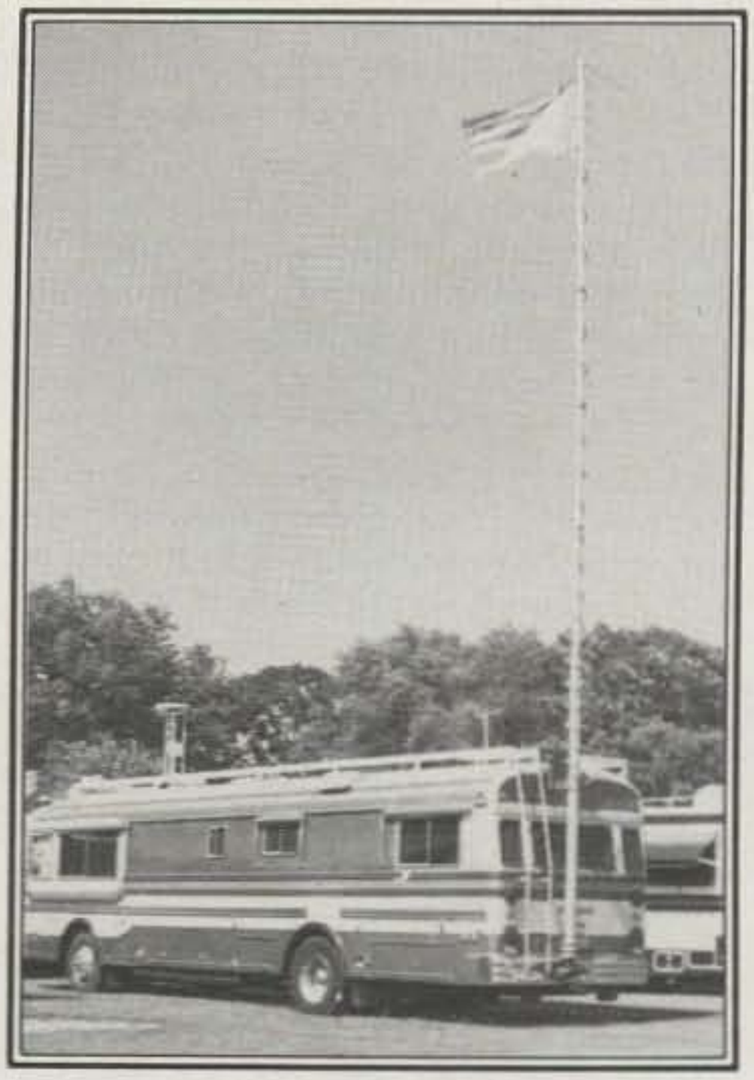
Three days following installation of the mast, we put it to a good test, as the Summer National Convention of the FMCA and our ARC chapter met in Des Moines, Iowa.

Members of our ARC group eagerly anticipated our arrival at the campground, due to the advanced publicity I had given the 'mobile tower' via our daily SSB Net. To put it mildly, it was the HIT OF THE RALLY!! Over 30 amateurs inspected the mast and requests to elevate and lower the tower were proudly fulfilled. When fully raised the tower and flag were quite a land-mark, and could be seen from almost any location on the Iowa State Fairgrounds.

A Kenwood TS-440S w/AT is the mobile Transceiver used in our Coach (RTTY is accomplished with a Tono 5000E) and dipole SWR readings below 1.3 were consistently obtained at both ARC 20 meter net frequencies. Solid QSO's were made from the Des Moines portable location with ARC members in New York, Pennsylvania, California and Texas. Although we were very pleased with the performance of the 'whip dipole', we realize a more sophisticated antenna will further enhance the potential of our mobile tower. Since arrival back at our home QTH, we have run tests with a two element tri-bander, and are presently awaiting arrival of a mini-quad, which we feel should present less storage problems on the coach.

After our short and basically satisfactory experience with the mast, a letter containing a few observations was sent to Sales Manager Don Barlow of TMD. Among our suggestions was to insulate the mast from the mounting brackets, to allow 'loading' the mast itself for radiation on the lower amateur bands. We also feel the amateur mast should consist of fewer but longer telescoping sections, and the first section should be a smaller diameter than that of the TMD-7-34 commercial model (o.d. = 5″) which was installed on our coach. Finally, the mast must be cost-attractive to the amateur community.

In his reply, Barlow stated that TMD is presently developing a series of Ham mast models, which will be designed specifically for the larger sail areas, torsional loads and height requirements of amateur radio antennas. They expect to have amateur mast models available this year.



Extended to 30′, the pneumatic mast supports a flag and a dipole antenna. The author plans the addition of a mini-quad rotatable antenna.

Packet radio has come a long way in a few years and is still evolving. K4ABT describes one aspect of this evolution that makes packet "picture perfect."

PICPRO—An Introduction To Packet Picture Transfers

BY BUCK ROGERS*, K4ABT

As with anything new, expecially in amateur radio, new terms and language are introduced. The following are terms you may not be familiar with, yet. PICPRO, a PICture PROgram for the PC and compatibles, which allows the display of a picture in color as it is received via packet radio. When the complete picture is received, it is then automatically saved to disk. It can later be displayed or printed to graphics printer. This process is so different and spectacular, that it ushers in a totally new era in packet and data communications. PACPRO is a text and binary transfer program. PACFILE is a combination of PICPRO and PACPRO.

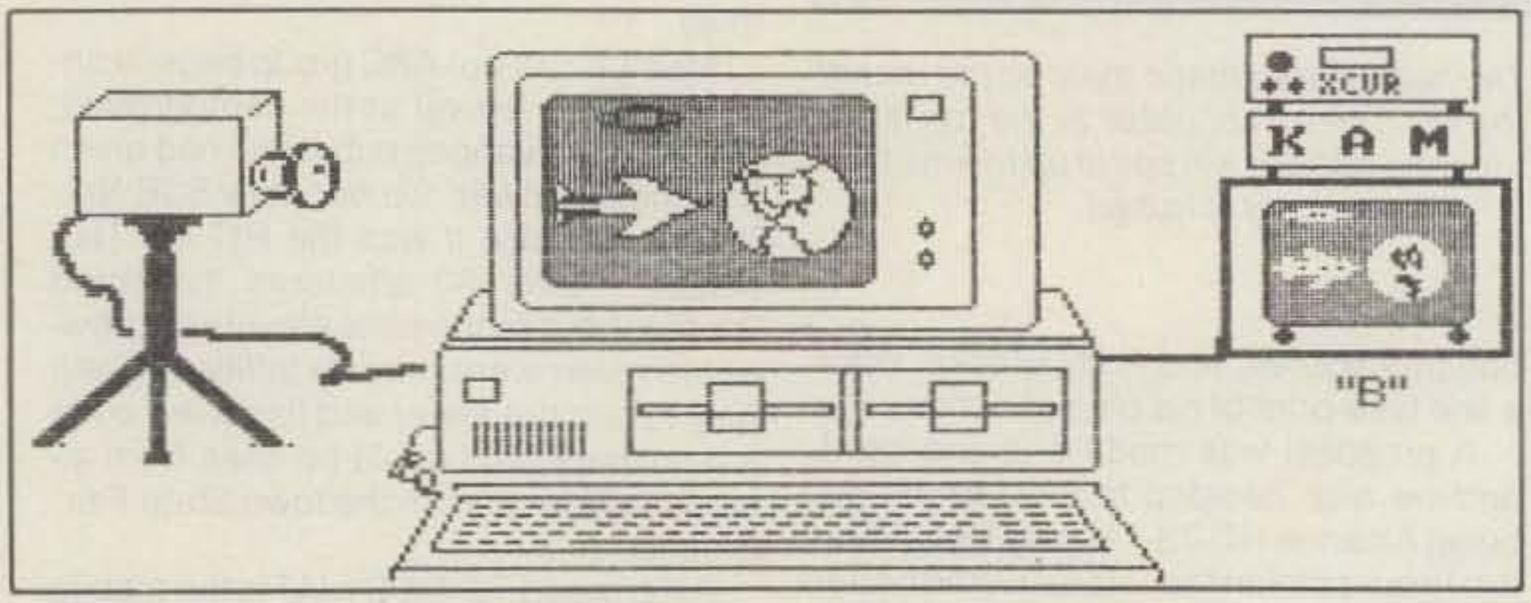


Fig. 1–The amateur radio packet station configured for video transfer. The video monitor at "B" is a convenient option. The "Digisector" is installed inside the PC.

CMD:converse

At 2 in the morning your eyes can sometimes play tricks on you. This December night was a bit different from a lot of others for those of us who were developing this "master piece." We had been playing around with the Kantronics MAXFAX, and somehow we entered the subject of how much we all enjoyed pictures and graphics via packet. The thrill of transmitting perfect color pictures with the COCO* and only the a KPC as an interface, was a real rush. My packet playmate is the writer and author of PACPRO, Southern Software Systems, Bob Slomka WD4MNT. Bob enjoys packet as much as I do, and he has been around packet as long as I have. Many facets of amateur radio come and go as do trends and "fads", but in forty years of hamming, I have yet to find any single mode as fascinating as packet radio.

At this writing, "PICPRO" the Packet Picture Passing Program for the PC is nearing absolute perfection. PICPRO is designed to function as a terminal program operating in conjunction with the Kantronics MAXFAX weather facsimile receiving features. Because of our interest in the transfer, display, printing, and saving of high resolution color pictures via Packet Radio, this system of weather fax receiving has evolved into a full-scale error-free color packet picture program.

The many sleepless hours of code writing and rewriting credit goes to Bob Slomka, WD4MNT. The requests for more features and more changes, kept Bob up to his "hex", making additions to the program. It would appear that we have now reached the pinnacle of success. Nothing could be further from the truth. Bob is a dedicated perfectionist. As with his super PC terminal program "PACPRO" which we all either use with the PC or have heard about, this program will continue to improve as Bob strives to make it even better. I am the "BETA tester". I provide a lot of requests for the "I want another feature " etc. I bounce the pic-

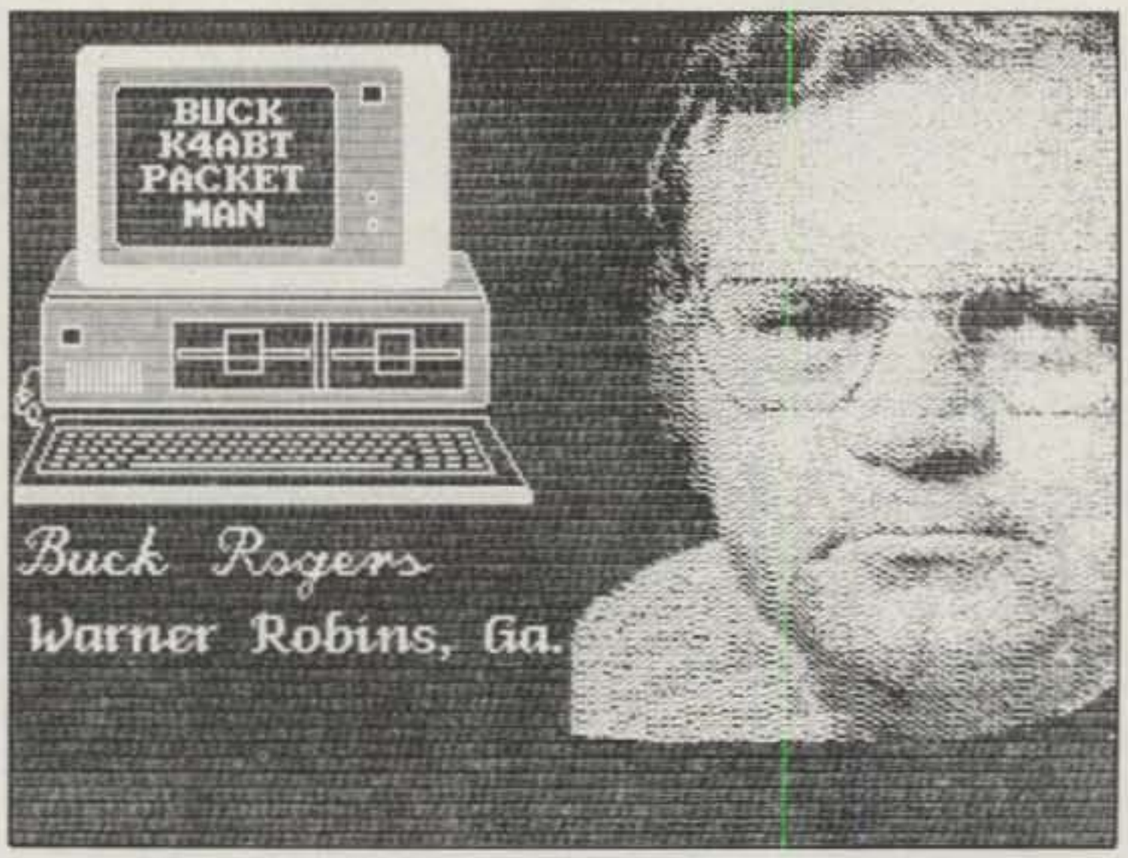
506 Pheasant Ridge Drive, Warner Robins, GA 31088

Table I

Command	Setting
XFLO	OFF
TXFLO	OFF
TRFLO	OFF
8BIT	ON
AUTOLF	OFF
AX25	ON
MRPT	OFF
NDMON	OFF
MCON	OFF
MCOM	OFF
PAR	4
PACL	128
FR	4
MAXF	4
USERS	1/1
ECHO	OFF
CSTAMP	OFF
MSTAMP	OFF
DWAIT	10
RESP	5
TXD	45*
FILTER	OFF
SCREENL	0**

*(Or to suit your linear pull up time)
**(It *must* be set to ZERO (0))

A completed packet picture sent from WD4MNT to K4ABT. Since it can be saved on disk, it can be run again at any time.



A black and white printout of the digitized color picture sent via packet radio.

tures to and from Bob as he tries to improve PICPRO.

Packet Picture Past

Development goes back a few years to the TRS-80 COCO and the interest it aroused in the packet community. I developed a packet picture passing technique and caused an increased interest in passing color packet pictures from one packeteer to another.

This new era of packet could have passed into oblivion were it not for the Kantronics and Phil Anderson, WØXI. Phil listened to our requests for a way to capture pictures with the Kantronics Packet Communicators. In fact, the first of the weather fax programs I successfully used was the "brain-child" of Phil Anderson. Now that the wheels of Digital Image Transfer (DIT) are set into motion for the PC and clones, our world of packet radio will never be the same again.

The many letters requesting information about packet picture transfers with the TRS-80 COCO stimulated an interest in the PC and compatible field, also. With the PC and clones having become the dominant computer in the hamshack, it is no small wonder the packet picture transfer interest is of such enormous proportions. I hasten to add, color packet pictures are not subject to the noise and streaking found on slow-scan.

Color packet pictures are, in fact, error-free. This is the nature of packet itself. The AX.25 protocol is the reason for this "perfect picture" concept. Since frame checking is an integral part of the packet picture, just like standard text packet, the same error checking is performed as the picture is transmitted and received. This presents the receiving station with a picture identical to the picture at the transmitting station.

What could be better! Not a pixel out of place. The reason? "The picture is Digital" and every pixel or bit is accounted for at both ends of the path.

From the moment you begin to use PICPRO, your world of packet will change. The change is sudden, so be prepared for the shock to the system. As you get into the picture passing scheme, you

```
-- PicPro HELP --
Commands for Receiving and Transmitting B/W & Color Pictures

        F1          Restart screen/Resync/Receive Black & White Picture.
        Alt 'F1'    Receive Color Picture.
        F8          Snap picture of screen to buffer.
        Alt 'D'     Display buffer picture to screen.
        Alt 'S'     Save Picture buffer To Disk.
        Alt 'L'     Load Picture to buffer From Disk.
        Alt 'T'     Transmit Picture buffer.
        Alt 'H'     Display this screen.
        F10         Exit scan mode to Cmd mode.

        Alt 'X'     Exit Wefax/Picture mode to normal Packet mode.

To receive weather fax, press F10 to enter Cmd mode. Type ie<Wefax 1280>
PageUp key to increment scan lines by one, PageDown key to decrement scan
lines.  F1 key to sync in Wefax picture.
```

*This is a printout of a quick reference chart that can be pulled up on the screen by pressing **Alt H**.*

will find yourself at the keyboard and glaring at the screen watching the pictures as they come in. Suddenly you will become aware of a beam of sunlight peeking through the window. You sit erect and realize you have just stayed up all night and it is Saturday morning . . . and the XYL wanted you to go with her to visit the folks! It is fun, and it is happening now.

Pacfile is User Friendly

Let's see what happens when we boot the PACFILE.EXE file. The program will execute in the PACPRO terminal mode. The **ALT H** command will allow you to examine the many great features of PACPRO. To setup the terminal parameters press **F3**. After the communications parameters are set to the proper baud rate, parity to None, Databits to 8,and 1 stopbit. You will need to make some changes in the KPC/TNC. Use the settings in Table I as a guide.

After you have configured the KPC, establish a "connect" to a station who is also using PACFILE.EXE. Go about your QSO as you normally do. When you are ready to pass a picture to the connected station, enter the picture transfer mode by pressing the **ALT** and **F1** keys. This will call the directory from the picture disk in the current drive. The first prompt will be for the path and/or drive. Just hit **Enter** if the picture disk is in the active drive. Next the list of pictures will appear on the screen. Use the cursor keys to place the high-light over the picture title you wish to send. Press **Enter**: The rest is history!

This is what will happen at the transmitting station as soon as you have hit **Enter**. There is a momentary pause, the first packet goes out and looks at the receiving stations disk to ascertain that there is enough space on it for the incoming picture. If "true", a validation packet signals the transmitting station, "You may proceed." The sending station will now send a "reset to picture mode" packet to the receiving station. As soon as the packet is received the screen goes blank and an "ack" packet is sent to the sender. When the sending station receives the "ack," the picture transfer begins.

There is a warm "rush" as a picture begins to paint on the screen,in color. It is truly an awe inspiring, experience. When the picture is completed, the picture will automatically save to disk. The title, and colors are preserved with the picture, along with the other automatic processes. The same title will be applied to the picture file as was on the originators disk. Next use **Control A** to get into the PICPRO "manual" picture transfer program. Here, you may "do" an **Alt D** and display the picture. Press **Enter** or **F10** and return to the connected mode.

Now we really begin to realize the potential of this"Packet Picture Passing Program". As we use this magnificent piece of software, we see more and more of Bob's genius unfolding. It is this moment in time that some of us have longed for. It is really happening for us, an affordable means of color picture transfer in which many amateurs can now participate. In conjunction with our packet controllers, we now have an automatic transmit, receive, display, and save system of packet picture transfer. What a wonderful way to operate packet!

The transfer takes about 2 minutes (2400 bps) or 3.5 minutes (1200 bps). The picture can be reloaded with **Alt L** and displayed with **Alt D** to be viewed or printed if you have GRAPHICS.COM resident, using the **Shift/Prt** or the **Prt/Sc** keys.

The PACFILE.EXE program, in MS-DOS format only, registered to your call sign, is available for $29.95, from:Southern Software Systems, c/o Larry Wood KF4JF, Route - 1 Box 1030, Hahira, Georgia 31632

PACFILE Offers Many Extras!

Using the Kantronics MAXFAX features to receive a weather fax picture with your communications receiver, is accomplished in a similar fashion. Use PICPRO to do so. Once you have the station tuned in, press **Alt W**, this will place you into the WEFAX 1280 mode with your Kantronics Packet Communicator (follow the instructions in the Kantronics manual). You can restart the MAXFAX picture or resync it by pressing the **F1** key, and as many times as you like.

Saving the weather fax picture is done in this manner: After the weather fax picture is complete, press **F8** to place it into the RAM buffer. Now you can look at the picture in the buffer using **Alt D**. If it is a picture you wish to save, press **Alt S** and give it a name, (we use an extension of PIC for pictures and FAX for weather fax) then press **Enter**. If not, just press **F10** and **Alt W** to return to MAXFAX or **Enter** to go to the packet CMD mode. **F1** will also take you to the MAXFAX mode you were in, and the **ESC** key will return you to PACPRO.

Once in the MAXFAX mode and while you are receiving a weather fax picture, you can change the overscan rate by using the **Page Up** and **Page Down** keys to vary the sweep, ie; wefax 1280 1 is what you enter when you do an **Alt W**. But you may want to set the complete picture to your screen with less resolution. To do so just press the **Page Up** key five (5) times. With practice, you will soon have the fax picture appearing exactly as you would like to print.

If you like to look at pictures in colors other than the received colors, just look at this touch of genius Bob has supplied in PICPRO. While the picture is displayed on your screen, use the up, down, left, and right arrows and watch the myriad of colors as you manipulate the arrow keys.

When you first pulled the directory of the PICPRO disk, you saw a program called, appropriately, "VUPIC.EXE".

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NEW FOR '88!

B3038 — 2 METER AMPLIFIER

30W IN - 380W OUT!

FEATURES

- Low noise (0.5dB) Ga As FET pre-amp provides 20 dB of *clean* gain
- Copper/aluminum heat sink* for maximum heat dissipation
- Only 4 power devices
- **Compact** power (only 13⅜"×5⅜")
- Automatic internal or external relay keying

SPECIFICATIONS

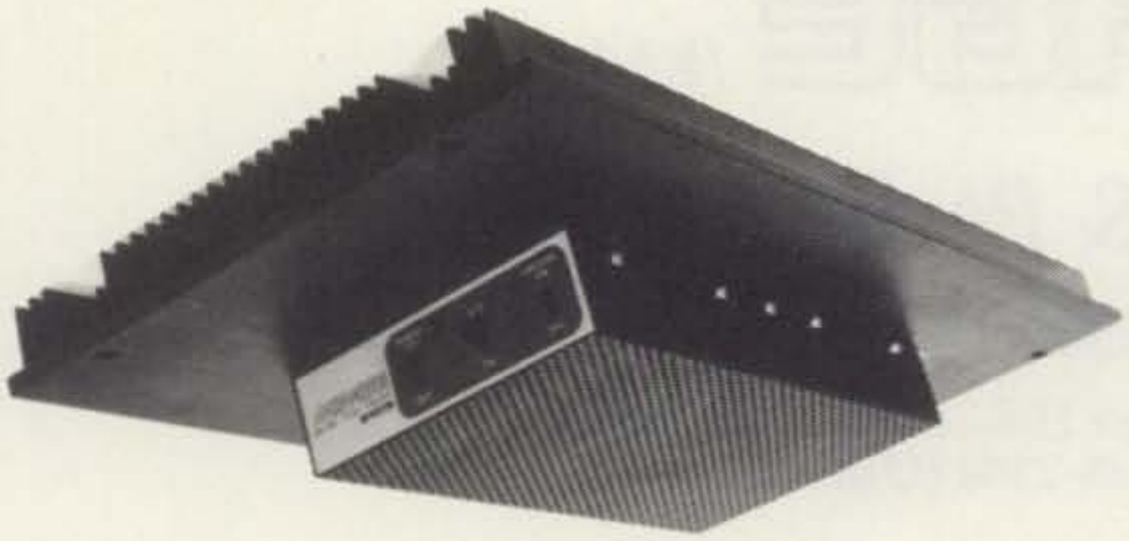
- Frequency range 144 MHz to 148 MHz
- RF power in . . . 200 mW to 30 Watts
- RF power out . . . 380 Watts nom. (30 in — 380 out)
- Modes . . . SSB, FM and CW
- Receive pre-amp . . . 20 dB gain with 0.5 db noise figure
- DC power . . . 13.6 watts 40 amps
- Size 13⅜"×5⅜"
- Weight . . . 8.5 lbs.

* Copper-Embedded Aluminum Heat Sinks

Copper is 2.5 times more conductive than aluminum and ensures rapid and even heat dissipation throughout the heat sink. By bringing heat away from the transistors, greater life can be expected. The extra margin of safety means you don't have to worry about shut-down during long-winded FM conversations or RTTY/Packet operation.

Mirage/KLM now features copper/aluminum heat sinks as standard on repeater amplifiers and as an option on other power amplifiers. *Beat the heat* with our newest addition. Ask for improved heat sink amplifiers!

— Mirage Repeater Amplifiers —



These amplifiers were designed to meet the demand for rugged, reliable, cool running output stages for repeaters and other high-duty cycle applications. Models are available for the 144, 220, and 440 MHz Amateur Bands.

FEATURES — 144 and 220 MHz Models

Cool Running — A 10" high by 19" wide full-finned rack-mounted heatsink keeps the transistor temperatures low for long life. The chassis cover is perforated so air convection will keep the circuit board area cool.

Dual Protection — The amplifiers have two temperature sensors; one on the heatsink and one on the circuit board. If conditions cause either area to overheat, the amplifier will shut off until it cools down to a safe temperature.

Remote Control — The normal RF sensing is easily defeated to allow external control of the power amplifier via a landline of RF link and interface unit.

All-Mode Operation — Class AB linear amplification allows use with SSB, CW or FM modes.

FEATURES — 440 MHz Model D1010R

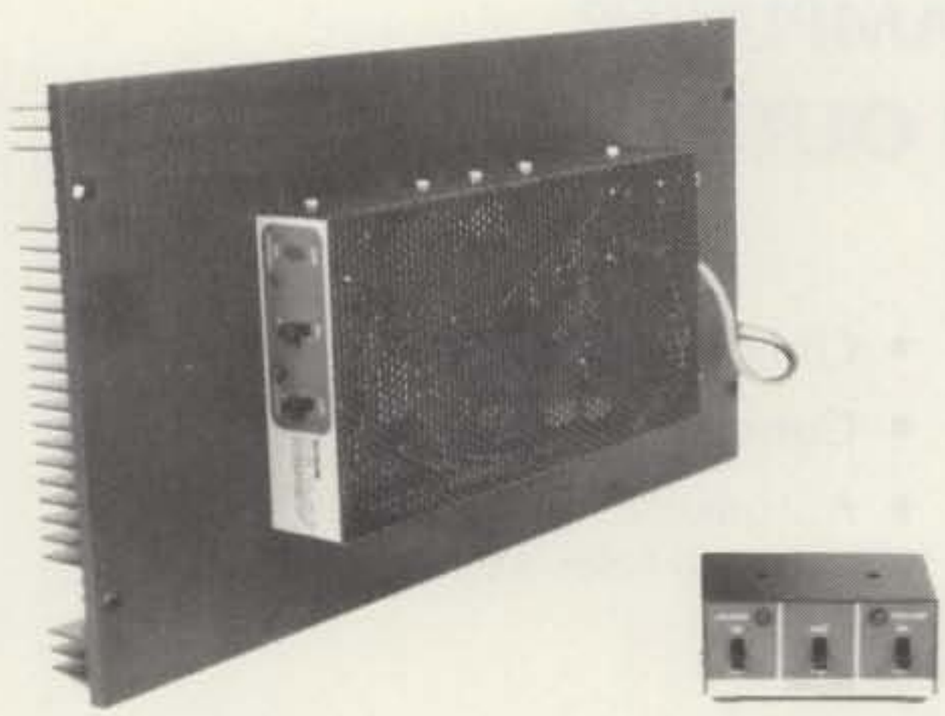
Cool Running — A 10" high by 19" wide full-finned rack-mounted heatsink keeps the transistor temperatures low for long life. The chassis cover is perforated so air convection will keep the circuit board area cool. The RF board is low loss Telflon for minimum dielectric heating.

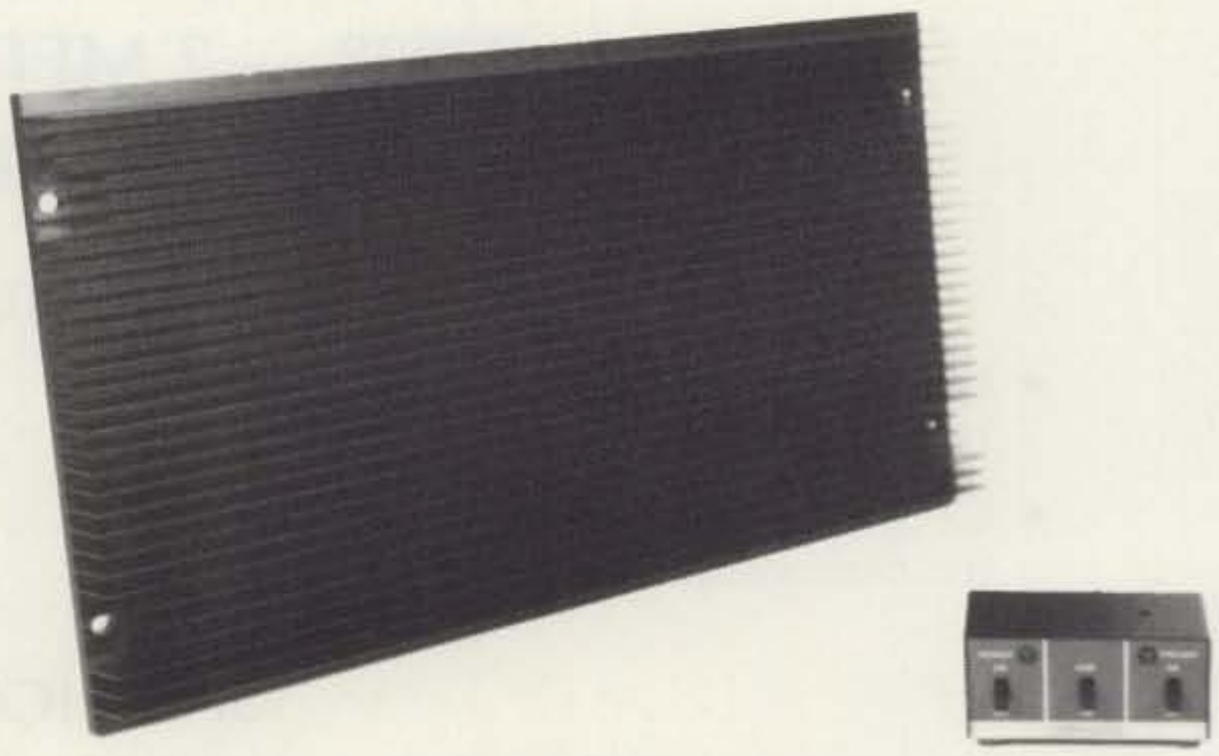
Reliable — The RF changeover relay has been eliminated on this model to provide the highest order of reliability. Teflon connectors are standard on this well-designed unit.

Protection — The amplifier will shut off if conditions cause the heatsink temperature to rise to an unsafe level.

All-Mode Operation — Class AB linear operation is rated for FM, SSB, CW and ATV operation. *(440-450 MHz Standard Range, 420-430 MHz or 430-440 MHz are special order).*

Warranty — RF power devices are guaranteed for one year against failure due to defective materials or workmanship. All other components are guaranteed for two years.





Mirage Repeater Amplifier Models

MHz Freq. Range	Model Number	Watts Power Input	Watts for Max. Cont. Output	Amps Nominal Current	Power Supply (VDC)	RF Connector
145-148	B215R	¾ - 1	110	16 - 18	13.8	Teflon SO-239
145-148	B1016R	3 - 4	120	16 - 18	13.8	Teflon SO-239
145-148	B3016R	10 - 12	120	14 - 15	13.8	Teflon SO-239
223-225	C211R	.3 - .6	80	15 - 16	13.8	Teflon SO-239
223-225	C1012R	4 - 5	90	15 - 16	13.8	Teflon SO-239
223-225	C3012R	13 - 15	90	13 - 14	13.8	Teflon SO-239
440-450	D1010RN	2 - 4	80	14 - 15	13.8	Teflon "N" UG58 A/U

— Specifications —

Our amplifiers run *all* modes (SSB, FM, CW, ATV) and on 12-13.6 VDC. Your output won't drop when your motor's off!

A1015 — 6 Meter Amplifier

10W In - 150W Out @ 20-25 Amps

- Frequency Range ..... 50 to 52 MHz
- RF Power In..... 0.5 to 15 Watts
- Receive Preamp ..... 10 db Gain
  1.5 db Noise Figure
- Size ..... 12"×3"×5½"
- Weight ..... 5 lbs.

2 Meter Amplifiers — 144-148 MHz

B23A

2W In - 30W Out @ 5 Amps

- RF Power In..... 200 mw to 5 Watts
- Receive Preamp .....10 db Gain Min.
  -2.0 db±0.5 db Noise Figure
- Size ..... 3½"×2"×7"
- Weight ..... 1¼ lbs.

B215

2W In - 150W Out @ 5 Amps

- RF Power In..... 200 mw to 5 Watts
- Receive Preamp ..... 10 db Gain with
  -2.0 db±0.5 db Noise Figure
- Size ..... 12"×3"×5½"
- Weight ..... 5 lbs.

B108

10W In - 80W Out @ 10-12 Amps

- RF Power In..... 200 mw to 15 Watts
- Modes ..... SSB, FM and CW
- Receive Preamp .....10 db Gain Min.
  -2.0±0.5 db Noise Figure
- Size ..... 8"×3"×5"
- Weight ..... 3 lbs.

B1016

10W In - 160W Out @ 20-25 Amps

- RF Power In..... 200 mw to 15 Watts
- Receive Preamp .....10 db Gain Min.
  -2.0 db±0.5 db Noise Figure
- Duty Cycle ..... Intermittent-Internal
  Overtemperature Protection
- Size ..... 12"×3"×5½"
- Weight ..... 5 lbs.

B3016

30W In - 160W Out @ 17-22 Amps

- RF Power In..... 200 mw to 45 Watts
- Receive Preamp .....10 db Gain Min.
  -2.0 db±0.5 db Noise Figure
- Duty Cycle ..... Intermittent-Internal
  Overtemperature Protection
- Size ..... 12"×3"×5½"
- Weight ..... 5 lbs.

1¼ Meter Amplifiers — 220-225 MHz

C22A

2W In - 20W Out @ 5 Amps

- RF Power In..... 200 mw to 5 Watts
- Receive Preamp ..... 10 db Gain
  -2.0 db±0.5 db Noise Figure
- Size ..... 3½"×2"×7"
- Weight ..... 1¼ lbs.

C211

2W In - 110W Out @ 18-20 Amps

- RF Power In..... 300 mw to 4 Watts
- Receive Preamp .....10 db Gain Min.
  -2.0 db±0.5 db Noise Figure
- Size ..... 12"×3"×5½"
- Weight ..... 5 lbs.

C106

10W In - 60W Out @ 10-12 Amps

- RF Power In..... 300 mw to 15 Watts
- Receive Preamp .....10 db Gain Min.
  -2.0 db±0.5 db Noise Figure
- Size ..... 12"×3"×5½"
- Weight ..... 3 lbs.

C1012

10W In - 120W Out @ 18-20 Amps

- RF Power In..... 300 mw to 15 Watts
- Receive Preamp ..... 10 db Gain
  -2 db±0.5 db Noise Figure
- Size ..... 12"×3"×5½"
- Weight ..... 5 lbs.

C3012

30W In - 120W Out @ 18-20 Amps

- RF Power In..... 5W to 45W (45W Max.)
- Receive Preamp ..... 10 db Gain
  -2 db±0.5 db Noise Figure
- Size ..... 12"×3"×5½"
- Weight ..... 5 lbs.

D24 — 430-450 MHz Amplifier

2W In - 40W Out @ 12 Amps

- Frequency Range ..... 430 to 450 MHz
- RF Power In.....Input 400mw to 4 Watts
  (4 Watts max.)
- Impedance .....50 Ohms Input and Output
- Duty Cycle ..... Intermittent-Internal
  Overtemperature Protection
- Size 7½"×2⅜"×7" • Weight ..... 4 lbs.

— Specifications —

D1010 — 430-450 MHz Amplifier
10W In - 100W Out @ 20 Amps

- Frequency Range ..... 430 to 450 MHz
- RF Power In.....Input 300 mw to 15 Watts (15 Watts max.)
- Impedance ..... 50 Ohm Input and Output
- Duty Cycle ..... Intermittent-Internal Overtemperature Protection
- Size ..... 12"×3"×5½"
- Weight ..... 5 lbs.

D3010 — 430-450 MHz Amplifier
30W In - 100W Out @ 20 Amps

- Frequency Range ..... 430 to 450 MHz
- RF Power In..... 5W to 45W (45 Watts max.)
- Impedance ..... 50 Ohm Input and Output
- Duty Cycle ..... Intermittent-Internal Overtemperature Protection
- Size ..... 12"×3"×5½"
- Weight ..... 5 lbs.

RC1 — Amplifier Remote Control

FEATURES

- For Remote Control of all MIRAGE Amplifiers except B23A, C22A and D24.
- Small Size for Convenient Mounting
- Same Attractive Styling as all MIRAGE Products
- Allows for Trunk or Under Seat Mounting of Amplifiers

SPECIFICATIONS

- Functions ..... Duplicates All Switches on Amplifiers
- Size ..... 1¾"×3¾"×2½"
- Cable ..... 18', 6-Wire Cable Complete with Connectors

Noise Figure, Pre-Amplifiers, Dynamic Range, and All That Good Stuff!

Two of the least understood but most important parameters of any ham station are the noise figure and dynamic range of the receiver.

What is a good noise figure? Many times when hams get together in technical discussion, receiver noise figure is the all-important topic. The noise figure of a ham station receiver is a figure of merit. A numerical value that, in combination with many other variables, is a measure of the ability of the receive setup to extract weak signals from the other. What number is good? You may see ads that specify 0.5 dB noise figure. Does this mean that any number higher than this is useless? Well of course it doesn't. In fact, we should look to the first radio imports from Japan to give us our answer.

In most situations, the lower the noise figure the better the unit. On some bands and some receiving situations this is not true.

In Japan, where most transceivers are now designed, the density of population per square mile is so great that equipment is designed to be selective and immune to interference from adjacent channels. The design has to be a balance between the dynamic range and the noise figure.

In our abundant land areas we soon discovered that we could improve sensitivity of a transceiver by the addition of a low-noise pre-amplifier. In many circumstances a pre-amp will degrade the dynamic range. This is because strong local signals will produce intermodulation.

A pre-amplifier, in order to improve the absolute sensitivity of a receiver, must provide some gain combined with a minimal addition to system noise. The overall system noise figure is given by the following equation, where F1 is the pre-amplifier, F2, that of the second stage, or in this case that of the whole receiver, and G1, the pre-amplifier gain.

$$NF = F1 + (F2 - 1)/G1$$

From this it may be seen that the overall system noise figure depends not only upon the noise figure of the pre-amplifier, but also on its gain. However, as mentioned above, the receiver has a limited dynamic range. In other words, a maximum signal level that it can tolerate before crossmodulation occurs. Clearly, the addition of a pre-amplifier of, say, 20 dB gain will reduce this permissible signal level by 20 dB, while at the same time only extending the lower threshold of sensitivity by typically 17-18 dB. If there are no signals present that are of sufficient amplitude as to overload the receiver, then receive performance is improved. Otherwise the result of the additional gain may well degrade overall performance. The above is a simple explanation of the results to be expected when adding a pre-amplifier to a receiver.

Let us consider a typical 450 MHz station as might be used for terrestrial or space communications. For our example, the receiver has a noise figure of 2 dB, a common figure for modern Japanese UHF equipment. The antenna has 15 dBd gain and the feedline has a loss of -3 dB. Our optional pre-amplifier has a gain of 20 dB with a noise figure of 0.5 dB (probably the best unit that money can buy!).

With no pre-amplifier, our system noise figure is 5 dB. If we live in a quiet location that is one of low man-made or natural noise level, then the system noise will be the limiting factor in weak signal capability. We now have three choices:

1) Increase our antenna gain;
2) Insert our pre-amplifier at the receiver;
3) Insert our pre-amplifier at the antenna.

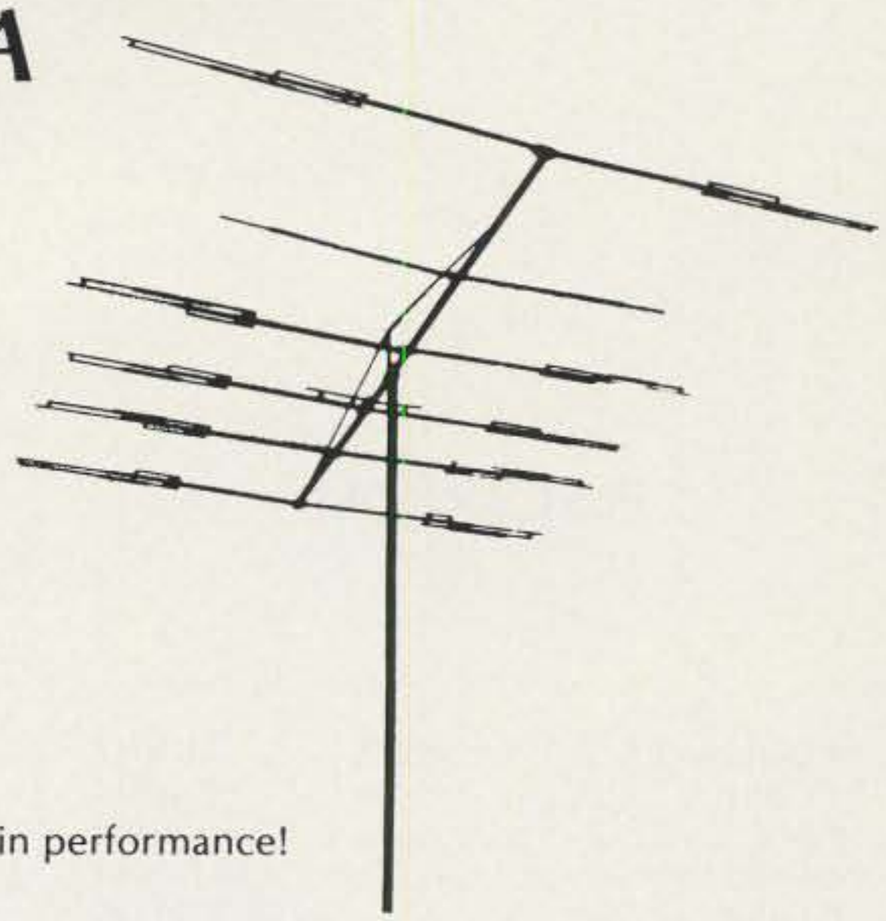
The first choice is a good one and gives the added advantage of increasing the ERP of the transmitter. Dynamic range is unaltered as although any unwanted signal is increased. So also is the wanted signal and by the same amount. At the same time the system noise figure remains the same.

Inserting our super low noise pre-amplifier at the receiver does two things. One, it reduces the receiver noise figure to just over 0.5 dB, a very good figure indeed, but as explained above, does degrade the receiver dynamic range by maybe 17 dB. The overall system noise figure is now down to a little over 2.5 dB, and some sensitivity improvement should be discernible.

Inserting our pre-amplifier at the antenna however will result in an overall system noise figure of only a little over 0.5 dB with no more dynamic range degradation than case #2. The all-important factor clearly is the feedline loss. The longer the feedline, the greater the loss and therefore the greater the system noise figure improvement to be had by placing the pre-amplifier at the antenna. In systems such as vehicle installations, feedline losses are usually low due to the use of very short lengths. However, in vehicle installations, it is usually external noise and not receiver noise performance that is a limiting factor. It should be remembered that even the most sophisticated ignition noise eliminator available will result in degradation of the received signal as it is impossible to eliminate noise pulses without also removing some of the wanted signal.

Degradation of receive system sensitivity due to feedline loss is a function of cable type and frequency. System performance regarding dynamic range and noise figure is a function of frequency and level of activity. At lower frequencies, *pre-amplifiers* are of little or no value due to the presence of high-level man-made and atmospheric noise. As system operating frequency increases, such noise levels decrease and receiver noise figure and feedline loss become limiting factors. Improvements obtained by using external pre-amplifiers range from little, when used after a long run of feedline, to dramatic, when correctly mounted at the antenna.

Best Amateur Tribanders Available — KT-34A/KT-34XA*



SPECIFICATIONS — KT-34XA

ELECTRICAL

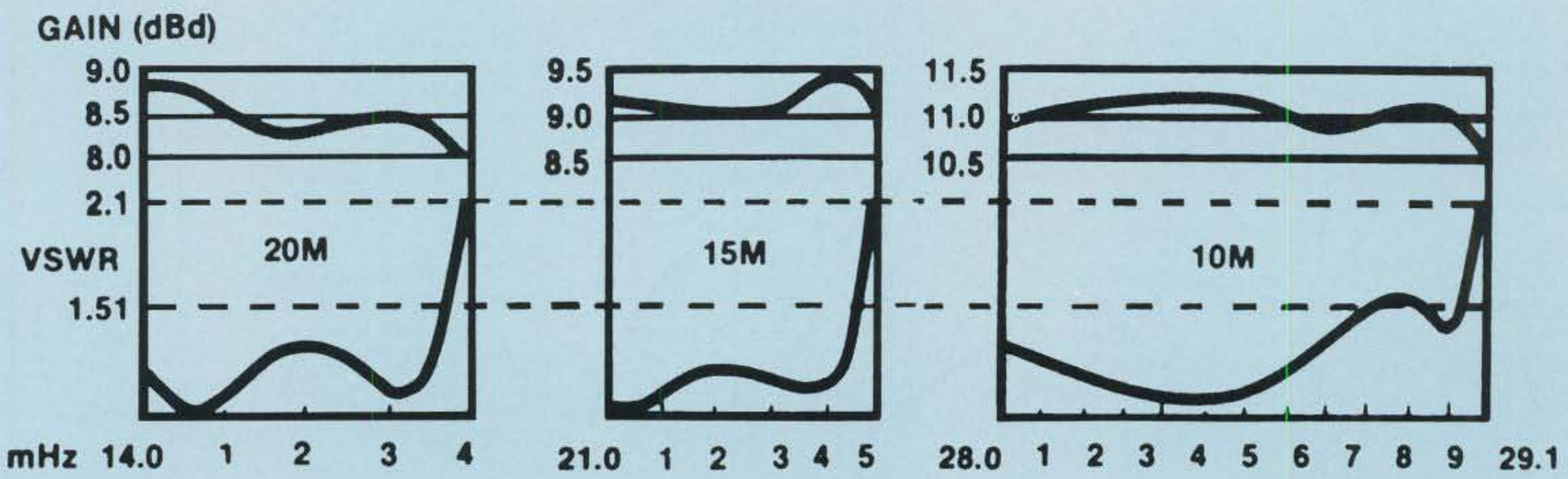
- Bandwidth ..... 14.0-14.350 MHz
  21.0-21.450 MHz
  28-29.7 MHz
- Gain ..... 8.5-9 dB
  9-9.5 dB
  11-11.3 dB
- VSWR 1.5:1
- F/B ..... 20 dB
- F/S ..... 40 dB
- Feed Imp ..... 50 Ohms with balun
- Balun ..... 4:1, 5 kW PEP

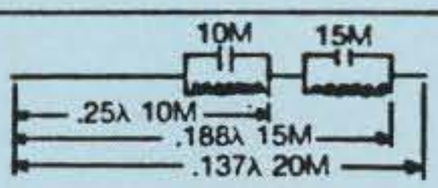
MECHANICAL

- Element Length ..... 24 ft.
- Boom Length ..... 32 ft.
- Turn Radius ..... 21.5 ft.
- Windload ..... 9 sq. ft.
- Weight ..... 68 lbs.
- Mast ..... 2 in. O.D.

*Lack of space or funds? How about a KT-34A? It's upgradable to a KT-34XA and similar in performance!

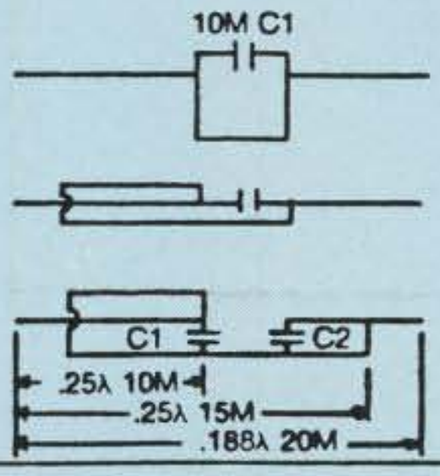
KT-34XA Gain vs. VSWR





Conventional tribander element

Development of the KT-34XA Element



1. Replace coils with lossless linear loading.
2. Fold back and symmetrically place linear loading for mechanical strength and balance.
3. Extend element to 1/4 wave on 15M. Fold back and decouple tip with C2.
4. Extend tip for 20M. Tuning of 15 and 20M is independent.

The KT-34XA's design represents the first major advancement in tribander technology in over 20 years! The conventional traps, coils, and capacitors have been discarded in favor of integral linear loading and hi-Q air capacitors, all composed of aluminum tubing. These give the KT-34XA a conservative power handling capability of 5KW PEP and an unusually high level of operating efficiency. Linear loading also makes full ¼-wave elements possible on 10 and 15 meters, and brings 20 meters much closer to the desirable ¼-wave than any conventional tribander. The sketch above diagrams the profound differences between the KT-34XA and a typical tribander element and the electrical activity of its various sections. Note also the lower windloading profile!

21 Jan.-1988

Mr. W.M. Scott
Mirage/KLM
P. O. Box 1000
Morgan Hill, Ca. 95037

Hello Scotty

Just want you to know that once again your KT34XA is the king of the 10/15/20 meter bands!

In 1987, just closed, I worked 268 countries on 10/15/20 SSB with your KT34XA - and this was done in only 11 months - (since I spent October in China at BY4RA and BY4AOM in Shanghai - away from my home qth.) -congratulations, Scotty, on providing the finest tri-bander available anywhere — . . . and you can quote me!

73/Ken Miller
KG9R/3

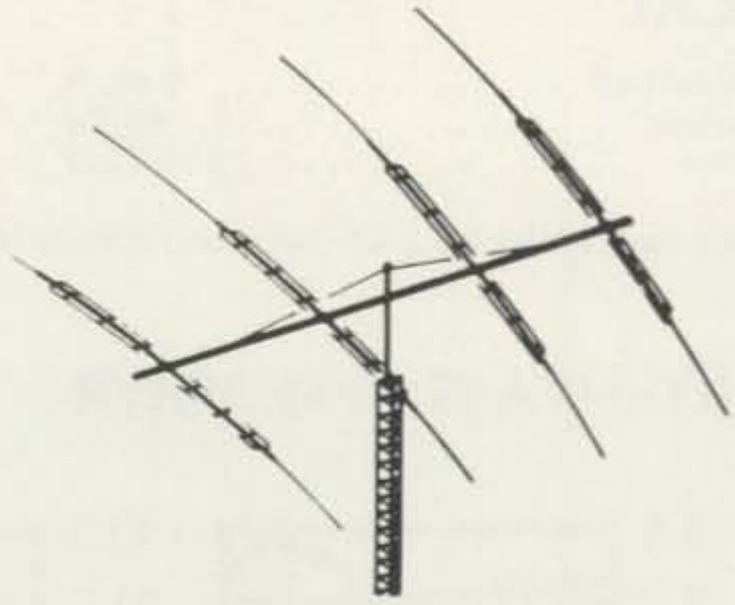
(See the Feb. issue of S.E.R.A. Repeater Journal's "Dream Farm" story — reprints available).

— 40 Meters —
7.0-7.3 MHz

ELECTRICAL

4 Element World Class

- Bandwidth @ 1.5:1 VSWR . . . . 260 kHz
- Gain 7.2dBd
- F/B . . . . . 20 db
- Feed Imp . . . . . 50 Ohms
- Balun . . . . . 4:1, 5 KW

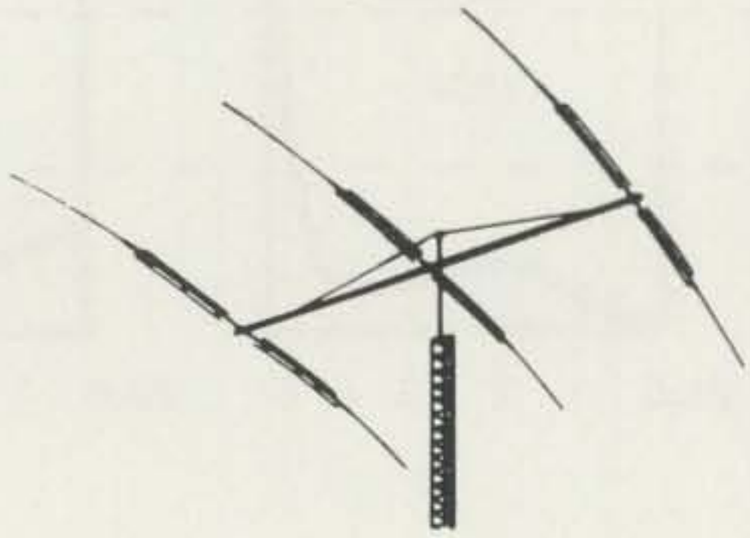


MECHANICAL
(Heavy Duty Booms Available)

- Element Length . . . . . 46 ft.
- Boom Length . . . . . 42 ft.
- Turn Radius . . . . . 32 ft.
- Windload . . . . . 12 sq. ft.
- Weight . . . . . 85 lbs.
- Mast . . . . . 2 in.

3 Element

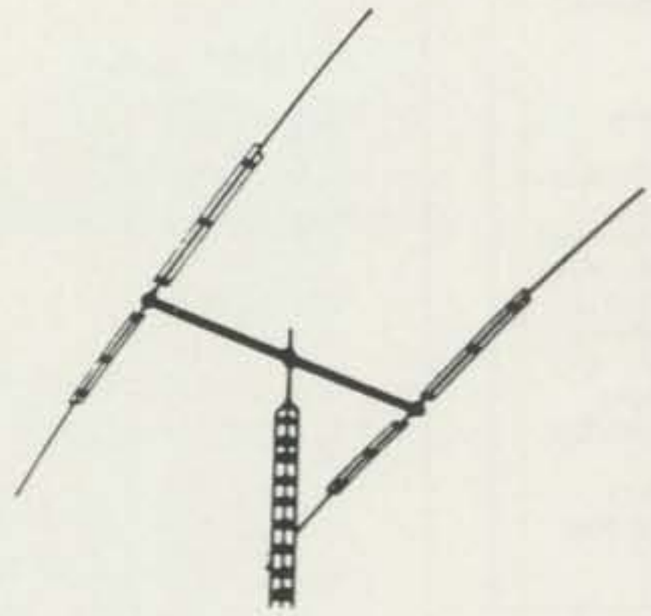
- Bandwidth @ 1.5:1 VSWR . . . . 200 kHz
- Gain . . . . . 6.5 dBd
- F/B . . . . . 20 db
- Feed Imp . . . . . 50 Ohms
- Balun . . . . . 1:1, Coax



- Element Length . . . . . 46 ft.
- Boom Length . . . . . 32 ft.
- Turn Radius . . . . . 28 ft.
- Windload . . . . . 10 sq. ft.
- Weight . . . . . 70 lbs.
- Mast . . . . . 2 in.

2 Element

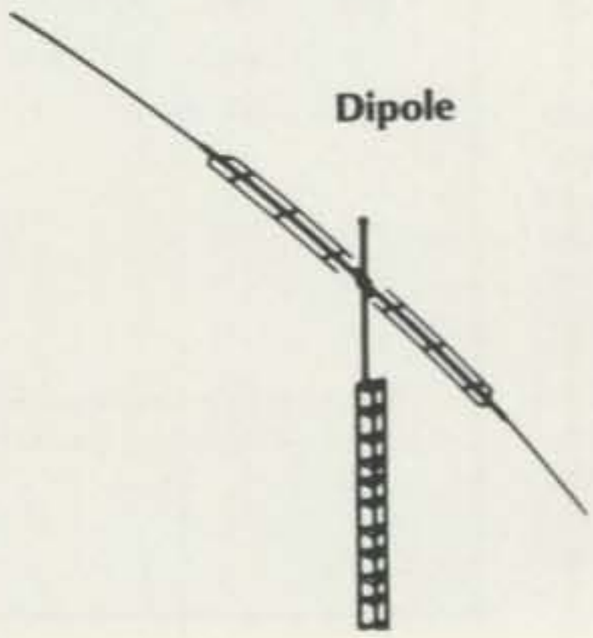
- Bandwidth @ 1.5:1 VSWR . . . . 125 kHz
- Gain . . . . . 4.9 dBd
- F/B . . . . . 12 db
- Feed Imp . . . . . 50 Ohms
- Balun . . . . . 1:1, Coax



- Element Length . . . . . 46 ft.
- Boom Length . . . . . 16 ft.
- Turn Radius . . . . . 25 ft.
- Windload . . . . . 6 sq. ft.
- Weight . . . . . 45 lbs.
- Mast . . . . . 2 in.

Dipole

- Bandwidth @ 1.5:1 VSWR . . . . . 75 kHz
- Gain . . . . . 0 dBd
- Feed Imp . . . . . 50 Ohms
- Balun . . . . . 1:1, 5 kW

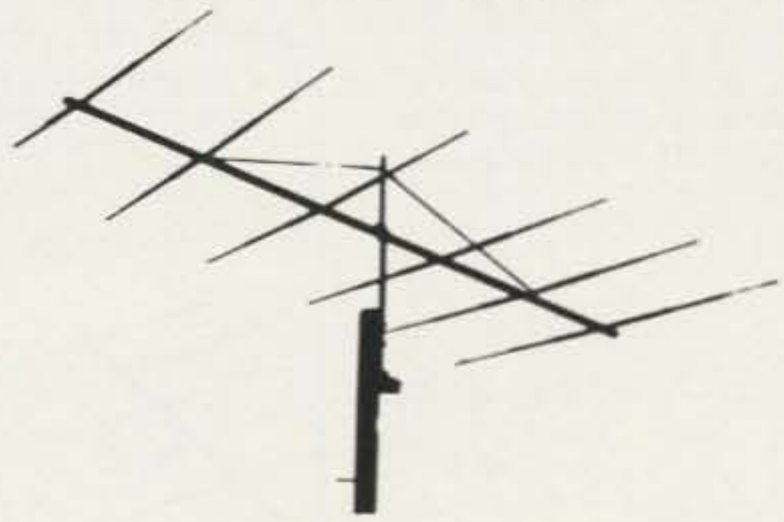


- Element Length . . . . . 46 ft., 6 in.
- Turn Radius . . . . . 23 ft.
- Windload . . . . . 2 sq. ft.
- Weight . . . . . 15 lbs.
- Mast . . . . . 2 in.

ELECTRICAL

- Bandwidth ..... 13.9-14.4 MHz
- Gain ..... 11 dBd
- VSWR 1.5:1
- F/B ..... 30 db
- Feed Imp ..... 50 Ohms
- Balun ..... 4:1, 5 kW

20M-6 World Class Extra

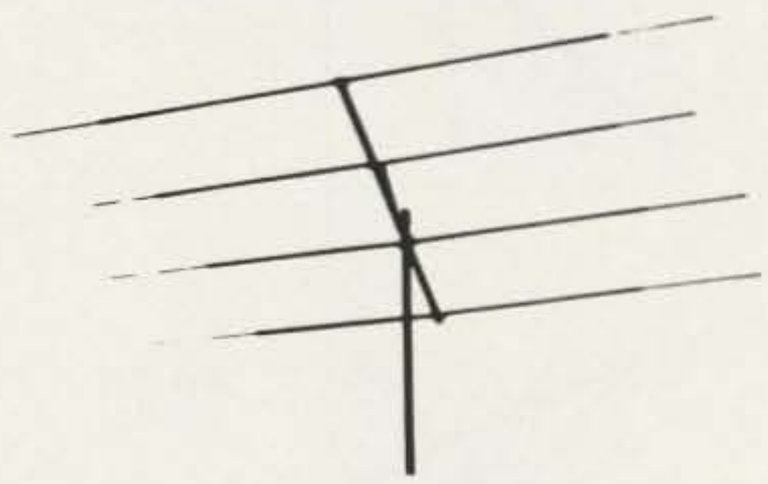


MECHANICAL

- Element Length ..... 37 ft.
- Boom Length ..... 57 ft.
- Turn Radius ..... 34 ft.
- Windload ..... 12.8 sq. ft.
- Weight ..... 95 lbs.
- Mast ..... 2 in.

- Bandwidth ..... 21.0-21.5 MHz
- Gain ..... 11.0 dBd
- VSWR 1.5:1
- F/B ..... 30 db
- Feed Imp ..... 50 Ohms
- Balun ..... 4:1, 5 kW

15M-6 World Class Extra



- Element Length ..... 25 ft.
- Boom Length ..... 36 ft.
- Turn Radius ..... 23 ft.
- Windload ..... 8.5 sq. ft.
- Weight ..... 60 lbs.
- Mast ..... 2 in.

10M-6 World Class Extra

- Bandwidth ..... 28-30 MHz × 1 MHz
- Gain ..... 11 dBb
- VSWR 1.5:1
- F/B ..... 30 db
- Feed Imp ..... 50 Ohms
- Balun ..... 4:1, 5 kW

- Element Length ..... 18 ft.
- Boom Length ..... 27.5 ft.
- Turn Radius ..... 16.5 ft., 8 in.
- Windload ..... 4 sq. ft.
- Weight ..... 29 lbs.
- Mast ..... 2 in.

10M-4

- Bandwidth ..... 28-30 MHz × 1 MHz
- Gain ..... 7.7 dBd
- VSWR 1.5:1
- F/B ..... 25 db
- Feed Imp ..... 50 Ohms
- Balun ..... 4:1, 5 kW

- Element Length ..... 18 ft.
- Boom Length ..... 10 ft.
- Turn Radius ..... 10.5 ft.
- Windload ..... 2.25 sq. ft.
- Weight ..... 12 lbs.
- Mast ..... 2 in.

— Moonbouncers —

Mirage/KLM is fueling the **Moonbounce** and Oscar 10 revolution with antenna equipment that delivers truly Out-of-This-World performance.

For the **Moonbouncer**, our new 2M-16LBX is designed to be the highest gain 2-meter antenna available on the market today by more than a full db, making the 2M-16LBX an outstanding performer as a single antenna or in **Moonbounce** (EME) arrays.

The new 432-30LBX follows the same pattern as the 2M-16LBX, and soon will become the industry's standard of comparison.

Featuring straightforward construction, and an innovative tapered boom and greatly reduces windload and adds strength and durability. Virtually unbreakable, insulated, 3/16" rod parasitic elements are anchored through the boom to ensure years of trouble-free performance.

For the satellite enthusiasts, the 2M-22C high gain, 2-meter, circular polarized antenna features the same rugged construction and total flexibility as our very popular 2M-14C with a 2 db increase in gain.

Four or more 2M-22Cs make an excellent array for **Moonbounce** (EME) by eliminating Faraday fading.

Fiberglass/aluminum stacking frames are available as well as 2- and 4-port power dividers and phasing harnesses to optimize the performance of these type arrays. Our new elevation drive system is available with MTI*.

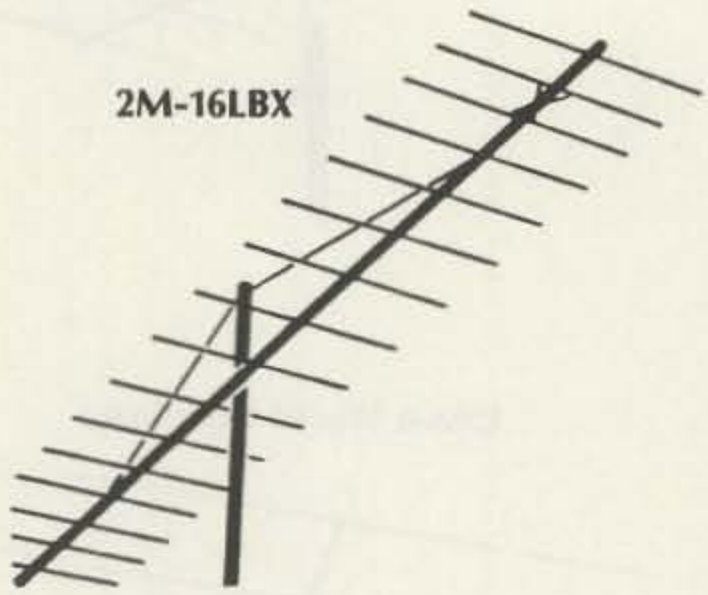
2M-16LBX - Specifications

ELECTRICAL

- Bandwidth ..... Spec. 144-146
  Usuable 143-148
- Gain 144-14.5
  145-14.5 — 146-14.4 — 147-14.3 — 148-13.2
- VSWR 1.2:1
- Beamwidth ..... E = 26°, H = 29°
- Feed Imp ..... 50 Ohms, unbal.
- Balun ..... 4:1, 2 kW Coax

MECHANICAL

- Element Length ..... 4⅝ in. max.
- Boom Length .. 28 ft. (4.1 wavelengths)
- Turn Radius ..... 15 ft., 5 in.
- Windload ..... 2.44 sq. ft.
- Weight ..... 10 lbs.
- Mast ..... 2⅛ in. max.



435-40CX - Specifications

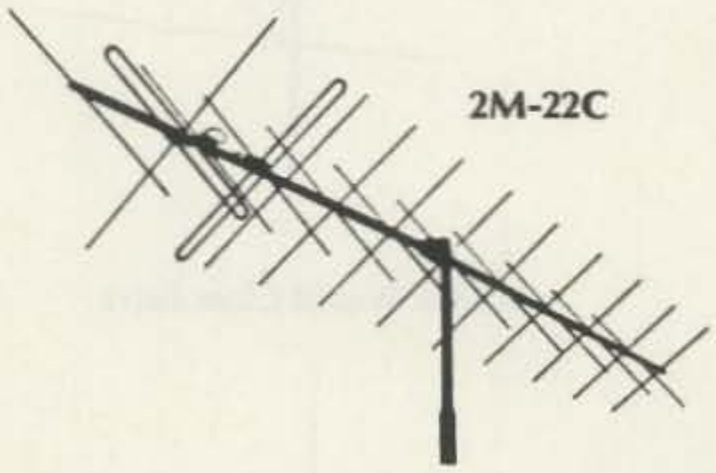
ELECTRICAL

- Bandwidth ..... Spec. 420-440 MHz
  Usable 410-450 MHz
- Gain ..... 15.2 dBdC at 436 MHz
- VSWR 1.5:1
- Beamwidth ..... 25°
- Feed Imp ..... 50 Ohms unbal.
- Balun ..... 4:1, coax 1 kW*
- Mount ..... Center

**250W max. when using CS-2 Switcher. (Supplied)*

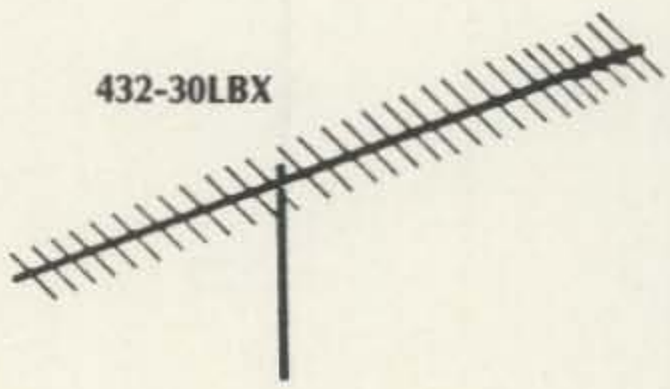
MECHANICAL

- Element Length ..... 13.625 in. max.
- Boom Length ..... 175.5 in.
- Turn Radius ..... 105 in.
- Windload ..... 1.16 sq. ft.
- Weight ..... 10 lbs.
- Mast ..... 1½" max.
- Polarity ..... Circular R.H. and L.H.
  Switchable using CS-2



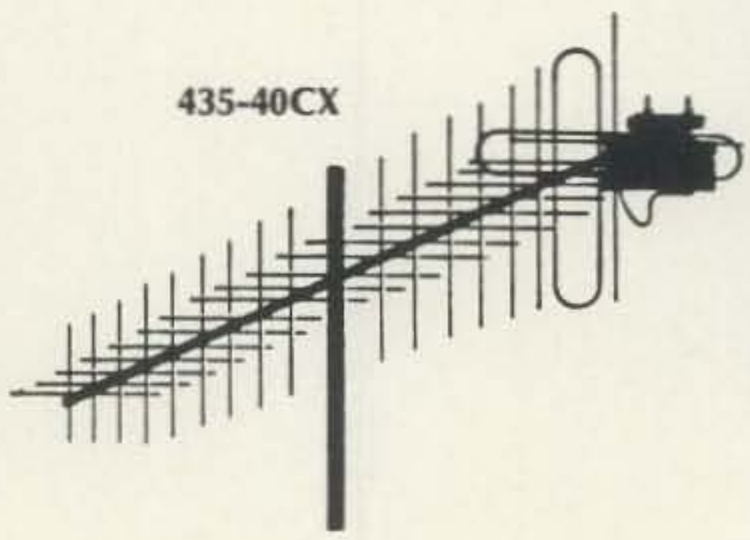
2M-22C - Specifications

- Bandwidth ..... 144-148 MHz
- Gain ..... 13 dBdC
- Beamwidth ..... 34°
- Feed Imp ..... 50 Ohms unbal.
- Balun ..... (2) 4:1 coax
- Boom Length .... 19 ft., 1 in. (tapered)
- VSWR 1.5:1
- Windload ..... 1.85 sq. ft.
- Ellipticity ..... 3 dB max.
- Circularity Switcher .... CS-3 included
- Weight ..... 11 lbs.



432-30LBX - Specifications

- Bandwidth ..... 430-440 MHz
- Gain ..... 17.3 dBd
- Beamwidth ..... 20°
- Feed Imp ..... 50 Ohms unbal.
- Balun ..... Included
- Boom Length ..... 21 ft., 9 in.
- F/B ..... 20 dB
- F/S ..... 35 dB
- VSWR 1.5:1
- Windload ..... 1.43 sq. ft. (typical)
- Turning Radius ..... 12 ft., 5 in.
- Weight ..... 9 lbs.



*Mirage Tracking Interface

The Mirage Tracking Interface system includes a complete hardware and software package for real-time tracking of man-made earth satellites, the Moon, and the Sun, referenced to your QTH. The MTI and your IBM compatible can display a high-resolution world map, and up to 16 satellite tracks updated as often as once per second! Satellite coverage circles are shown, and satellites usable between two specified locations are automatically determined. Elevation, azimuth, and doppler shift corrections are displayed for any selected satellite and observer. The heavy-duty rotor will give your antennas instant access to what is displayed on the screen.

ALL THIS AND ASTRONOMY TOO?

Radio astronomy amateurs will love the MTI too. It locates the sun, moon, planets, and selected stars at the push of a button. Perfect for EME work.

FREE UPDATES

Never a worry about your database becoming obsolete. Your MTI purchase includes free updates when available. Call or write now!

Place this program on the "picture disk" with the pictures you are filing. At any time you wish to look at or view the pictures which you have saved, just boot the VUPIC.EXE program and at the prompt for filename, give it the picture title you want to see and enter. Bob has supplied some of the same features in this program that are in the PACFILE program, such as the color changing of the pictures utilizing the arrow keys. **ESC** returns you to DOS.

Another program on the disk is SCD.EXE. When you find a picture in a program or file you would like to send or save for future packet transfer, simply load it. It will advise you how to proceed if a picture appears on screen you wish to save. This "screen dump" program will save as many pictures as you can look at while loaded or until the disk is full. Each successive picture title will be incremented by one, until the screen dump/save utility SCD.EXE is removed from the "background" of the PC.

Now that we have the basics for transmitting high resolution color pictures via packet, we must turn to the manner in which we generate these "Picasso's". I generate my pictures in these three ways: First, I can draw the picture with one of the many drawing or CAD programs. Second I can use one of the many screen "dump-to-disk" routines, and grab the picture. In this way I can load it into the drawing package and color it or add my call sign to it. This will give me a chance to develope many cartoon like pictures or just a personalized QSL.

The third way is a bit more expensive, but it is much more fun and indeed, it is more professional. Several companies offer a digitizer of one format or the other. The digitizer I use is the DS-88. The DS-88 is produced by the Micro Works. You can obtain more information by calling Bob Lentz NN6E, (619) 942-2400 or writing: Micro Works, PO Box 1110, Delmar, CA. 92014.

The DS-88 is a plug-in card and is easily added to the PC or clone in the same manner that is used to add a second com port card. I like the DS-88 for several reasons, but the big reason is because the DS-88 software saves the screen picture to the exact address and format, as that needed by PICPRO. This way I am able to digitize the picture and send it to another station within seconds.

My pictures are black and white, but I can recapture the picture with my screen dump utility, then color it with any number of colors and in the colors I desire. We use some of the paint/drawing programs like TPAINT2 for the PC. I can "touch-up" any area of the picture if I care to, or change the colors of any area within the graphics screen.

At first I was using my expensive "NuviCon-tube" camera for this purpose, until I found a company who was selling black & white, surveillance cameras for under $ 100. It works great, and I leave it connected to the system all the time (see fig. 1). Now I can shoot a picture, digitize it, and have it on the air to a local packeteer, in less time than it takes to go get a cup of coffee. I sometimes "grab" video frames from television or from my VCR and digitize them. The pictures are saved in "compressed" format. This is one of the good points about this form of packet pictures. We now have ability to file, sort, and store up to 22, high resolution color pictures on one 360K disk.

Although many of the pictures are captured from game graphics, the larger number are either drawn or digitized. The picture source is unlimited. With the video digitizers becoming a hardware utility now affordable to many PC owners, we can soon send our picture or "mug-shot" to any packeteer who is running PICPRO.

Just imagine receiving a picture from a packeteer with whom you have been typing for over three years, but have never met. The first time I sent a digitized picture of myself, via packet, to my friend George N4AGO, in Seale, Alabama, I received a long distance phone call almost immediately. George ask a question I'll never forget. "Buck, is it legal to send something that looks like this over the air?" Since that day 5 years ago, I've been trying to convince George, that binary bits get scrambled sometimes, and he could have received something else. George knows, as all packeteers know, the picture is a "perfect" reproduction of the original, since packet, is error free.

Now you have the best of all worlds with packet. Have a good time and we will see you at Orlando and Dayton.

cmd: * disconnected**

Did you ever get that feeling after a day of selling stuff at a hamfest fleamarket, that somehow, something was wrong? Suspicions confirmed! There was something wrong with the dregs you brought home.

The Fleamarket Bandit Strikes Again

BY DR. ROBERT E. BROSSMAN*, W8PMS

Any true amateur eventually faces the need to rid his shack and miscellaneous parts stores of excessive materials like old 5 volt 20 amp filament transformers, defunct 4-125's, selenium rectifier stacks, slightly off center variable capacitors, "solid state" transistor remnants, and items of similar value. After the purge of "87", I ended up with several cardboard boxes of "priceless" junk and a decision to make. Should I feed it to the local garbage men a box at a time during the regular trash pickup, or should I drag it off to the next area hamfest and attempt to see that it got a good home. Now, don't get me wrong, the vast majority of this stuff was really prime material of unquestioned quality and was just too good to simply toss away. Time and technology had just made it a bit less desireable to the eye.

By the time the next Wheeling Hamfest & Computer Fair fleamarket rolled around I had several boxes of stuff neatly packed in the trunk. Everything had a little stick on label with a negotiable price on it, and its use and historical background had been memorized and the stories of why it had to go were rehearsed. Somehow, during the few days preceeding the big day, I had acquired a couple of friends with similar offerings. Isn't it always the same? When you have a good idea, someone else always comes along to take advantage of your ideas.

Hamfest day finally arrived, and we were all up at the crack of dawn and on the way to the big event in order to get a decent place in the fleamarket parking area. When we arrive, only to find out that the real zealots have already taken the best parking areas, a guy in a baseball hat and a cigar stump in his face directs us to the left field section of the fleamarket. Left field, as you must remember, is the part of the hamfest site that still has running water and looks like the local tractor pull had just closed the night before. Oh well! After all, we're here to have fun and dispose of all that good stuff in the car. We already planned to take turns staying with the goodies which would let us have time to view the various offerings spread on the tables all around us. Everyone had already taken the oath to limit purchases to small, clean, absolutely necessary items, and we already had gone through the usual good natured banter about what was going to happen to the one that brought back anything remotely resembling the old "boat anchor".

115 Oakmont Hills, Wheeling, W. VA 26003

After opening the trunk and carefully arranging the wares for inspection on the ground around us, we settled in for the long day of peddling. As usual, the first few customers that straggle past grunt their approvals or disapprovals and move on to view the offerings in the next space. We know sales are always dismal the first hour or so, because all the bargain hunters are checking out everything before zeroing in on their targets. By the time all the coffee in the thermos is gone some of my compatriots are beginning to get the urge to move out to locate needed items. The need to wander off and get the tickets for the prize drawings is becoming evident, so we haggle out the first rotation of the duty.

Alone with the group offerings, I manage to sell John's SWR bridge to a bearded gentleman carrying an armful of old telephone cable. For a time, he seems interested in the shoebox full of old 6146's that belongs to Chuck, but after a few minutes of muttering to himself, he rehoists his cable and wanders off down the line of cars. Another customer gradually saunters up, this one a cadaverously thin fellow with a U.S. Army backpack overflowing with short sections of one-half inch conduit and what appears to be the remnants of a Heathkit Robot. He immediately zeros in on the box containing a mixed assortment of 12 and 28 volt motors. Inevitably "How much for the motors?" comes out, and a deal is struck. Now this is more like it. In the next few minutes, the smell of money attracts several other strangely attired humans, and the box of 6146's joins the motors fading off down the line. Holy Smoke, only an hour and a half and already we made $4.00. No wonder so many people are engaged in flea-market merchandising!

Around this time, my compatriots return with some refreshments and several purchases, which are squirreled away inside the car. We fend off several potential customers as a group during the next hour. At the rate my offerings are disappearing, I realize that I will need about two weeks at this hamfest to get rid of the stuff. I am beginning to think I'll never get a chance to check out the stuff inside the main building. In a flash of inspiration, I picked up several oil filled capacitors and one of the smaller transformers in my pile of junk and began a slow walk down the adjoining row of cars and tables. A few cars down the row, I found a table with five or six troglodites examining the proferred items. Slipping next to the table, I placed the capacitors and the transformer down amongst the other items and pretended to examine several of the wares arranged on the table. After a minute, I replaced the items I had been examining and checking to be sure that the proprietor was busily engaged in haggling with another customer, I turned and walked back to our fleamarket base of operations. I couldn't believe it! He didn't see me, and I got away with it! What a rush of adrenalin! The solution to my problems had been right in front of me for years and it finally came to me. Reverse shoplifting! The guaranteed way of reducing your store of junk without worrying if it got a good home!

Rushing back to my buddies, I gloatingly confessed my misdeed. They didn't believe me. Challenged, I knew I had to do it again, but this time, I knew I had to have the caper witnessed. Picking up a particularly ungainly, heavy amperage 2 volt transformer and a brand new, but 45 year old dynamotor, I set off down the row trailed by my friends. I motioned them to stay at a discrete distance, passed the table where the new owner of the previously mentioned capacitors and transformer was still blissfully unaware of my crime, and zeroed in on the next table where the action seemed hot and heavy. Feeling a lot more confident, I just bellied up to the table, dropping the transformer in the process, and pushed it under the table with my foot. Leaning well over the table, I placed the dynamotor in between several small boxes while at the same time I pretended to examine another item of merchandise on the table top. After a suitable interval, I again replaced the decoy, turned toward my buddies, and walked away. They were incredulous! Being honorable men, I could see they were having serious second thoughts. If I could talk them out of turning me in to the merchants around us, I knew that I actually had a good chance of getting rid of everything I brought with me. My conscience bothered me for several seconds, but I was hooked!

Growing ever bolder, I gathered up a small box of assorted mica and electrolytic capacitors, resistor halves, 813 tubes, 2C39 tubes, 6L6 output transformers, and the like and once again set off down the line. This time, I headed for a professional merchandiser set up at the end of the row of cars. Arriving, I placed the box on the table and began examining the defunct computer parts being offered in the bins. After a few minutes, I moved down the line, sans the box, and slowly worked my way to the end of the tables of parts. I glanced backward to see if I had been noticed in time to see the merchant notice the box on his counter. He lifted the lid and looked inside. I couldn't believe what happened next. The man looked around in a furtive manner, decided that someone had forgotten his box of purchases on his table, and then carefully picked up the box and put it in the back of his van out of sight!

Out of control, I returned to the car for more boxes, disposing of fifty pounds with ease. While I was out on my missions, I left signs at the unattended stuff invoking the "Honor System" of merchandising along with an open cigar box. On my last trip to the car, I actually found $2.80 in the box and found that at least 30 pounds of stuff was gone, gone, gone!

Peer pressure works! Within a short while, even John and Chuck were out prowling the area around our car carrying armfulls of junk to the unsuspecting flea marketeers blissfully unaware of the criminals in their midst. Well, to keep the story short, I successfully disposed of every last piece of junk long before the afternoon was over and in the process created both a legend and a new form of crime. Reverse shoplifting had made the charts. Take heed! The days are gone when you could go to a hamfest and spend a whole day unsuccessfully trying to dispose of your favorite unwanted materiel without a hassle. No more relaxing in the sunshine. Now you'll have to keep your eyes open, and, if you're a big enough merchant, you'll have to even consider employing security guards to watch your customers! Imagine! Hams having to strip and go through metal detectors before they can approach the tables where the junk is set out. I can see it coming, but I suppose it's just a sign of our times. If it gets started in hamfest fleamarkets, it will only be a matter of time before it spreads to all of the general fleamarkets. Think of what that portends! Those people will just keep all that stuff at home rather than take the chance of acquiring more than they can handle. CQ

MFJ-931 creates artificial RF ground with random wire *also*, electrically places far away ground *directly* at your rig

NEW

MFJ-931
$79.95

- **Creates artificial RF ground with random length wire**
- **Electrically places a far away ground directly at your rig**
- **RF ammeter makes tuning for maximum RF ground current easy**
- **Eliminates "RF bites", RF feedback, TVI/RFI and other problems due to inadequate RF ground**
- **Improves radiation pattern distorted by poor RF ground**

Don't we all sometimes have problems getting a good RF ground?

Unpleasant problems. Problems like RF "hot spots" that "bite" our lips or fingers when we transmit; like RF feedback that causes our rigs to quit working on certain bands; like excessive RF coupling to AC lines that causes everything to quit working; like our neighbors screaming about TVI and RFI; like our computers computing jiberish; or like being unable to talk across town because of extreme ground losses or radiation pattern distortion.

"Hey, my rig is on the second floor. There's no way I can get a good ground," you're thinking, or "I already have an excellent ground but the long ground connection wire causes reactance and acts like a high impedance circuit, isolating my rig from true RF ground."

What to do

Use the new MFJ-931 to create an artificial RF ground! It resonates a random length of wire thrown along the floor and produces a tuned counterpoise. This artificial ground effectively places your rig near actual earth ground potential even if your rig is on the second floor or higher with no earth ground possible.

Also, the MFJ-931 electrically places a far away RF ground directly at your rig -- no matter how far away it is. The MFJ-931 reduces the electrical length of the ground connection wire to virtually zero by tuning out its reactance.

How it works

The MFJ-931 connects between the ground connection of your transmitter or antenna tuner and a random length of wire thrown along the floor. Two knobs are adjusted for maximum RF ground current using its built-in RF ammeter. This resonates the random wire, converts it into a tuned counterpoise and presents an effective low impedance near ground potential to your rig, thus creating an artificial RF ground.

To electrically place a far away ground directly at your radio equipment simply connect the MFJ-931 between your rig and the connecting ground wire and adjust its two knobs for maximum RF current using its RF ammeter. This tunes out the reactance of the connecting wire, reduces the electrical ground lead length to virtually zero and electrically places your far away ground directly at your rig.

Get an effective RF ground

Get an effective RF ground. Eliminate "RF bites". RF feedback TVI, RFI and many other annoying problems due to inadequate RF ground, *and* -- at the same time --improve your radiation and radiation pattern for more DX.

The MFJ-931 covers 1.8 to 30 MHz and has a built-in RF ammeter for indicating RF ground current. It's ruggedly built in an all aluminum cabinet with a brushed aluminum front panel and measures 7½x3½x7 inches. It comes with a one year unconditional guarantee.

It's available only from MFJ. MFJ-931, $79.95.

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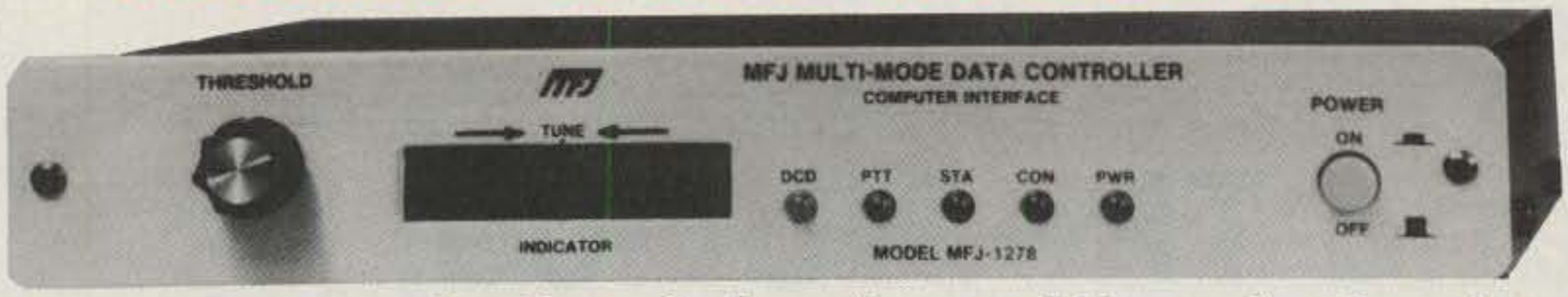
MFJ multi-mode data controller



MFJ *shatters* the 6 mode barrier *and* the price barrier with the MFJ-1278 and gives you . . . Packet, RTTY, ASCII, CW, WEFAX, SSTV and Contest Memory Keyer

. . . 7 digital modes . . . for an affordable $249.95

Amateur radio's newest multi-mode data controller -- the MFJ-1278 -- lets you join the fun on Packet, RTTY, ASCII, CW, Weather FAX, SSTV and gives you a full featured Contest Memory Keyer mode . . . you get 7 modes . . . for an affordable $249.95.

Plus you get high performance HF/VHF/CW modems, software selectable dual radio ports, precision tuning indicator, 32K RAM, AC power supply and more.

You'll find it *the most user friendly of all multi-modes.* It's menu driven for ease of use *and* command driven for speed.

A high resolution 20 LED tuning indicator lets you *tune in signals **fast** in any mode.* All you have to do is to center a single LED and *you're precisely tuned in to within 10 Hz* -- and it shows you which way to tune!

All you need to join the fun is an MFJ-1278, your rig and any computer with a serial port and terminal program.

You can use the MFJ Starter Pack to get on the air instantly. It includes computer interfacing cable, terminal software and friendly instructions . . . everything you need to get on the air fast. Order MFJ-1282 (disk)/MFJ-1283 (tape) for the C-64/128 and VIC-20 or MFJ-1284 for the IBM or compatible, $19.95 each.

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Packet gives you the fastest and most reliable error-free communications of any amateur digital mode.

With MFJ's super clone of the industry standard -- the TAPR TNC-2 -- you get **genuine TAPR** software/hardware plus more -- not a "work-a-like" imitation.

Extensive tests published in *Packet Radio Magazine* ("HF Modem Performance Comparisons") prove the TAPR designed modem used in the MFJ-1278 gives better copy with proper DCD operation under all tested conditions than the other modems tested.

Hardware DCD gives you more QSOs because you get reliable carrier detection under busy, noisy or weak conditions.

A hardware HDLC gives you full duplex operation for satellite work or for use as a full duplex digipeater. And, it makes possible speeds in excess of 56K baud with a suitable external modem.

Good news for SYSOPs! New software lets the MFJ-1278 perform flawlessly as a WORLI/WA7MBL bulletin board TNC.

Baudot RTTY

You can copy all shifts and all standard speeds including 170, 425 and 800 Hz shifts and speeds from 45 to 300 baud. You can *copy not only amateur RTTY but also press, weather and other exciting traffic.*

A high performance modem lets you copy both mark and space for greatly improved copy under adverse conditions. It even tracks slightly drifting signals.

You can transmit both narrow and wide shifts. The wide shift is a standard 850 Hz shift with mark/space tones of 2125/2975 Hz. *This lets you operate MARS and standard VHF FM RTTY.*

You get both the American Western Union and the international CCITT character sets, Autostart for unattended reception and selectable "Diddle".

A receive Normal/Reverse software switch eliminates retuning and Unshift-On-Space reduces errors under poor receiving conditions.

ASCII

You can transmit and receive 7 bit ASCII using the same shifts and speeds as in the RTTY mode and using the same high performance modem. You also get Autostart and selectable "Diddle".

CW

You get a Super Morse Keyboard mode that lets you send perfect CW effortlessly from 5 to 99 WPM, including all prosigns -- it's tailor-made for traffic handlers.

A huge type ahead buffer lets you send smooth CW even if you "hunt and peck".

You can store entire QSOs in the message memories, if you wanted to! You can link and repeat any messages for automatic CQs and beaconing. Memories also work in RTTY and ASCII modes.

***A** tone Modulated CW mode turns your VHF FM rig into a CW transceiver* for a new fun mode. It's perfect for transmitting code practice over VHF FM.

An AFSK CW mode lets you ID in CW.

The CW receive mode lets you copy from 1 to 99 WPM. Even with sloppy fists you'll be surprised at the copy you'll get with its powerful built-in software.

You also get a random code generator that'll help you copy CW faster.

Weather FAX

***You'll** be fascinated as you watch WEFAX signals blossom into full fledged weather maps on your printer.* Other interesting FAX pictures can also be printed -- such as some news photographs from wire services.

Any Epson graphics compatible printer will print a wealth of interesting pictures and maps.

Automatic sync and stop lets you set it and leave it for no hassle printing.

You can save FAX pictures and WEFAX maps to disk if your terminal program lets you save ASCII files to disk.

Pictures and maps can be *printed to screen in real time or from disk* on IBM and compatibles with the MFJ-1284 Starter Pack.

You can transmit FAX pictures right off disk and have fun exchanging and collecting them.

Slow Scan TV

The MFJ-1278 introduces you to the exciting world of slow scan TV.

You'll not only enjoy receiving pictures from thousands of SSTVers all-over-the-world but you can send your own pictures to them, too.

You can print slow scan TV pictures on any Epson graphics compatible printer. If you have an IBM PC or compatible you can print to screen in near real time or from disk with the MFJ-1284 Starter Pack.

You can transmit slow scan pictures right off disk -- there's no need to set up lights and a camera for a casual contact.

You can save slow scan pictures on disk from over-the-air QSOs if your terminal program lets you save ASCII files.

The MFJ-1278 transmits and receives 8.5, 12, 24, and 36 second black and white format SSTV pictures using two levels.

Contest Memory Keyer

***Nothing** beats the quick response of a memory keyer during a heated contest.*

You'll score valuable contest points by completing QSOs so fast you'll leave your competition behind. And you can snag rare DX by slipping in so quickly you'll catch everyone by surprise.

You get iambic operation with dot-dash memories, self-completing dots and dashes and jamproof spacing.

Message memories let you store contest RST, QTH, call, rig info -- everything you used to repeat over and over. You'll save precious time and work more QSOs.

You get automatic incrementing serial numbering. In a contest it can make the difference between winning and losing.

A weight control lets you penetrate QRM with a distinctive signal or lets your transmitter send perfect sounding CW.

More Features

Turn on your MFJ-1278 and it sets itself to match your computer baud rate. Select your operating mode and the correct modem is automatically selected.

Plus . . . printing in all modes, threshold control for varying band conditions, tune-up command, lithium battery backup, RS-232 and TTL level serial ports, watch dog timer, FSK and AFSK outputs, output level control, speaker jack for both radio ports, test and calibration software, Z-80 at 4.9 MHz, 32K EPROM, and socketed ICs. FCC approved. 9x1½x9½ inches. 12 VDC or 110 VAC.

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CIRCLE 97 ON READER SERVICE CARD

Sooner or later, both Novice and newcomer will face the problem of interference. W1ICP gives all of us a basic lesson in interference, its causes and most of all, its remedies.

RFI and The Novice, Some Basic Information: Part 1

BY LEW McCOY*, W1ICP

RFI (Radio Frequency Interference) is an all-encompassing term that applies to all types of interference generated by the operation of your amateur radio station and—there are many, many types. This article discusses the subject in some depth plus the amateur responsibilities and cures for many of the problems a new amateur is likely to encounter. Before getting into actual treatment of interference the Novice may find some of the history of the subject of interest.

Some History of Interference

In earlier days, interference "caused" by amateurs was almost entirely limited to broadcast radio and, such interference was known as BCI. My own problems were mainly related to neighborhood broadcast sets, but I also had one other unusual case of interference. My wife and I rented an old house and the electrical wiring in this house was of the "knob and tube" era. What this wiring consisted of was single strands of insulated wires mounted on porcelain knobs and strung along rafters. Where the wire went through a wall, a porcelain tube was used; hence, it was named "knob and tube wiring". Unfortunately, some of this wire happened to be resonant lengths on 20 meters and acted as antennas. Because of this, RF energy from my antenna was coupled back into the wiring. I operated a lot of 20 meter CW in those days, and the result was blinking lights all over the house as I keyed the transmitter. The lights only blinked dimly but my wife took a much "dimmer" view of the whole procedure.

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

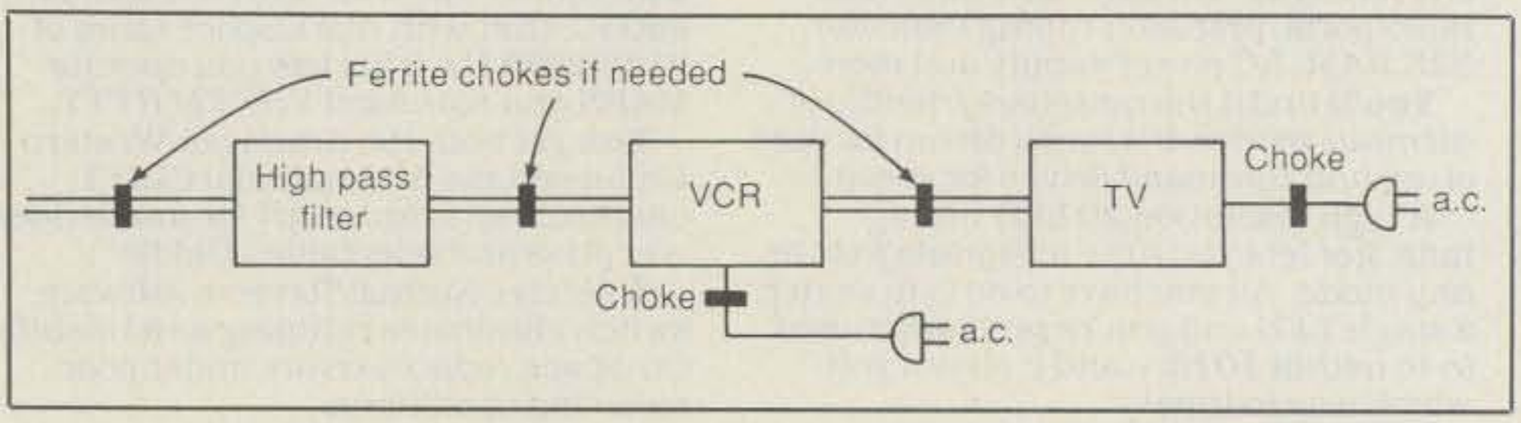

Fig. 1–At "A" we have a high pass filter installed at the TV set as described in the text. For the transmitter end, at "B" be sure that your RF stages are well shielded, particularly the final stage, and the low pass filter installed directly at the output. Many amateurs ask where is the best point to install the filter when many pieces of equipment are used with the transceiver. Usually, the best spot is directly at the transmitter. Most SWR indicators use diodes and they can possibly generate harmonics. Assuming they were on the antenna side of the low pass filter they could create interference but it is unlikely and would be unusual. However, forewarned is forearmed.

When television came along, amateur radio faced a much bigger threat to the hobby, namely TVI. TVI started in the late 1940s and continues to this day. In 1950, I was employed in the ARRL Technical Department. George Grammer, W1DF, was our Technical Editor, and he had quickly realized what a really serious problem TVI was going to be. George did monumental work in the development of high- and low-pass filters, plus transmitter shielding to determine the correct approach to cure TVI. Phil Rand, W1DBM, also did a great deal to alleviate the problem by writing articles about shielding and lead filtering. These two men contributed more to answering the problem than any other amateurs. The problem was so serious that ARRL undertook a campaign, (in which I played a leading part), to combat TVI. I traveled the then 48 states and Canada going to cities that had low-band, Channels 2 through 6 television services. I demonstrated with transmitters and television receivers how TVI was created, and then how it was cured. The lectures were aimed at educating both amateurs and TV service people and proved to be extremely successful.

In those early days of TVI, TV sets didn't have the best of front-ends (the initial receiving portion of the TV set) and were inclined to be easily overloaded by any nearby field of RF. In addition, the early TV stations ran relatively low power simply because the transmitting tubes were not capable of high power at TV channel frequencies. Of course, this combination was tough on the amateur who had to deal with poor front-end design and relatively weak signals from the TV stations. As the years went by, TV stations gradually ran higher and higher power and used better antennas. On the flip side, TV front-ends improved, and cable TV has become more and more popular (cable acts to prevent RF from getting into the system.) So the amateur situation is not as

serious, but nevertheless, the problem is still with us.

Fortunately or unfortunately, depending on one's point of view, transistors and solid state devices came along and with it, a whole new ball game. Tubes in older TV front-ends could handle strong amateur signals without overloading. In general, however, transistors were on the order of 10 dB less capable, or in simple terms, about 10 times more likely to overload. Be that as it may, we certainly have to live with solid state. Tubes are another era of the past, just as spark transmissions are (spark would have caused tremendous TVI!).

While some of the devices (besides TV) existed in the tube era, there are many more such devices subject to RFI now. Electronics, to be blessed or cursed, has entered our lives to a massive extent. It is almost impossible to name a field of life be it cooking, driving an automobile, sleeping (yes, electronic alarm clocks) and so on, where some solid state device, probably using a microprocessor, is not used. I am writing this article on an Epson Equity I computer, and, while it has RFI suppression and protection built in, it is still far from perfect. In other words, it can both generate and receive interference! So much for some of the past history. New devices come out every day that can cause us problems. Thankfully, we have tried and proven methods for dealing with them. As a Novice, or a newcomer to amateur radio, you should be aware of these problems and the answers—because there are standard answers and treatments.

Your Obligations

Probably the most important aspect of any type of interference is how we, as radio amateurs, deal with the public. In many, many cases, interference will not be the fault of the amateur but rather in the poor design of the equipment being interfered with. Many amateurs would simply say, "It isn't my fault so to heck with it!" It may not be our fault but always keep in mind that interference relating to your station operation wouldn't exist if your station wasn't there!

It is very easy for interference cases to get completely out of hand and cause a very messy situation. In my career, I have known of amateurs being shot at, beat up, fire bombed, and so on. With all the pressures amateur radio has on its hands these days, it doesn't pay to alienate the public. So try to be diplomatic and helpful at all times. In addition, even though the FCC would say you were in the right, many local ordinances are written that state the town doesn't care who is at fault—they can order you to cease and desist because you are a public nuisance. FCC and Congress have made it clear that interference is a Federal jurisdiction matter. So, if you ever went to court on a public nuisance charge, you would probably win. But who wants to go through that sort of an ordeal.

Table I

TVs	VCRs
Stereo equipment	Radios (BCI)
PA systems	Monitors
Computers	Garage Door Openers
Telephones	Cordless Telephones
Smoke Alarms	Switching Devices
Electronic Clocks	Modems
Industrial machinery	Domestic devices

Some Types of RFI

Just to give the reader an idea of the types of devices an amateur station can interfere with, refer to Table 1. As I said at the outset there are many types of interference and I'll try to cover as much as possible. The first we'll go over is TVI.

Television Interference—TVI

A few generalizations are in order about TVI. Normally, an amateur need only be concerned about nearby neighbors, those within a few hundred feet. I have to state that it is true that there are recorded cases of distant TVI, but these are certainly not the norm.

Many amateurs use vertical antennas, and you will hear statements that antennas with vertical polarization will cause more TVI. This is an "iffy" statement at best simply because the RF field around your station is going to be strong whether or not the field is vertical or horizontal. One of the arguments is that a vertically polarized field is more likely to couple to TV sets and other devices. The fallacy here is that AC lines and TV feed lines have no respect for horizontal or vertical polarization simply because, depending on their length and orientation, they can couple to either field. The best axiom to follow is, (meaning your antenna system) if it works—leave it alone.

What Bands Are Worse?

Some bands are more likely to cause you problems than others. Operation on 80 and 40 meters for the most part shouldn't result in TVI. It is simply that any harmonics that are generated in your transmitter usually (and note I say "usually") are so attenuated that they are normally too weak to be a problem. However, there are exceptions. I remember one particular case of 80-meter operation causing interference over a wide area to many TV viewers. The amateur was running one kilowatt to an ordinary half-wave dipole fed with coax through a balun. His transmitter showed no intereference when run into a dummy load (which is the normal testing procedure for harmonic radiation from the transmitter).

After a long period of searching, it was finally discovered that the balun, which was one wound with No. 18 wire and formed over a ferrite core, was the culprit. The manufacturer had spot welded the wires in the windings to the coax fitting and the weld had come loose, strictly a case of poor manufacturing. What then occurred was that the RF flowing through this bad connection started to arc and caused a "non-linear" rectifier to exist. Such rectifiers generate very strong harmonics actually (diodes, for example).

Once the balun was carefully wrapped in a garbage bag and buried deep in a garbage can which was all hauled to the dump, the interference disappeared. I have found in my career of chasing TVI that faulty baluns and bad antenna connections are a source of TVI for low-band operation—and higher bands for that matter. However, as I said, the worst harmonic situations occur with operation on 20 meters and higher.

If your station genertes and radiates harmonics in the TV spectrum, these harmonics are going to cause TVI to your neighbors (and your own set). And it is *your* responsibility to eliminate such harmonics—both to abide by FCC rules and for your own peace of mind. A simple technical fact of life is that the stronger a TV signal is, the less likely it is to have interference.

In talking to your neighbors, be sure to point out that an outdoor TV antenna is much better than an indoor one. Also, cable TV is better than normal antenna reception (less chance of your RF field getting into cable). These are just a few of the important points to consider. Many more will come to mind as you deal with the problem.

Most important is that you clean up your own TVI so that you can run your station without interference. This is one of the best pieces of evidence to show a neighbor.

High and Low Pass Filters

There are two basic causes of TVI. The first is fundamental overloading of the TV set by a strong RF field. In this case, the TV set is unable to handle the presence of strong RF signals that can be coupled or fed into the set. The RF levels coming into the TV sets of nearby neighbors are so strong either via the antenna (or sometimes cable) and the AC line—that the TV set cannot handle the resultant signals and interference. Technically, the RF and mixer stages in the TV set simply go crazy with the strong RF signals and many spurious signals are generated in these stages which cause a messed up picture. Usually, two approaches to the problem are necessary. We have to close the door, so to speak, on the TV set to prevent the undesired RF from getting in.

The first approach is to use a "High-Pass Filter". Such a filter is designed to pass the TV signals without attenuating

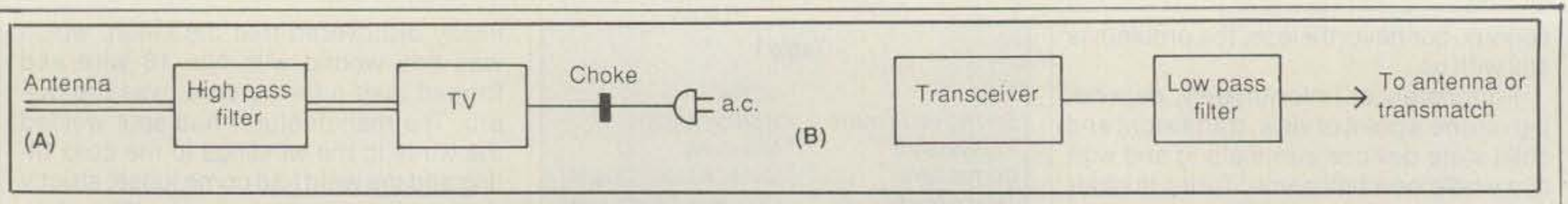

Fig. 2– VCRs require a high pass filter (and lead filtering which will be discussed in more detail in part two.)

them but stops any RF below the filter's cutoff frequency, usually around 40 MHz. This means that any field of RF from 160 meters through 10 meters (the amateur low bands) which are all well below 40 MHz, are stopped. In the days of tube-type TV sets this was usually all we needed, just a high pass filtyer. I never in my career ever saw a case of fundamental overloading via the AC line with a tube type TV. However, with solid state devices and integrated control circuits on modern sets, we need to clean up the AC end of the set. Fortunately, there is a simple way to handle this problem with ferrite chokes and lead filtering. More on that later.

At your end, as I stated above, it is your responsibility to clean up your station. This means making absolutely sure that you are only putting out radio signals on the bands you intend to transmit on—no parasitics and no harmonics. Nearly all modern transmitters are shielded to a degree that if a low pass filter is used, most of the energy has to enter the filter to be attenuated.

A low pass filter is just the opposite of a high pass. The low pass filter will permit any signals below its cutoff frequency (usually just above the 10 meter band, about 30 MHz) to pass through without attenuation. Signals above the cutoff frequency are greatly attenuated. A well designed filter will give about 70-dB attenuation—and that is lots and lots of attenuation. So much in fact, that if no signals "leak" around the filter, the filter will eliminate any harmonic problems. See Fig. 1 for more details.

VCR Interference

In a typical TV installation, we usually have more than just the TV set to deal with. A recent survey showed that more than 50 percent of the homes in this country also use VCRs, video recorders and players. The normal installation for this device is between the TV antenna or cable, and the TV set.

This means that a high pass filter should be installed at the point where the antenna lead comes into the VCR. Fig. 2 shows various setups and the points of installation for the high pass filter and lead filtering. The high pass filter should always be the first thing in the antenna line, and mounted as close as possible to the VCR input or TV input. I am often questioned whether of not more than one high-pass filter should be used and would it help. For example, one filter in front of the VCR and another at the TV set. All I can say is to try it in stubborn cases. In a few cases I have seen it help.

Usually, a high-pass filter and ferrite choke lead filtering will clean up VCR interference, at least on all bands above 80 meters. However, there are circuits in some VCRs that are susceptible to 80-meter signals. The answer is that if the normal steps do not clean up the VCR problem on 80, then reduce your power. As I stated a couple of times earlier, it is not

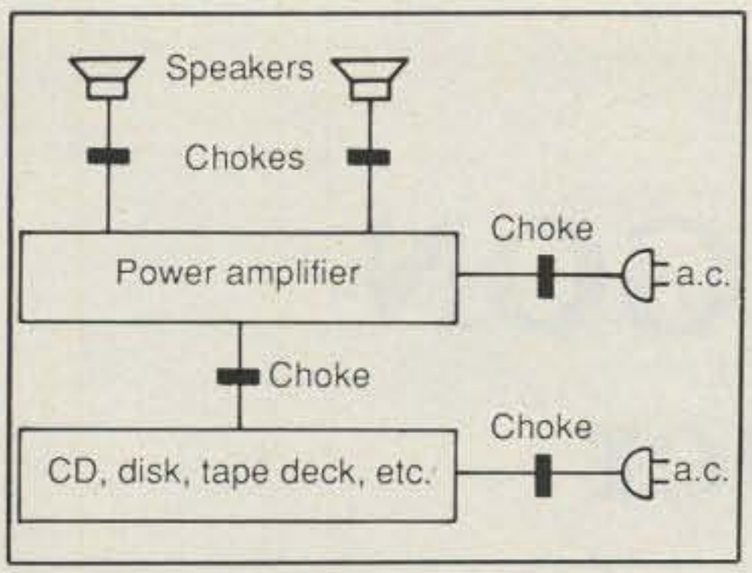

Fig. 3– Stereo and Hi Fi require plenty of lead filtering to keep RF out.

your fault if the VCR receives your 80-meter signal but it is a heckuva lot easier to live with your neighbor if you "tend to your operating properly."

One interesting point about VCRs is worth covering. I have a couple of them and one, an Emerson, has a plastic case (no shielding). The unit worked fine until one day when my wife bought me a new cabinet to hold all my TV accessories. I mounted the VCR directly above the TV set with the cases of both separated by less than two inches.

On recording and playback, the video cartridge ran slower and erratically (making some rather weird sounds). I found out (from Emerson) that the circuits in that particular model (and other VCRs that don't have adequate shielding were susceptible to the radiation from the TV flyback transformer. It got into the drive motor circuits of the VCR, fouling them up. Moving the VCR cured the problem. However, just for kicks I tried my rig on 80, no filtering on the VCR, and experienced the same VCR motor screwups! With filtering installed, the problem was cured.

Stereo RFI

Another type of RFI is that of stereo or Hi Fi reception. This is 99 percent the fault of the stereo equipment and not the amateur's fault. One point that bears mentioning—any device that is not designed to receive RF—in other words, not a radio receiver, should not be able to be interfered with. There has been an ongoing fight for years with manufacturers of such devices to manufacture them "clean". However, it is a fight that we cannot seem to win—even though Senator Goldwater had a bill passed giving the FCC the authority to control such manufacture.

Getting back to stereo interference, one of the big problems is the use of remote speakers where long speaker leads are used. These leads, particularly if they happen to be half wavelengths in amateur bands, will pick up the RF from the strong RF field, feed it into the stereo chassis, rectify it, and out the amateur comes as audio.

The answer of course is to get the RF off the speaker leads. Disk bypass capacitors, .01 uF, can be installed at the speaker leads where they leave the chassis. This will usually do the job of bypassing the RF to ground. In stubborn cases, shielded (coaxial) speaker leads should be used plus the bypassing. See fig. 3.

BCI

Broadcast interference (BCI) is a real stinker. The reason being that it is tougher than the dickens to cure. Most radios these days are portable even to the point of being called "Walkman." They are made with plastic cases, very little shielding, and so on. The amateur handbooks describe traps but in my own experience, I just try to ignore such interference either by changing bands or operating frequencies. I know this is far from a satisfactory answer but truthfully, BCI is not a common complaint in a neighborhood so I would ignore it as tactfully as possible. (Heck, I am being truthful!)

Fortunately the advent and use of ferrite chokes has helped us clear up many interference problems. Next month we will discuss ferrite filtering, what they are, how to make them (simple) and provides source information.

(To Be Continued)

No 41-42

CQ REVIEWS:

Ten-Tec's PARAGON HF Transceiver

Part I – Overview and Technical Details

BY JOHN J. SCHULTZ*, W4FA/SV0DX

The PARAGON can be said to be the first microprocessor based, American-made transceiver which competes directly in its price class with imported transceivers. It comes from a manufacturer who has had a solid, long-term track record in the manufacture of amateur radio transceivers and an outstanding reputation regarding after-sales service. So, many amateurs might indeed have a special interest in taking a detailed look at the PARAGON. So, I have tried in this review article to take an in-depth look at the PARAGON starting with an overview of its features and circuitry and then going on to describe some of its special operating features and, finally, my own experiences after using the transceiver over an extended period of time.

Like they say in the advertisement, this is face to face with the PARAGON.

General

The PARAGON is a 100 watt output class transceiver that covers all of the HF bands and includes general coverage receive from 100 kHz to 30 MHz. It features direct keyboard frequency entry and bandswitching, dual digital VFO's, 62 memories (each of which stores frequency, mode, VFO A/B information, IF filter selection and a seven digit letter/number memo tag), memory scan (with channel lockout) and tuning of each memory channel via the main tuning knob or in an automated mode. Standard modes include CW (with full or semi break-in), SSB (with speech processor) and RTTY (true FSK or AFSK). FM is available as an option. Standard filters include a 6.0 kHz one for AM receive and a 2.4 kHz one for SSB/CW. Optional filters are available for 1.8 kHz and 500 and 250 Hz. There is a full range of both IF and AF selectivity controls (e.g. passband tuning, bandpass tuning, notch filter tuning, etc.).

An optional interface unit provides bi-directional communication between the logic circuits of the PARAGON and an external computer with RS232 capability. All of the keypad functions on the transceiver and the main tuning circuitry can be computer controlled.

The PARAGON is, of course, a completely solidstate design with no tuning controls except for the main tuning knob. The transceiver (with internal speaker) is contained in one enclosure while the power supply is external. Ten-Tec power supply and microphone accessories are available which allow the PARAGON to be immediately placed into operation as a complete station. The accessory items will be described in the final part of this article.

Please Take a Look

At the specifications for the PARAGON as shown in Table 1. It's a big table (because Ten-Tec provides so much detailed information) and, I realize, it can be boring reading to some. But, nonetheless, it provides a *wealth* of information. I should say factual information! The specifications are totally short on meaningless superlatives and concentrate strictly on facts and figures.

I won't go through the entire table but allow me to highlight various points:

Frequency Coverage: 100 kHz to 30 MHz on general receive. All bands, 160 through 10 meters, on transmit with modification possible for non-amateur band transmit.

Frequency Stability: an excellent 1 part per million per degree C even at 30 MHz.

Physical: A very light package (16 lbs) due to almost total aluminum construction. The dimensions would allow mobile or portable usage but augur best for home station usage.

RF Output Power: Adjustable up to 100 watts, key-down, in all modes. The power amplifier has no cooling fan and can operate key-down for 20-30 minutes.

Receive/Transmit Switching: Regular PTT or VOX. Fast or slow break-in on CW.

Transmit Spurious Suppression: Excellent at −60 dB for carrier and unwanted sideband suppression and quite reasonable

*c/o CQ Magazine

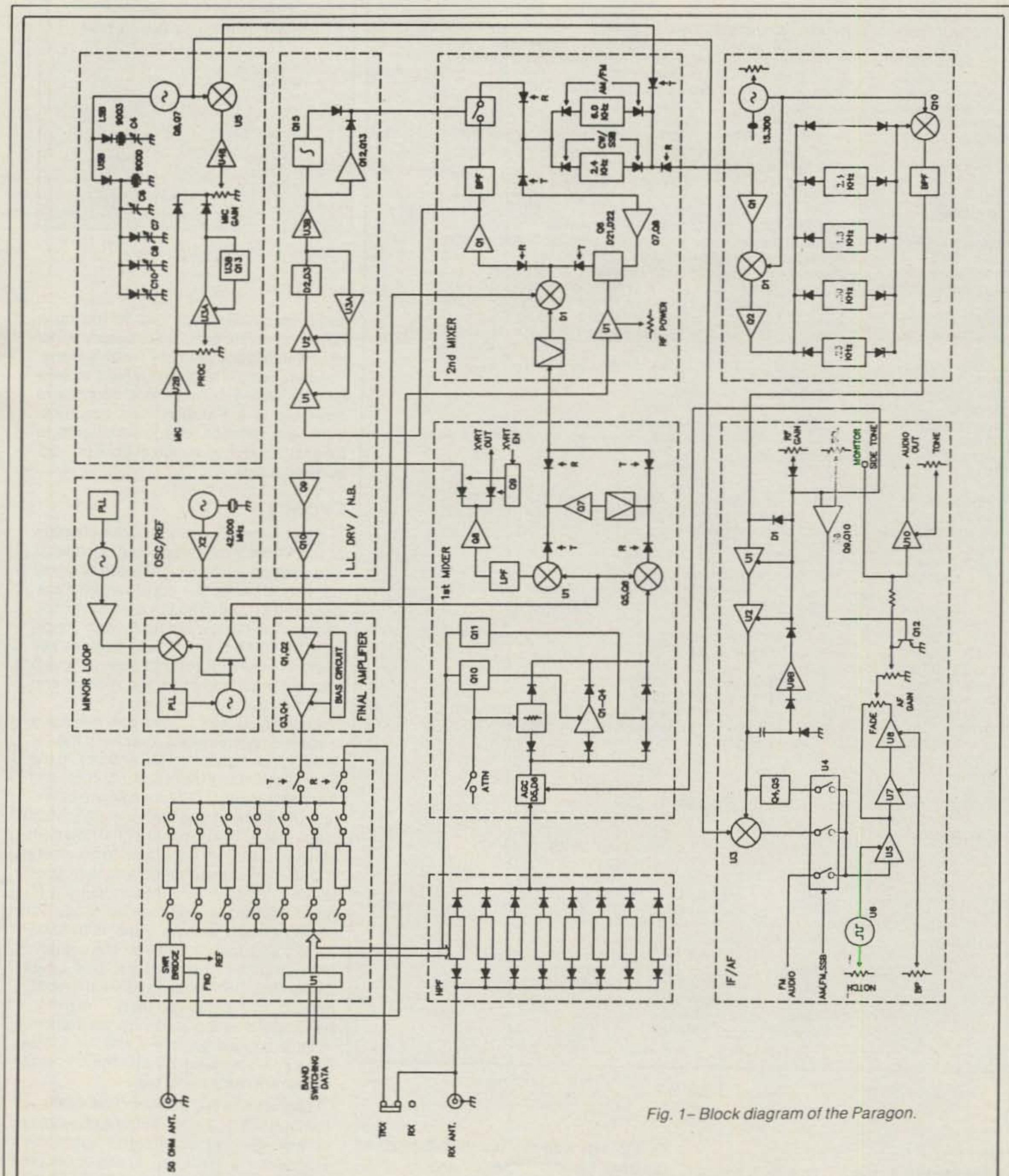

Fig. 1– Block diagram of the Paragon.

at – dB for miscellaneous spurious outputs.

Metering: Very complete including direct reading SWR, forward output power and audio processing level. A separate LED indicates ALC peaks.

Receive Sensitivity: Certainly state-of-the-art with 0.15 uV sensitivity in the HF range for CW and SSB modes.

Receiver Selectivity: Again, state-of-the-art with some outstanding skirt selectivity specifications, especially for the optional 1.8 kHz SSB filter, as will be discussed later.

Image and IF Interference Rejection: Outstanding at greater than –70 to –80 dB. These values appear to be due to careful "front-end" filtering plus the use of a 75

General

FREQUENCY RANGE	Receive: 100 kHz to 29.9999 MHz Transmit: Standard Ham Bands 160M—10M (Note: For operation outside Ham Bands contact factory.)
FREQUENCY CONTROL	Microprocessor controlled digital PLL synthesizer. 10 Hz resolution.
FREQUENCY READOUT	7 digit 10 Hz fluorescent readout.
FREQUENCY STABILITY	Worst case, 1 PPM per degree C. at 29.999 MHz.
ANTENNA IMPEDANCE	50Ω unbalanced.
POWER REQUIRED	Receive = aprox. 1.5A. Transmit = approx. 20 A. @ 13.8 VDC.
CONSTRUCTION	Rigid aluminum chassis. Extruded aluminum front panel. Textured top and bottom, snap up stainless steel bail.
DIMENSIONS	HWD 5¾" × 14¾" × 17"—14.6*37.4*43.2 cm.
NET WEIGHT	16 lbs.—7.25 kg.

Transmitter

MODES	USB, LSB, CW, RTTY (FSK or AFSK), (FM optional).
DC POWER INPUT	Maximum 200 watts @ 14 VDC CW, SSB, (FM). 100% duty cycle for up to 20 minutes. Continuous with auxiliary air cooling.
RF POWER OUTPUT	25 to 100 watts adjustable with front panel RF PWR control.
MICROPHONE INPUT	High/Low impedance. Four pin, front panel connector accepts microphones with 5mV (−62 dB) output. Polarizing voltage is provided for electrets.
T/R SWITCHING	VOX or PTT on SSB. Switchable FAST or SLOW QSK on CW.
CW SIDETONE	Internally generated, adjustable tone and volume independent of AF GAIN control.
SSB GENERATION	9 MHz, 8-pole crystal ladder filter. Balanced modulator.
CARRIER SUPPRESSION	60 dB typical.
UNWANTED SIDEBAND SUPPRESSION	60 dB typical at 1.5 kHz tone.
SPURIOUS OUTPUT	More than 45 dB below peak power output.
METER	Switchable forward power, SWR, collector current, audio processinglevel.
CW OFFSET	750 Hz automatic.
FSK SHIFT	170 Hz.
ATTENUATOR	Approx. −20 dB for 1.6 to 29.999 MHz, −10 dB for .1 to 1.6 MHz.
I-F FREQUENCIES	1st = 75 MHz, 2nd = 9.0 MHz, 3rd = 6.3 MHz (FM 3rd = 455 kHz).
RX ANTENNA INPUT	Switchable 50Ω phono jack.
IMAGE REJECTION	80 dB.
I-F REJECTION	70 dB.
NOISE BLANKER	Switchable on/off with adjustable width.
S-METER	Automatically switched on during receive. Calibrated to 50 μV at S9.
DYNAMIC RANGE	100 dB typical.
3rd ORDER ICP	+18 dBm
SQUELCH SENSITIVITY	AM, CW, SSB, FSK (1.6-29.999 MHz) = Less than 1 μV. Optional FM (1.6-29.999 MHz) = Less than .4 μV.
PASS BAND TUNING	±1.2 kHz.
AUDIO OUTPUT	1.5 watts @ 8Ω with less than 2% distortion.
NOTCH FILTER	250 to 2.2 kHz, 50 dB notch typical.
AUDIO BANDPASS FILTER	4 pole, variable center frequency 220 to 1.7 kHz, 35% bandwidth @ −6 dB. Variable fader control selects filtered or flat audio response.
TONE CONTROL	Variable 15 dB rolloff @ 5 kHz.

Receiver

MODES USB, LSB, CW, FSK/AFSK, AM, (FM optional).

SENSITIVITY	FREQUENCY MHz	.1 - 1.6	1.6 - 29.999	
	MODE			
	SSB, CW, RTTY	.5 μV	.15 μV	10 dB S/N @ 2.4 kHz
	AM	3.5 μV	1.0 μV	10 dB S/N @ 6.0 kHz
	(FM)	1.0 μV	.30 μV	12 dB SINAD @ 15 kHz

SELECTIVITY	SELECTIVITY FILTER	−6 dB	−60 dB
	STANDARD	2.4 kHz	3.36 kHz
	AM	6.00 kHz	11.25 kHz
	OPTIONAL	1.80 kHz	2.90 kHz
	OPTIONAL	.50 kHz	1.40 kHz
	OPTIONAL	.25 kHz	.85 kHz
	(FM)	15 kHz	30 kHz

Table 1

Power Output Versus Frequency

Frequency (MHz)	Adjustable Power Output (Watts)
1.80 - 2.01	18 - 100
3.50 - 4.01	18 - 100
7.00 - 7.31	18 - 95
10.10 - 10.16	18 - 95
14.00 - 14.36	17 - 100
18.06 - 18.18	17 - 95
21.00 - 21.46	18 - 95
24.80 - 25.10	18 - 105
28.00 - 29.71	18 - 100

Table 2

audio notch filter equates to having a rather complete built-in accessory audio filter which is active in any receive mode.

Again, I would suggest that one muse a bit over Table 1 if one seriously considers investing in a Paragon. The specifications are detailed enough to be quite meaningful and, as bench checks proved, quite accurate.

Circuitry

Fig. 1 presents a block circuit diagram of the PARAGON. Depending upon what one considers a true signal path IF signal conversion, one can consider the Paragon to be a triple or quadruple conversion design. The point is not really very important; the 75 MHz first IF feature is the key design feature of the transceiver which allows for general coverage receive and general coverage HF transmit.

Looking at fig. 1, one can generally trace the receive signal flow from the 1st Mixer block to the 2nd Mixer block to the filter block (lower right hand corner) and then over to the IF/AF block where detection, AF filtering and audio amplification takes place. The transmit signal flow path starts in the upper right hand block where a DSB signal is produced and then goes to the 2nd Mixer board to produce a filtered SSB signal and then on to the 1st Mixer board where the signal is translated to the output frequency. The signal is then amplifier in part of the Low Level Driver (L.L. DRV) board and Final Amplifier block to the 100 watt level. The 8 high-pass filters associated with the receive input are diode switched and the 7 low-pass filters associated with the transmit output are realy switched.

Overall, the basic signal flow paths in the PARAGON are the same as one finds in any general coverage transceiver. Transceivers do differ, however, in the ways that design engineers divide up the necessary signal processing and generation functions among various PC boards. Large PC boards mean more economical production but the danger of signal "glitches" and undesired interractions. Multiple, smaller PC boards mean a lot of costly interconnections. Ten-Tec has tak-

MHz first IF frequency.

Noise Blanker: A true I.F. type with adjustable width control.

Dynamic Range and 3rd Order Intercept Point: very excelent values especially considering that they are quoted with the receive preamplifer in use. Details will be discussed later.

Pass Band Tuning: True I.F. control which functions as a variable bandwidth control (±1.2 kHz) with the standard 2.4 kHz or optional 1.8 kHz IF filters and as an IF shift control with other IF filters.

Audio Bandpass Filter: As its name states, an audio filter. One can set the center frequency anywhere from 220 to 1700 Hz and then independently adjust the bandwidth, pulling it in or spreading it out from the center frequency selected. An interesting feature which combined with the

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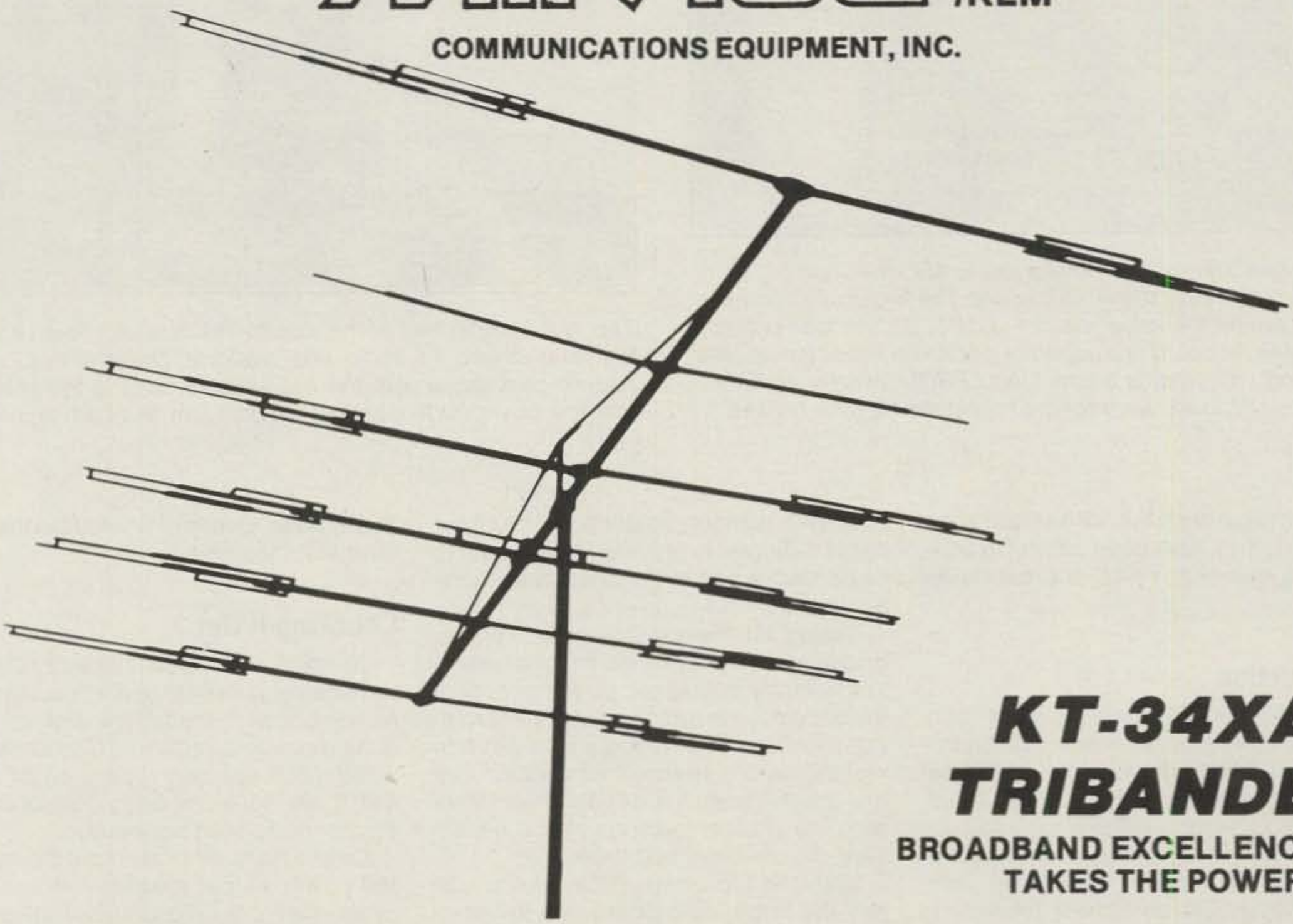

KT-34XA TRIBANDER

BROADBAND EXCELLENCE THAT TAKES THE POWER

KLM's KT-34XA TRIBANDER is the 2nd generation of a unique new series of antennas designed to provide superior **broadband** coverage on 20, 15, and 10 meters. The combination of lossless linear loading and hi-Q air capacitors enables the KT-34XA to outperform **all** commercial available tribanders and meet or exceed the performance of a conventional stacked monoband system. The lower weight and windload of a single antenna mean reduced tower and rotator requirements. Thus, overall system costs can be kept to a minimum while enjoying the best of monobander-type performance.

KLM's field proven KT-34A is the heart of the "XA" model. The boom length of the "XA", however, has been doubled, and one tri-resonant and one full size 10 meter element have been added. These changes increase the gain to **11-11.3 dBd** on 10M, **9-9.5 dBd** on 15M, and **8.5-9 dBd** on 20M. Two driven elements are used to make the KT-34XA unusually broadbanded (a concept applied to many KLM antennas). Gain is virtually flat across each band except for 10 meters which has been optimized for the DX'er, 28-29 MHz. The chart shows the remarkable performance qualities of the KT-34XA.

The KT-34XA's design represents the first major advancement in tribander technology in over 20 years! The conventional traps, coils, and capacitors have been discarded in favor of integral linear loading and hi-Q air capacitors, all composed of aluminum tubing. These give the KT-34XA a conservative power handling capability of 4 KW PEP and an unusually high level of operating **efficiency**. Linear loading also makes full ¼-wave elements possible on 15 and 10 meters, and brings 20 meters much closer to the desirable ¼-wave than any conventional tribander.

BANDWIDTHS:	14.0-14.350 MHz 21.0-21.50 MHz 28-29 MHz	**GAIN:**	8.5-9dB 9-9.5dB 11-11.3dB
VSWR:	1.5:1	**BOOM LENGTH:**	32 ft. × 3" O.D.
FB/FS:	20dB/40dB	**TURN RADIUS:**	21.5 ft.
FEED IMP.:	50 ohms w/balun	**WINDLOAD:**	9 sq. ft.
BALUN:	3-60-4:1 5KW PEP	**WT. (LBS.):**	75 lbs.
ELEMENT LENGTH:	24 ft.	**MAST:**	2" O.D. (standard)

Mechanically, the KT-34XA has been built to survive the toughest weather conditions. All aluminum, including the boom, is strong 6063-T832 alloy. All electrical hardware is stainless steel. Virtually indestructible "Lexan" insulators, just like those on KLM's 40 meter "Big Sticker," are used for mounting the elements and insulating them from the boom. KLM's 3-60 MHz 4:1 balun is supplied for direct connection to any 50 ohm feedline.

Turn your KT-34A into an XA.
Call your local dealer for price.
W6NL Scott

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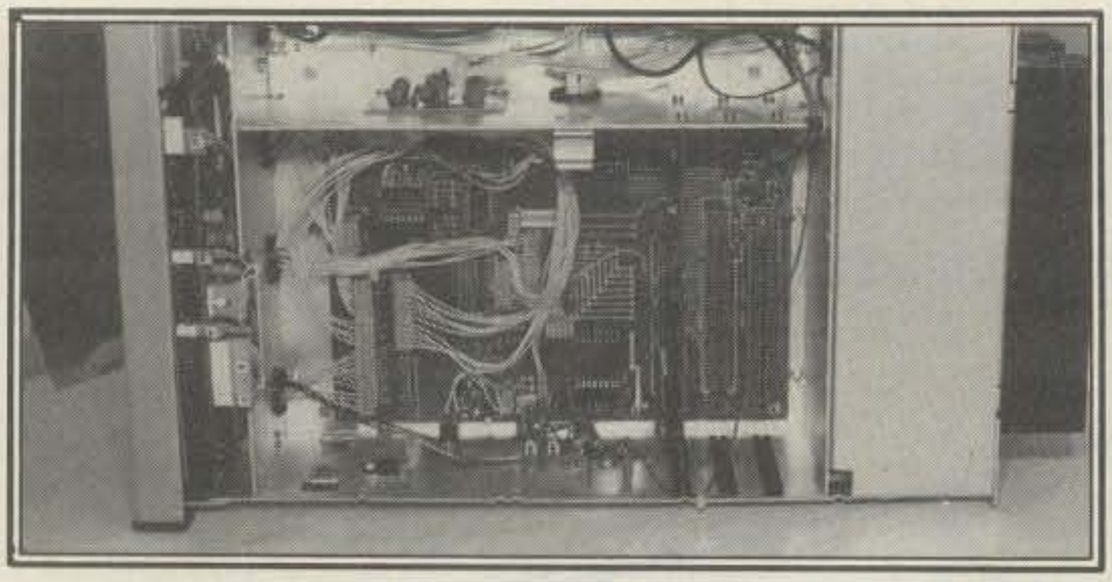
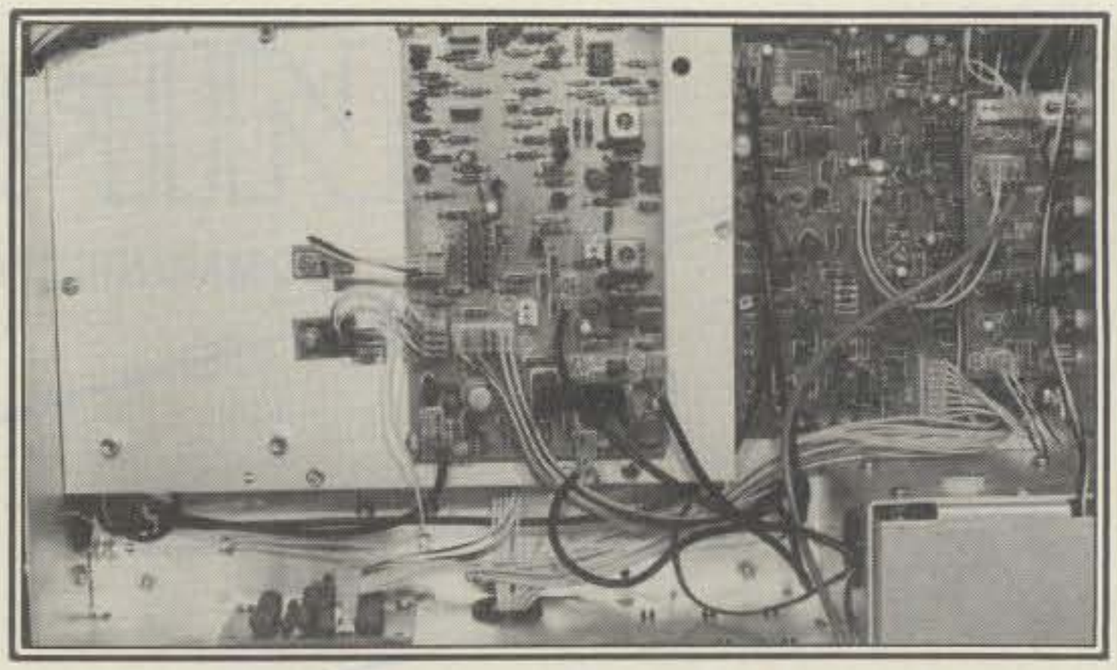
CIRCLE 159 ON READER SERVICE CARD



With the bottom cover removed, this is the lower half of the inside. The large board is the logic board. The two unused connectors on it are for the voice readout and RS232 interface options. The RAM/ROM board is plugged in just to the left of the unused connectors. It contains a socketed EPROM which can be exchanged if the software for the transceiver is ever revised.



This is the upper half of the inside. The boards shown are the low level driver, TX audio and sidetone. There are still other boards concerned with the oscillator circuits in the shielded compartment underneath the middle, low level driver, board.

en its own approach but, as one can note from fig. 1, they have been careful to separate various of the PLL and oscillator boards.

Construction

The PARAGON features almost total aluminum frame construction with an extruded aluminum front panel, multiple aluminum internal chassis sections and textured covered aluminum top and bottom covers. The construction is lightweight (16 lbs. or 7¼ kg) but yet very rugged. It should be almost totally immune to environmental factors no matter where in the world it might be used.

The photographs I made try to illustrate some of the constructional features but, in reality, they do a better mediocre job. There are a total of 14 glass-epoxy, double-sided PC boards and 9 glass-epoxy, single-sided PC boards. All of them use connectors and any one can be removed without soldering. The front panel is hinged to provide access both to its hardware and to the chassis sections behind it.

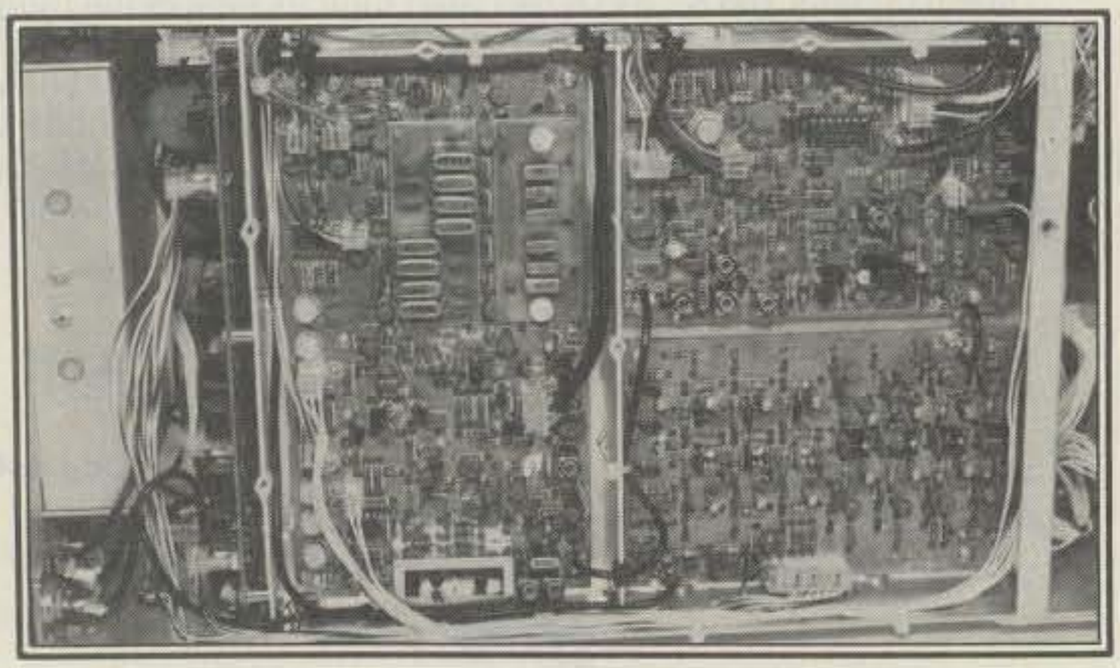
Taking off the top cover (see photograph) and looking inside the unit, one is immediately impressed by the quality of the construction and the spacious layout. Apparently a lot of thought was given to making the unit service-friendly such that one doesn't need a super detailed "roadmap" to find components and, if necessary, to remove or test them.

With the top cover removed one can see the large logic board, the low-level amplifier board, the TX audio board and the sidetone board. The shielded compartment to the rear enclosed the power amplifier. Removing the bottom cover, one sees the mixer boards, filter boards and the IF/AF board. The components associated with the PLL's and frequency synthesis are in separately shielded areas. The cable dressing is extremely neatly done. Overall, I would rate the construction "top quality."

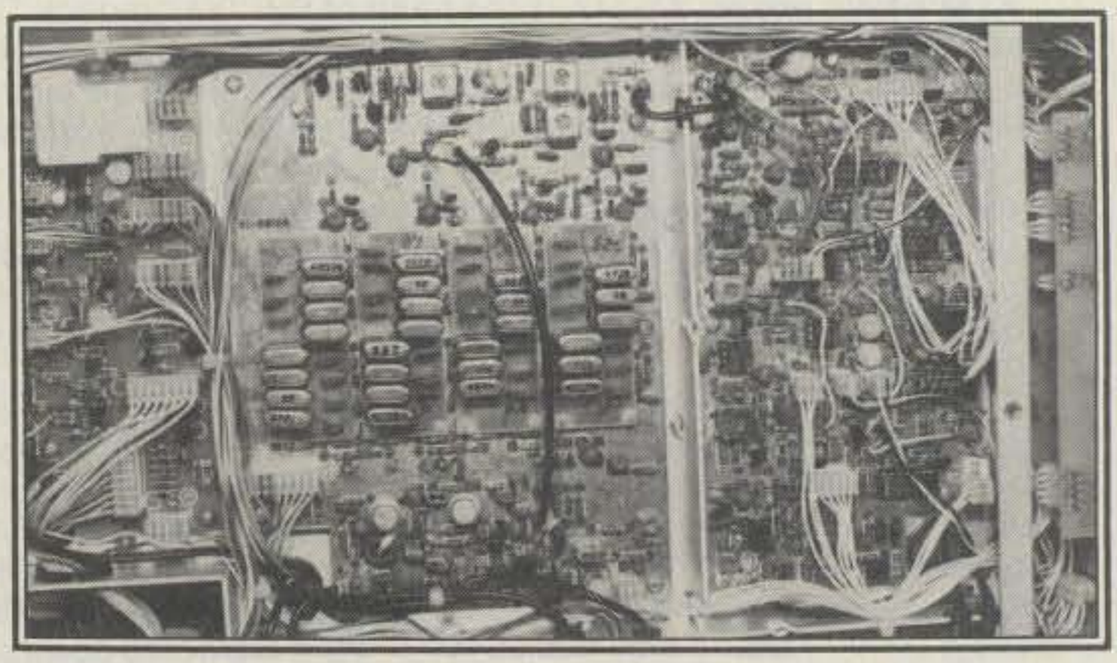
Checking It Out

Jumping ahead a bit let me say that the transceiver is easy to operate but to technically check the functioning of some 12 analog controls and some 52 switches or pushbutton controls took a bit of time. But, it was done and every control and indicator performed perfectly.

On the *transmit* side, Table 2 presents the power output measurements. Third order intermodulation products (two-tone test) were −33 dB down (−39 dB for fifth order). Carrier suppression and unwanted sideband suppression were outstanding at slightly less than −60 dB. A look at a spectrum analyzer revealed no spurious or harmonic emission greater than −50 dB. Use of the speech processor on SSB about doubled the average power output level. At 90-100 watts power out-



With the bottom cover and an internal overall bottom shield removed, this is the lower half of the inside. The 2nd mixer board in the middle contains the 8 pole 2.4 kHz SSB filter and 6 pole 6.0 kHz AM filter. The power amplifier is to the left in another separately shielded enclosure.



This is the upper half of the bottom inside. The large board in the middle is the passband tuning one. It contains the standard 2.4 kHz filter (left side) which in conjunction with the SSB filter on the 2nd mixer board, provides 16 poles of SSB filtering. The other filters to the right of the SSB one (all plug-in) are the optional 8 pole 1.8 kHz filter, the optional 6 pole 500 Hz filter and the optional 6 pole 250 Hz filter.

Filter Specification

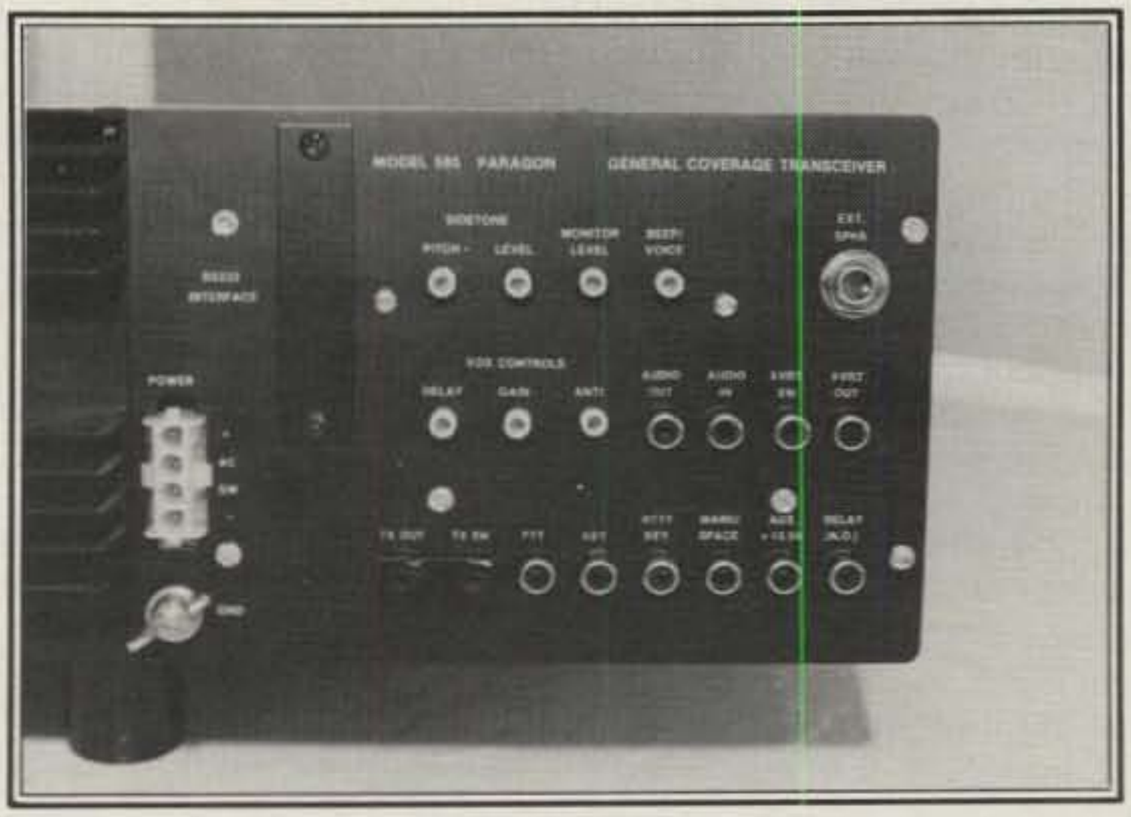
Filter	−6 dB Bandwidth	−60 dB Bandwidth	Shape Factor
AM	6.0 kHz	11.25 kHz	1.88:1
SSB	2.4 kHz	3.36 kHz	1.87:1
SSB (Optional)	1.8 kHz	2.90 kHz	1.80:1
CW (Optional)	500 Hz	1.4 kHz	2.80:1
CW (Optional)	250 Hz	850 Hz	3.40:1
FM	15.0 kHz	30.0 kHz	2.00:1

Table 3

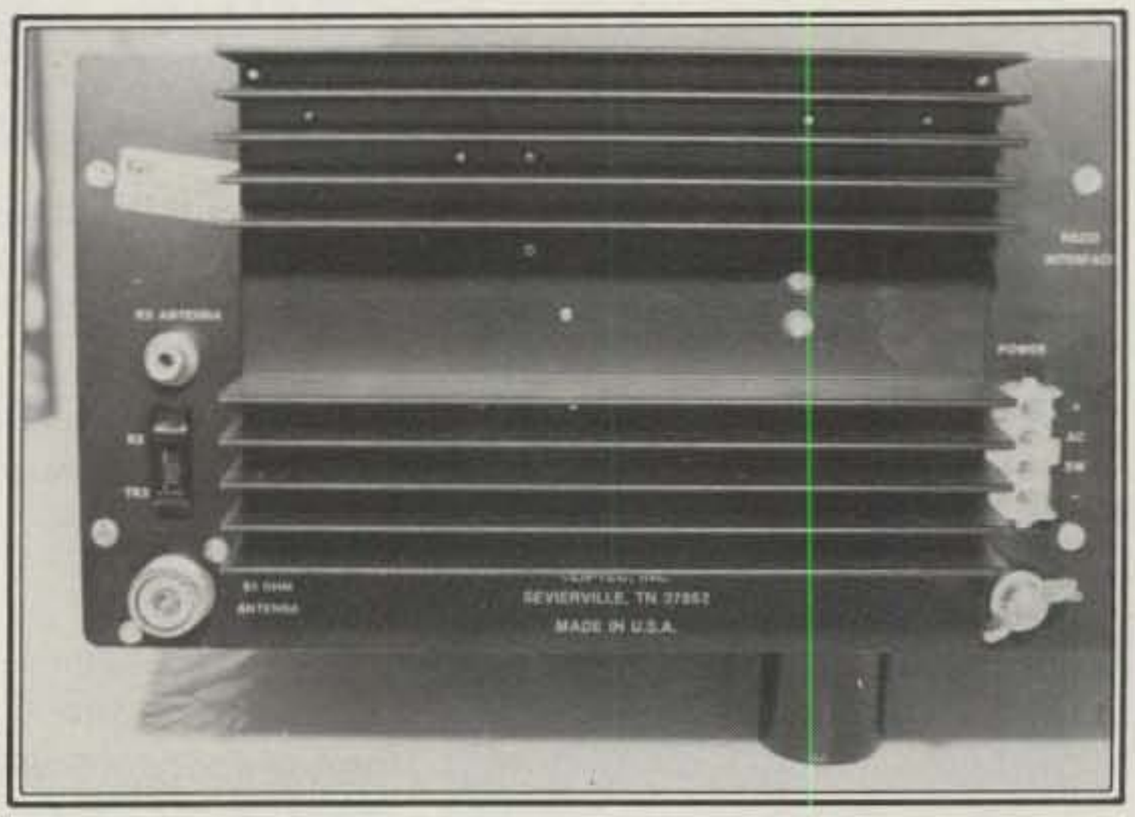
S Meter Response

Standard	Filter Used	20 Meter	10 Meter
S9,50 uV	250 Hz	S8½	S8
	500	9	8½
	1800	9 + 3dB	9
	2400	9 + 2dB	9
	6000	9	8½
S5,3 uV	250 Hz	S5½	4¾
	500	5¾	5
	1800	6	5
	2400	6	5½
	6000	6	5¼
S3,0.8 uV	250 Hz	S3½	S2¾
	500	3½	3
	1800	4	3½
	2400	4	3½
	6000	4	3¼

Table 4



The right side of the rear pane. A very clean and logical layout of various connectors and seldomly used controls.



The left side of the rear panel. It contains mainly the large heat-sink for the power amplifier. There is no fan. None is necessary for normal usage of the PARAGON.

put from a cold start the transceiver was run 20 minutes key-down before I felt the heat sink for the output transistors was getting too warm to tolerate. But this is within the rating specified and one must remember that the transceiver has no internal cooling fan. For normal operation this poses no problem whatsoever but for extended contest or key-down mode operation, an external fan would give one more piece of mind and prevent the transceiver from tripping off during the middle of a QSO as its protective circuitry was activated. Overall, on the transmit side, the transceiver produces a very stable and clean output signal.

On the receive side, the PARAGON has features galore. The actual operating features which will be described in more detail later, nicely complement the excellent technical performance. No matter how you like to look at the "numbers," the transceiver has a low-noise design with an excellent "front-end." I measured the noise floor at −138 dBm (2.4 kHz bandwidth) and the Third Order Intercept plotted to +18 dBm with the RF preamplifier in use and +35 dBm with the input attenuator activated. Table 1 presented the claimed sensitivity measurements and they all checked as good or better than specified (except FM since the FM option was not available). The same is true for the filter selectivity measurements as shown in Table 3. Although the standard 2.4 kHz SSB filter has a good shape factor, that of the 1.8 kHz is really interesting and recommended for DX'ers. The ultimate rejection of the filters is between 90-100 dB! Image and IF rejection were as good as claimed. The S meter calibration was "right on" with S9 being 50 uV and S3 about 0.8 uV. In fact, the S meter response was so good I decided to detail it a bit as shown in Table 4. It's rare to find a transceiver that isn't 3-4 S units out of calibration, especially on 10 meters. The calibration I show in Table 4 for S3, S5 and S9 refers to a Recommendation developed at the 1981 IARU Region 1 Conference. The squelch operates on all modes. The pass band tuning, notch filter and tunable audio bandpass filter form an interesting trio to combat QRM and although the numbers shown in Table 1 are correct, the usage of these controls can only be appreciated in practice. Receive recovery time was a hair under 30 ms making the transceiver usable in this respect for AMTOR operation. Keying rise and fall times were under 5 ms. The keyed signal exhibits the usual Ten-Tec quality. There is an internal CW waveshape control in case one has some special reason to change the keying response. Overall, receive specification are totally state-of-the-art and impressive even forgetting for the moment all of the unique operating features which translate the technical excellence into a user-friendly transceiver.

Interface Connections

The microphone input of the PARAGON will accept high (22K ohms) or low impedance microphones, non-amplified or amplified types, with a minimum out-

put of 5 mV. Crystal microphones with typical impedances of 100K ohms might be a problem. A standard 4 pin microphone socket is used; one of the pins provides a polarizing voltage in case an electret microphone is used.

The rear panel connections and functions are very extensive, as shown by one of the photographs. Just about every possible external interconnection possibility has been provided although no complex or unusual connectors are used. Generally, complete connections are provided for use with a linear amplifier, VHF transverters, a phone-patch, PTT foot switch, AFSK/FSK modems and a separate receive antenna. An auxiliary 12 VDC connector is provided for accessory items.

The VOX controls (delay, gain and anti-VOX) are all located on the rear panel as well as the controls for sidetone level and pitch, transmit audio monitor level and beep/voice level. The latter control refers to setting the level of an input confirmation beep for front panel keypad entries or to the output level of an optional voice synthesized frequency announcing IC. The concentrated, but not crowded, grouping of these controls on the rear panel of the transceiver is a very practical idea. They are normally controls that one would adjust only infrequently but, certainly, having them concentrated in one area is superior to having them spread out on the side, back or bottom panels of a transceiver and/or having them being recessed controls which require a screwdriver for adjustment.

Computer control (RS 232 Interface) interface information was not available at the time that this review was written. The optional Model 258 Interface Option Package is supposed to include a plug-in PC board that contains all of the necessary driver and interface circuitry, an RS 232 connector, connecting cable and complete command code information. All keypad functions and the main tuning circuitry can be controlled, according to Ten-Tec.

(To Be Continued) CQ

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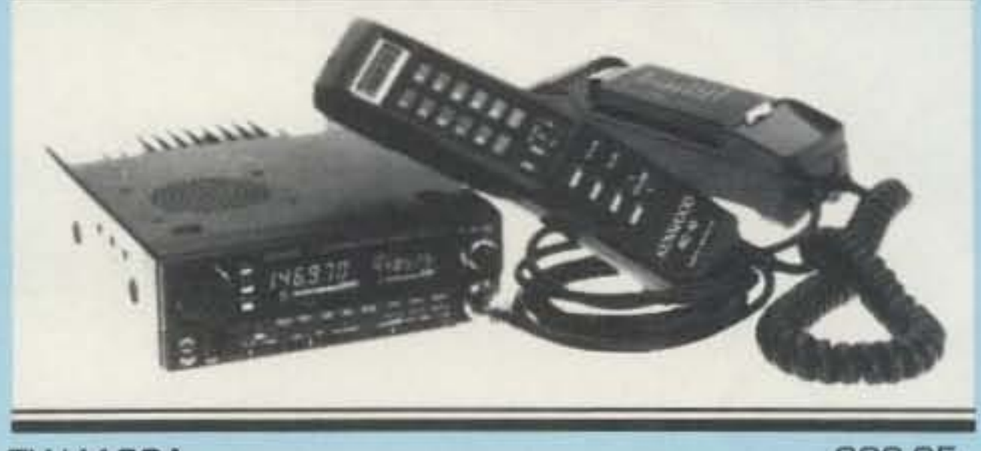

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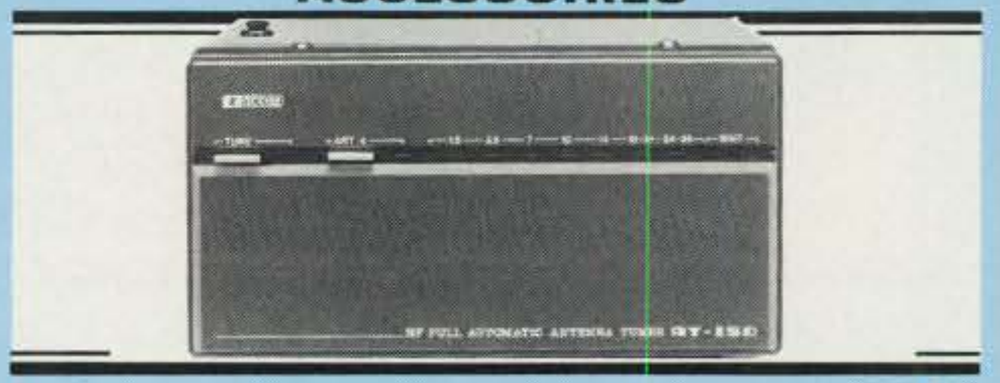

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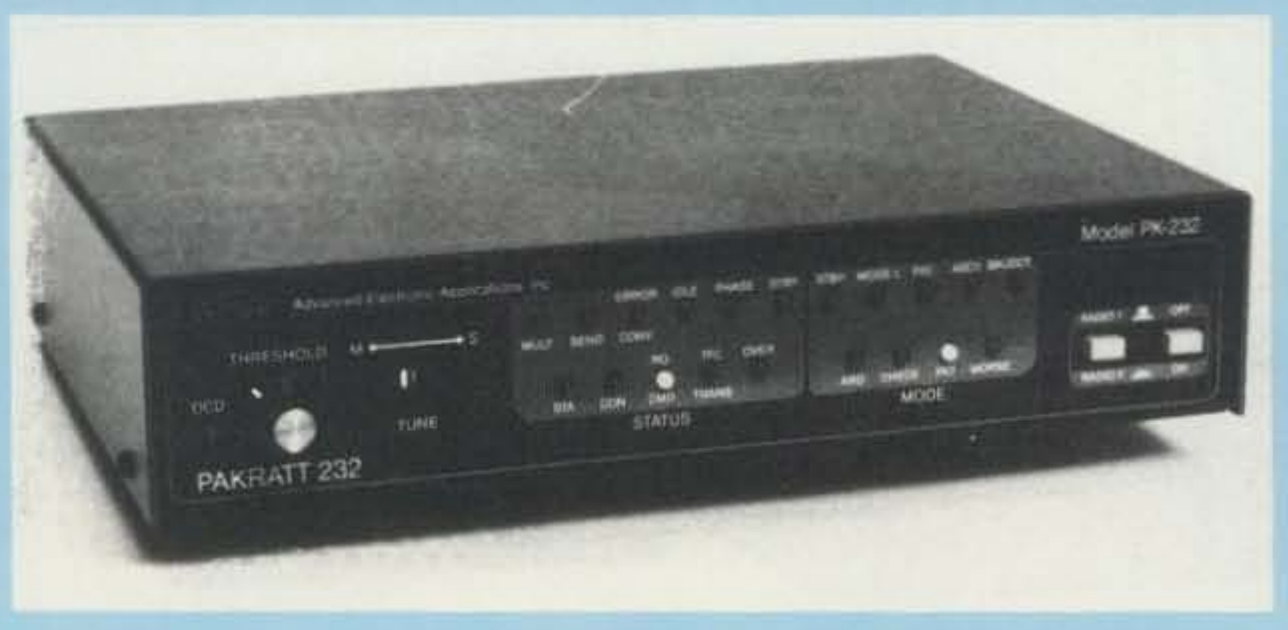

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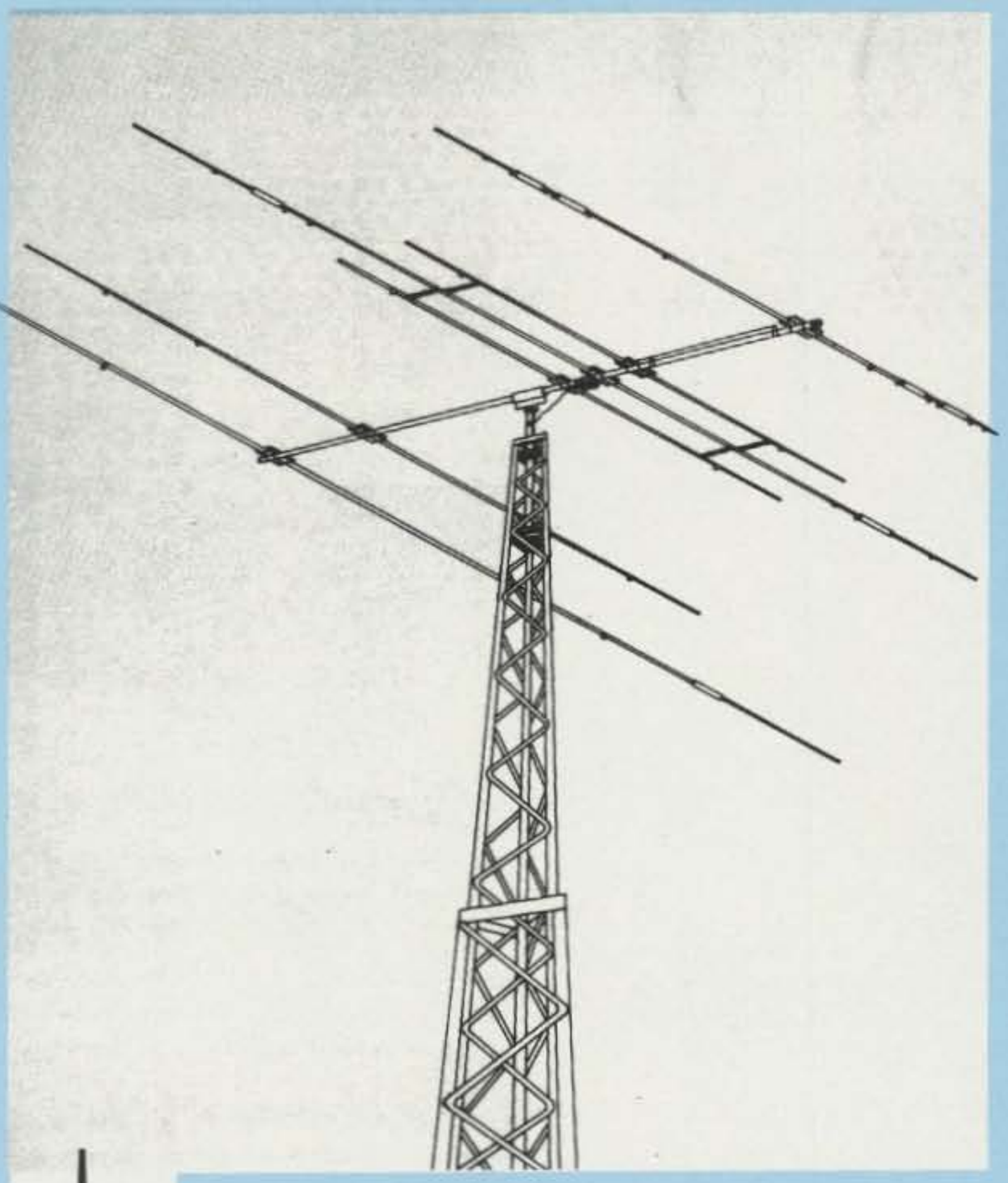

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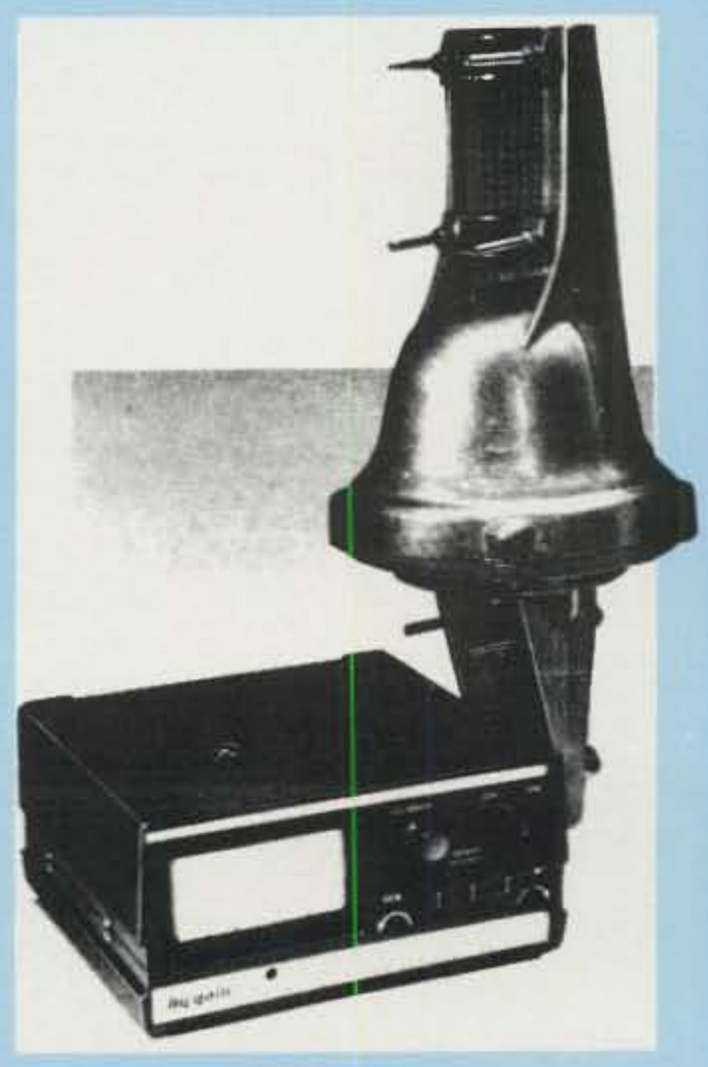

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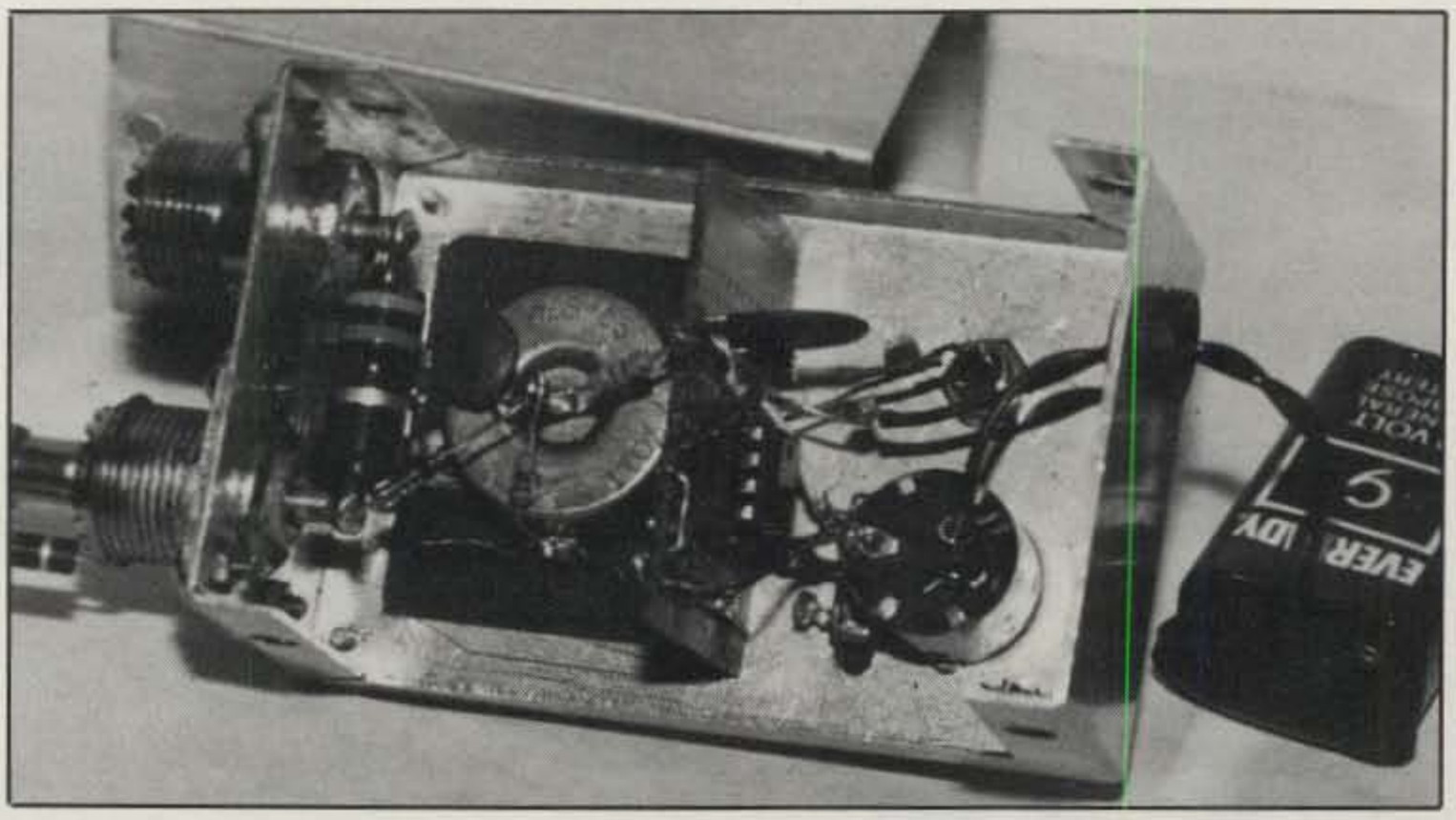
A Meterless RF Bridge

BY CORNELIO NOUEL*, KG5B*

Many of the most popular RF bridge circuits are based on the Wheatstone resistive circuit. Originally intended for use with DC, it is now used almost exclusively with RF (into the VHF range) and other AC waves. The circuit described here is similar to the ones found in most electronics handbooks with one exception. It uses an LED instead of a meter as the null indicator.

The principal advantages of this are reduced cost, reduced size and, perhaps, increased reliability without sacrificing the inherent accuracy of the design. An additional advantage is the increased sensitivity, which is much greater than a similar circuit utilizing a meter. In fact, this bridge can actually be driven by most signal generators and certainly by any solid-state dip meter with very loose coupling. This avoids pulling and other instability problems. The required drive is only on the order of 0.2 V RMS or so. I have tested it from about 500 kHz to 50 MHz. My guess is that it will work to at least 150 MHz.



Internal view of the meterless bridge. Notice the tight, compact layout of components. If VHF operation is contemplated, lead length must be kept to a minimum.

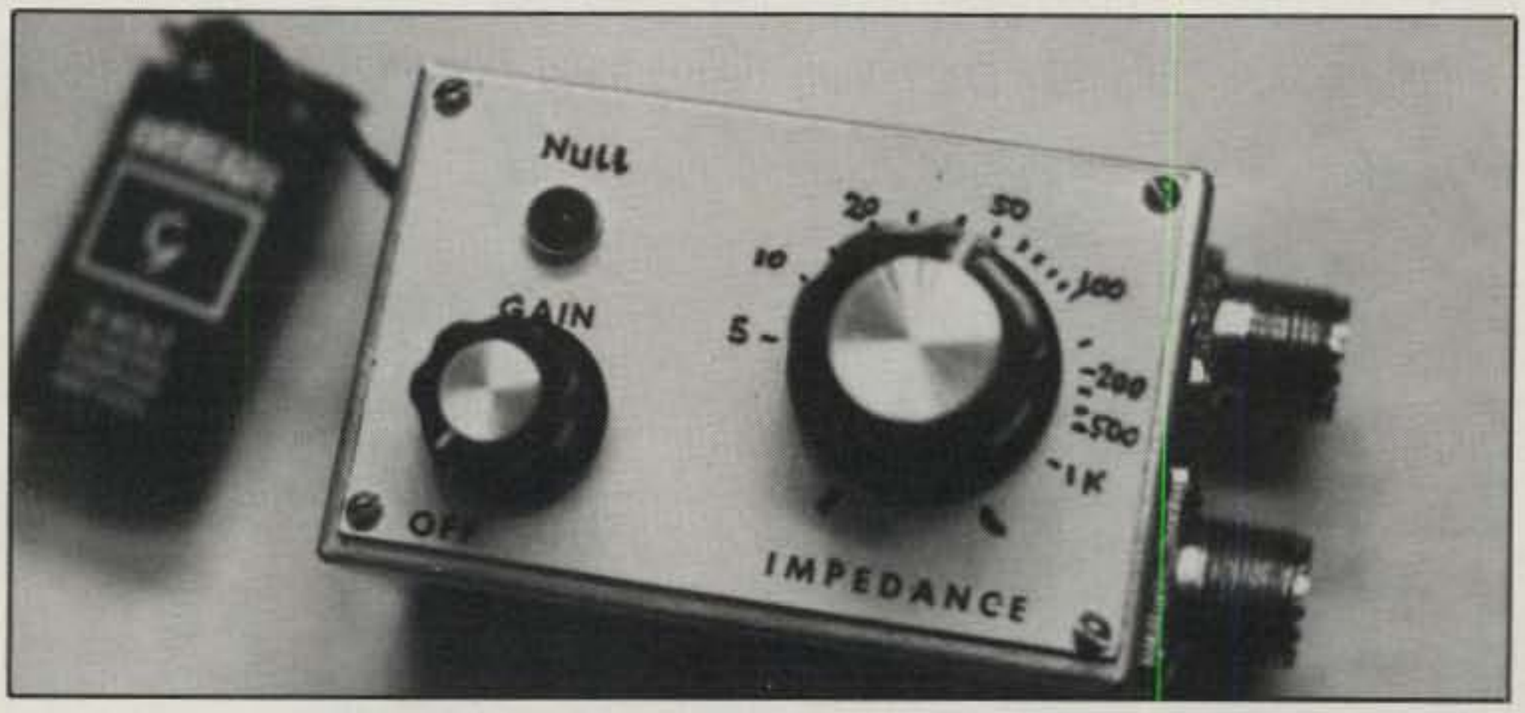
The Circuit

The circuit consists of two sections: the bridge itself and the amplifier/null indicator. The bridge is similar to ones found in popular VHF manuals. As shown in the schematic diagram (fig. 1), it consists of only four components. R1 functions as the reference arm;R2, the ratio arm; C1, the coupling capacitor and D1, the rectifier. Since both ratio arms are varied when R2 is adjusted, the scale will not be linear. However, it will cover a much greater range than if only one ratio arm is adjustable. If you prefer a linear circuit, use the one shown in fig. 2. If R2A is a linear-type potentiometer, the scale will be linear.

The amplifier is a 741 op-amp connected for bridge null detection. Because the amplifier input impedance is quite high, R3 is included to provide current flow through the rectifier. The rectified voltage from D1 is filtered through R4 and C2. It then goes to the 741 via the sensitivity control, R5.

Since the current flow in a bridge reverses from one side of the null to the other, it is necessary to operate the 741 in split voltage fashion. this could be accomplished with two separate batteries, but the design shown does the same thing while only drawing an additional 2 mA or so. The total current drain is less than 5 mA, so a standard 9-V battery will last a long time.

If the LED were connected in reverse, it would light up when the bridge is in the



External view of completed project. Note that this unit used the bridge circuit of fig. 1 that resulted in a non-linear impedance scale.

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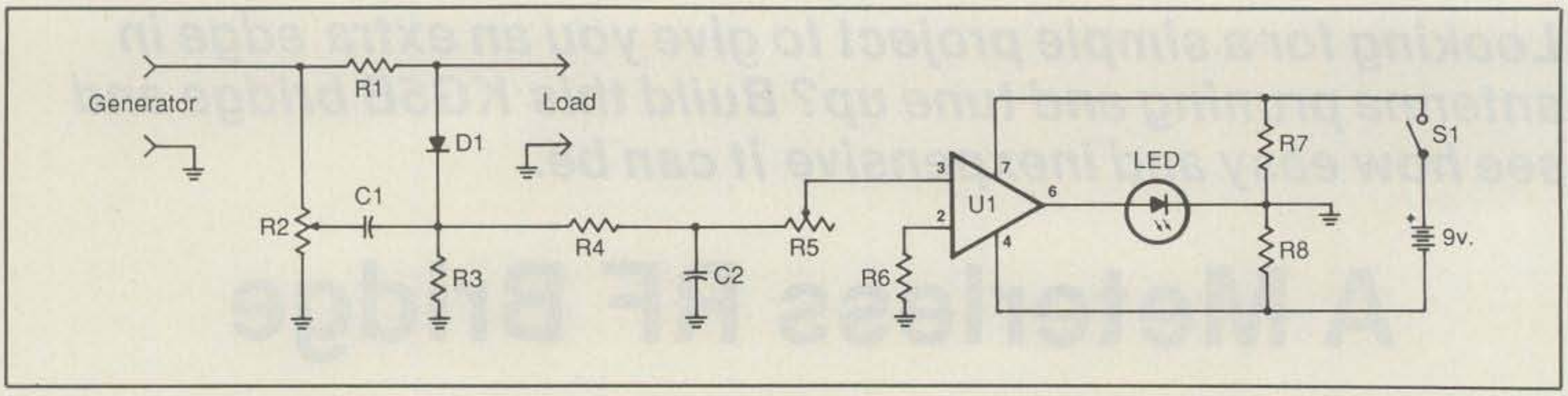


Fig. 1–Schematic diagram of the meterless RF bridge. See text for comments on construction. All resistors are ¼-W carbon composition types unless otherwise noted. Resistance is in ohms. Capacitance is in uF unless otherwise noted.

null condition. You could connect two opposite conducting LEDs in parallel, if desired. Using different color LEDs for each direction would make sense. If you would like additional information on the functioning of op-amps or bridge circuits, I suggest you consult the *ARRL Handbook*.

Construction

I built my RF bridge in a 2 × 1½ × 3¼ " aluminum box that was at hand from a previous project. A larger one would make construction a little easier and would allow the battery to be enclosed. Housing size is not really critical. But, it is important to keep the bridge components as close to each as possible. This is particularly critical if VHF operation is contemplated. Look carefully at the photographs to see how I laid out the components.

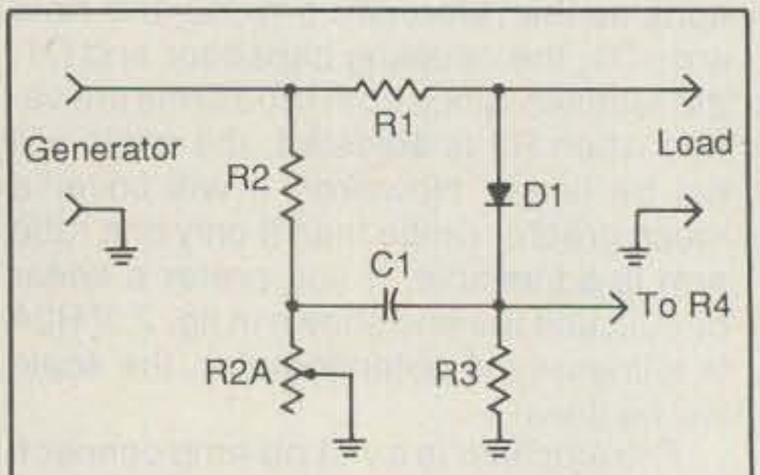
The amplifier PC board is mounted vertically between the bridge components and the rest of the unit. I used a piece of heavy cardboard to provide a suitable panel for the lettering and calibration values of the dial. I have not found it necessary to use any shielding between the bridge and the amplifier.

You can use the PC board layout that I've provided, but it is not necessary. My prototype was built on a piece of scrap perf board. An another alternative would be to use a "universal" construction board such as Radio Shack's 276-159. If you use this board or something similar, connect all the unused foil pads together and ground them to the box. Remember, all connections should be kept as short as possible.

I used SO-239s for input and output. Any standard connector that you favor should work fine. If you use a larger cabinet than mine, you can put the battery inside. You will probably want to use a battery clip to hold the battery securely in

Parts List

R1—47, 1W.
R2—500, linear potentiometer.
R3—10 k.
R4—1 k.
R5—10 k,linear potentiometer.
R6—470.
R7,R8—2.2 k.
C1—.002 disc ceramic.
C2—.01 disc ceramic.
D1—1N270 or 1N34A.
U1—741 op amp.
LED—Radio Shack 276-068 or equiv.
SW1—SPST (part of R5).



Values same as those in fig. 1, except:
R1,R2—47, 1W (matched).
R2A—100, linear potentiometer (non-inductive).

Fig. 2– Bridge circuit for linear scale.

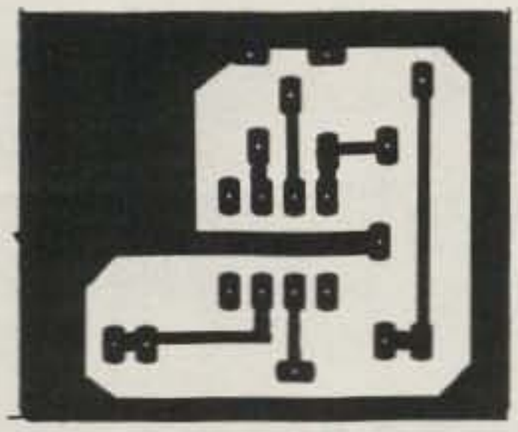


Fig. 3– Etching pattern for PC board. Scale equals 1 to 1.

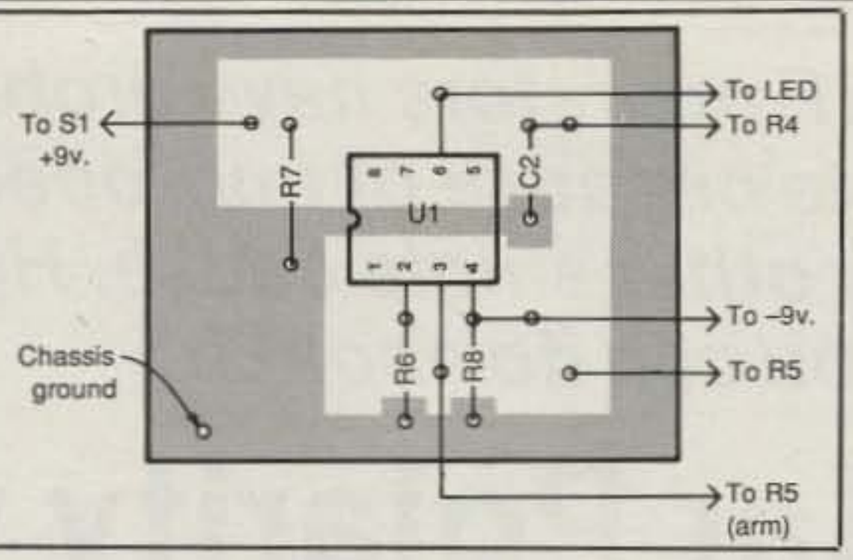


Fig. 4– Parts placement guide for PC board.

place. Or you can simply use a piece of double-sided foam tape approximately the size of the battery case to affix the battery to the cabinet.

Calibration and Use

First, connect your bridge to a suitable signal source, such as a generator or dip meter. Remember that very little drive is required. Set the **Impedance** and **Gain** to about mid scale. Connect a 50-ohm non-inductive load. Now start increasing the drive from the generator until the LED lights up. Adjust the **impedance** dial until a null is indicated by the LED extinguishing. Advance the **Gain** or increase the drive from the generator to ensure that the null is as narrow as possible.

Repeat the above procedure for several points of interest on the dial by substituting different resistive values. I used ½-W carbon resistors for calibration. Where common value resistors were not available for the values I wanted, I tied two resistors in parallel to approximate the desired value. I found it easier to attach the resistors to banana plugs than PL-259s. Keeping the leads as short as possible, just tack solder one end of the resistor to the banana plug. Push the banana plug into the center receptacle of the SO-239, and wrap the other resistor lead tightly around the threads of the SO-239.

When the desired points have been marked, they can be labeled with dry transfer letters or by hand. Several light coats of a clear acrylic spray (Krylon® for instance) will protect the markings.

Using the bridge is similar to calibrating it. After attaching the signal generator or dip meter and the unknown impedance, look for a broad null first. Start with the generator drive near its lowest value. Slowly sharpen the null by "tweaking" the **Gain** control. If no null is found, it may be due to too much drive. Check for this condition by reducing the drive and looking for a null. If none is found, it may mean that the impedance is simply out of scale. Also, highly reactive loads tend to produce shallow dips.

As a matter of record, I used a frequency near 21 MHz for the primary calibration. Checks at 3.5 MHz, as well as some near 60 MHz showed practically no difference in calibration. In general, I would guess you can expect an accuracy of about ±10% on non-reactive loads.

I have used this bridge for many antenna measurements feeding the signal from the generator to the coax in the shack while doing the measurements on the outside. I was very satisfied with one set of measurements that I made with the bridge. After readjusting the "front end" of my transceiver, I found that all the values fell in the 35- to 65-ohm range. If I had any doubts, that proved the value of this project to me. CQ

Weak signal VHF/UHF operators have probably missed more contacts because of improper polarization than any other single cause. Here's what it is and what you can do about it.

Circular Polarity with Linear Antennas

BY JOHN QUINN*

Over the years, at both HF and VHF, linear antenna polarization has been used almost exclusively. At VHF, antenna polarity was often divided between vertical polarization, used mainly for FM/Repeater use, and horizontal, used for long haul CW/SSB. The main advantages to vertical polarization is the ease of obtaining electrical separation of transmitting/receiving antennas at repeater sites, and the simplicity of mobile antennas. It may be that for long haul VHF operation, horizontally polarized signals suffer less from polarization shifts than vertically polarized signals. The advantage of horizontal polarity over vertical polarity for such operation is an arguable point.

With either vertical or horizontal polarization, some polarity distortion will occur between the transmitting and receiving stations. The degree of rotation will depend upon frequency, terrain and distance. Any such rotation of the transmitted signal will result in decreased signal capture at a linear receiving station. The solution is to use circular polarization at both the transmitting and receiving sites. Provided that both stations are using the same polarization sense, i.e. right-hand circular or left-hand circular, then all the available energy at the receiving site will be captured by the receiving antenna.

Until the advent of space communications, specifically satellite communications, little thought was ever given to the phenomena. Space communication however demands a re-think of this whole situation. Control of polarization of a signal emanating from a spinning satellite is difficult if not impossible and circular polarization has become the accepted standard. Other space communication applications also benefit from circular polarization. As frequency of operation increases, it is not uncommon for moonbounce operators to observe a phenomena known as Faraday rotation. This propagation phenomena is really an extreme of the rotational distortion that is evident on long terrestrial paths. However, moonbounce operation is a marginal art, and if linear polarization is used at both transmitting and receiving sites, it is not uncommon for the bounced signal to suffer such a high degree of rotational distortion as to be un-copyable at the receiving site, even though calculations regarding path loss, transmitter power and receiver performance indicate that contact should be possible. Clearly, circular polarization at both transmitter and receiver will eliminate this problem. One point to note however is that circularity reversal occurs as the signal bounces off the moons surface. That is, a signal arriving with clockwise circular polarity at the moons surface, will produce a bounced signal with counter-clockwise polarity.

*Mirage/KLM, P.O. Box 1000, Morgan Hill, CA 95037

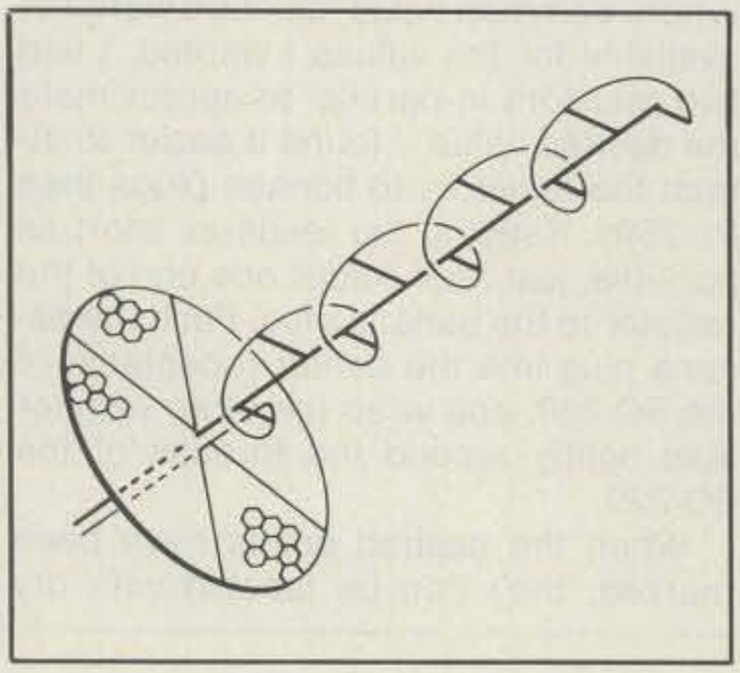


Fig. 1– A typical home-made helix antenna constructed on a wooden pole with a "chicken wire" reflector.

Achieving Circular Polarity

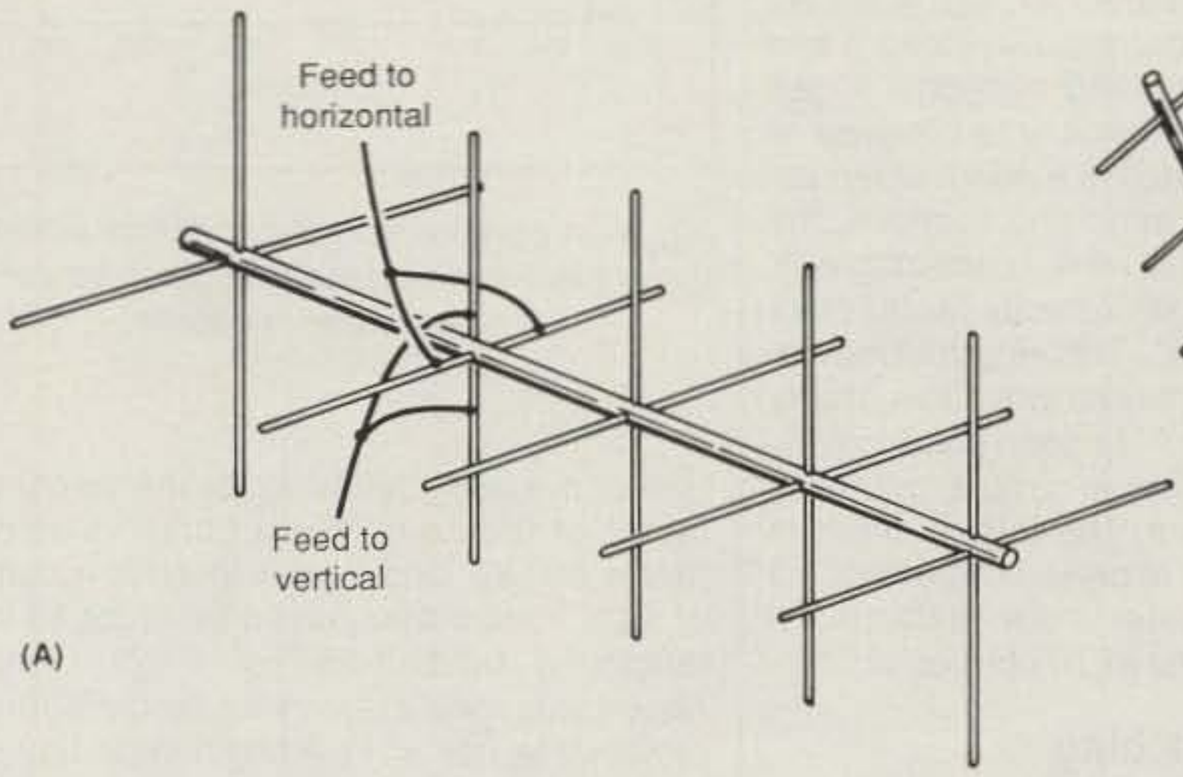
There are two common antenna designs for producing circular polarization: the helix and the crossed Yagi.

The helix antenna, fig. 1., is probably the most simple form of high gain, circular antenna, but it suffers from one major problem. The polarization sense of a helix is determined by its construction. If the antenna is wound as a right hand thread form, then the antenna will exhibit right hand circular polarization. Conversely, a left hand thread form will produce left hand circular polarization. Such an antenna would be fine if all signals to be received were of known polarity but moonbound operation for example, one would require a separate antenna for both transmit and receive. Considering the huge antenna arrays necessary for moonbounce operation, this is clearly impracticable.

The crossed Yagi, fig. 2A, is the most common form of circular antenna in use for the VHF/UHF bands today. It offers high gain for it's length combined with switchable polarity (circularity sense). This form of antenna will provide excellent performance at both 144 and 432 MHz bands. The crossed Yagi is nothing magical. It is simply two completely separate Yagi antennas, one horizontal, the other vertical, which just happen to share a common boom. It is in the method of combining these two antennas that the propagation mode is determined. At lower frequencies, with only a few elements, both horizontal and vertical antennas may be constructed on a common boom with little interference, either mechanically or electrically. At higher frequencies, i.e. 432 MHz and above, this becomes increasingly difficult for two reasons.

First, higher frequency operation demands higher gain antennas. With Yagi designs, this equates to more elements, and thus to a greater chance of mutual mechanical interference between the vertical and horizontal antennas.

Second, as frequency increases, the absolute dimensions of elements decreases but the physical size of driven structures, baluns and cables remain large. Therefore, it is impossible to design a crossed Yagi for 1296 MHz for example, without suffering performance



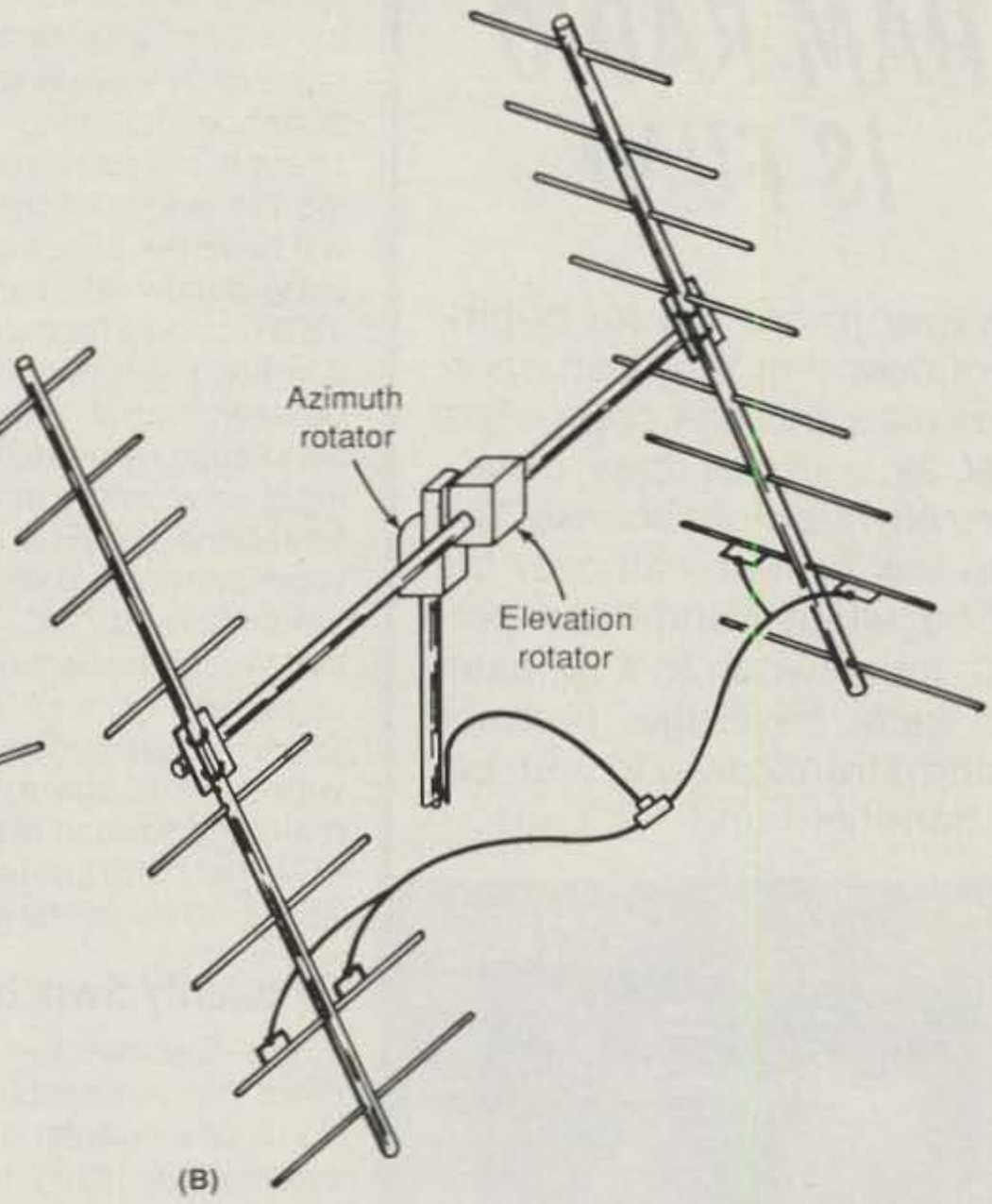


Fig. 2– At (A), a crossed Yagi with both antennas mounted on the same boom. At (B), a second version of the crossed Yagi with each antenna having its own boom. In both cases, the planes of the elements are perpendicular to each other.

degradation. An attempt to combine two 18 dB linear Yagis on one boom might result in circular antenna with poor circularity and several dB down on expected gain performance. Not exactly state of the art.

Remember we decided above, "the crossed Yagi is nothing magical." Why not construct two separate linear Yagis. Have one vertical, the other horizontal, combine them and produce a circular beam in this way. (fig. 2B).

Well, at 1296 MHz, this is indeed the optimum approach. After all, all that is required extra over a crossed Yagi design, is one more boom. At 1296 MHz, that is no big deal!

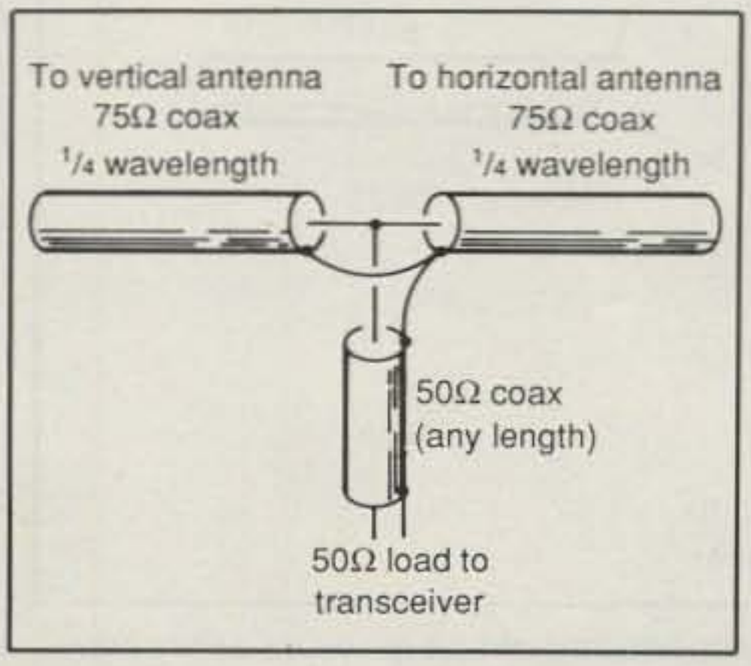


Fig. 3– A "T" connection for matching the two antennas to 50-ohm coax.

Before attempting to combine two antennas as above, it is necessary to understand how circularity control is achieved. Basically, to combine two Yagi antennas to form one circular antenna, two things are required. In order to maintain a 50 ohm drive impedance, some form of a matching network is required.

Second, to produce a circular wave front, either one antenna must be physically ¼ wavelength behind the other, or the signal to one antenna must be delayed by ¼ wavelength in time.

Typically, matching is achieved by the circuit in fig. 3. In this circuit, each antenna has a 50 ohm impedance. A ¼ wavelength coaxial line section acts as an impedance transformer, raising this impedance to 100 ohms. At the 100 ohm point, both are simply combined again to produce the desired 50 ohm characteristic impedance. Theoretically, the impedance of each matching section should be 70.7 ohms, however, the slight mismatch due to the use of standard 75 ohm coax is minimal.

In order to produce the desired circular wavefront, it is usual for crossed Yagi antennas to have one set of elements mounted ¼ wavelength in front of the other with respect to the rear of the boom. If the two antennas are now combined as above, the circularity sense of the combined antenna will be determined by the polarity of the driven dipoles of each separate antenna. In order to switch circularity sense, all that is required is to insert a ½ wavelength delay in the feed to the front-most set of elements. The effect of inserting ½ wavelength is to nullify the ¼ wavelength mechanical advancement of the front-most set of elements and to further delay it's signal by an additional ¼ wavelength thus electrically making this antenna the rearmost one.

The above techniques for combining and phasing two antennas, one horizontal, the other vertical, will work equally well whether a single or twin booms are used. If totally separate antennas are used, as in the 1296 MHz example above, one modification to the above technique is required. Using cable with a velocity factor of 0.66, ¼ wavelength at 1275 MHz is 1.529 inches, or a total of 3.058 inches between antennas. Clearly we have a problem.

There are two solutions. We can extend the ¼ wavelength 70 ohm matching section by inserting a length of 50 ohm cable between the matching section and the antenna feed point. Or we can increase the length of the matching section to an odd multiple of quarter wavelengths.

Clearly, the first solution is the less desirable as the transition from the 70 ohm cable to the 50 ohm cable is just one most point at which losses can occur. The se-

cond solution is preferred as no additional discontinuities are required. As long as the matching sections are exact odd multiples of ¼ wavelengths, the required impedance matching will be performed. There is a small trade-off in that increasing the length of the matching sections will have the effect of reducing the operating bandwidth. However, fig. 4 shows VSWR curves for both ¼ wavelength and 7/4 wavelength matching sections. It can be seen that although a small degree of band edge mismatch is evident when using 7/4 wavelength matching sections, the total-band VSWR is very respectable. 7/4 wavelengths of 0.66 velocity factor coax amounts to 10.703″. This length of matching section per antenna will allow antenna separation of 12″ (a good stacking distance for producing a circular pattern), with cable to spare. The failure of either matching section to provide a perfect 1:1 VSWR at band center is due to the use of 75 ohm coax in lieu of 70 ohm coax.

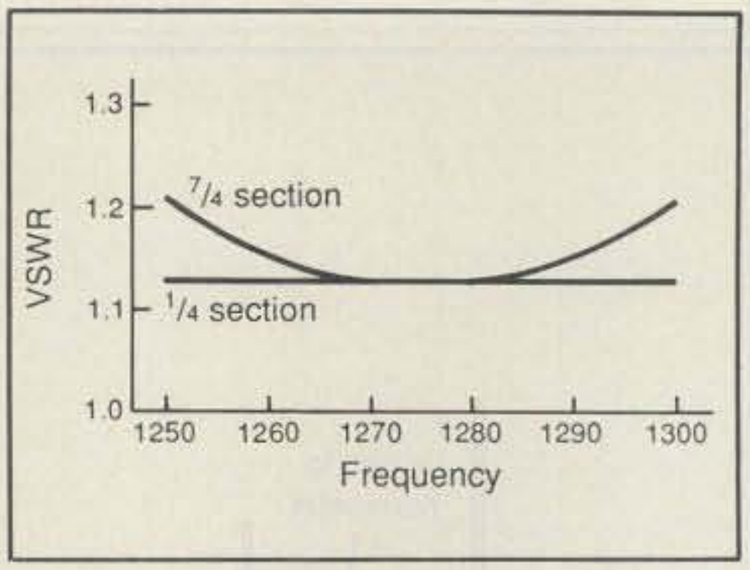


Fig. 4– A comparison of bandwidth when using 7/4-wavelength matching cables versus ¼-wavelength cables.

Circularity Switching

Fig. 5 shows the schematic arrangement that will enable switching between right-hand circular and left-hand circular polarization using only one single-pole double-throw, non-shorting coaxial relay. When in circuit, the 50 ohm ½ wavelength aection serves to delay the signal to the front-most antenna by 180 degrees. When switched out of circuit, this section presents a half-wavelength open circuit stub at the operating frequency and thus has little effect. All connections to the coaxial relay should be as short as possible. The 7/4 wavelength section to the front-most antenna should be reduced in length by the length of the internal structure of the relay, allowing for the velocity factor of the coax. For a cable velocity factor of 0.66, and a relay internal length of 1.25″, the cable should be reduced in length by 0.66, 1.25″ or 0.825″. The above assumes a relay with air dielectric (velocity factor = 1). A slight impedance mismatch occurs due to the relay impedance of 50 ohms however, the short electrical length of the relay renders this insignificant.

Conclusion

Overall, circular polarization is the preferred polarization scheme for both terrestrial and space communications. At frequencies above 450 MHz, superior performance may be obtained using correctly phased individual horizontal and vertical Yagis. Combining/matching may be achieved using odd multiples of ¼ wavelength coaxial cables and standard connectors. CQ

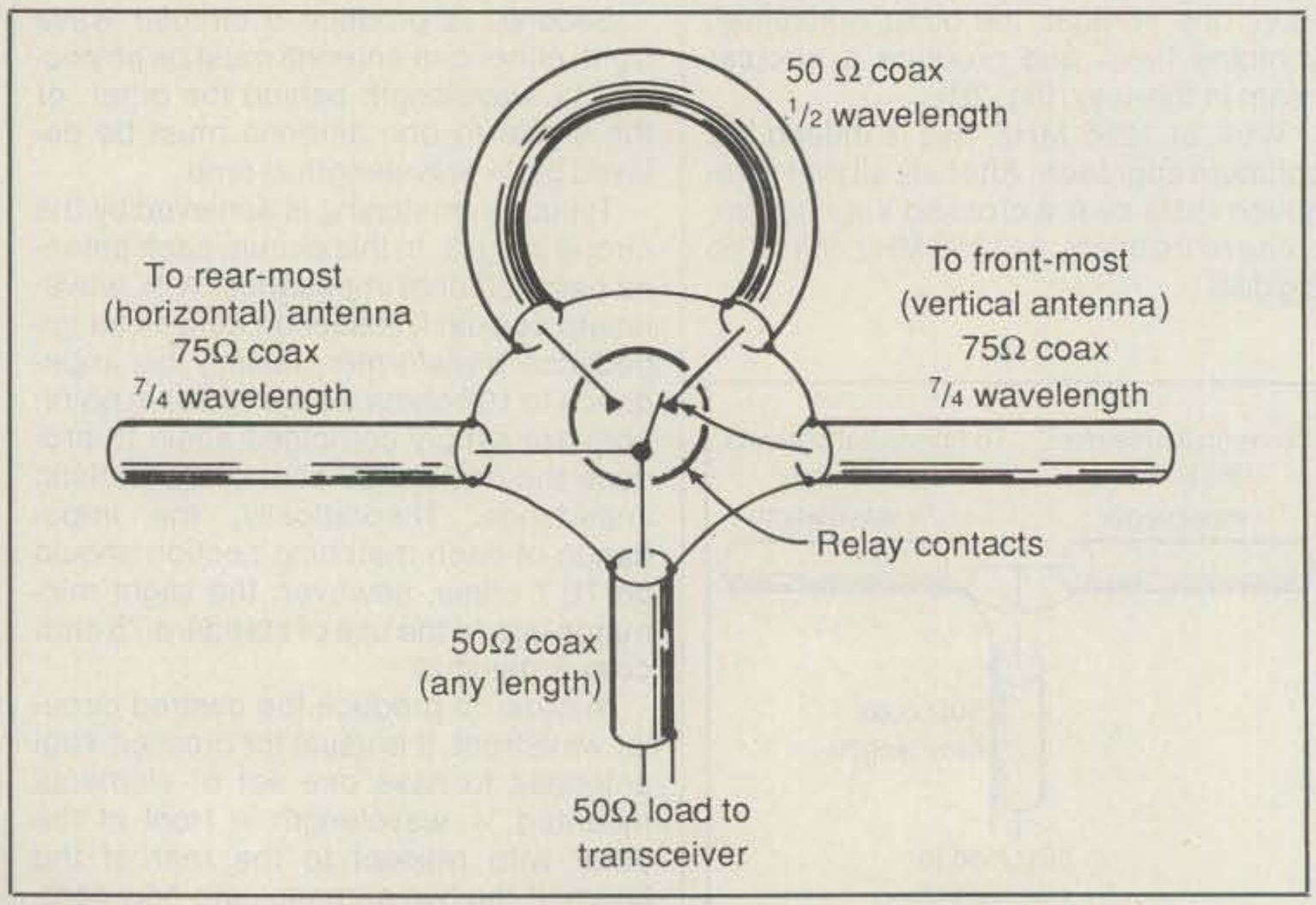


Fig. 5– Relay for switching ½-wavelength delay line into circuit to reverse the polarization sense. See text for specifications.

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CQ REVIEWS:

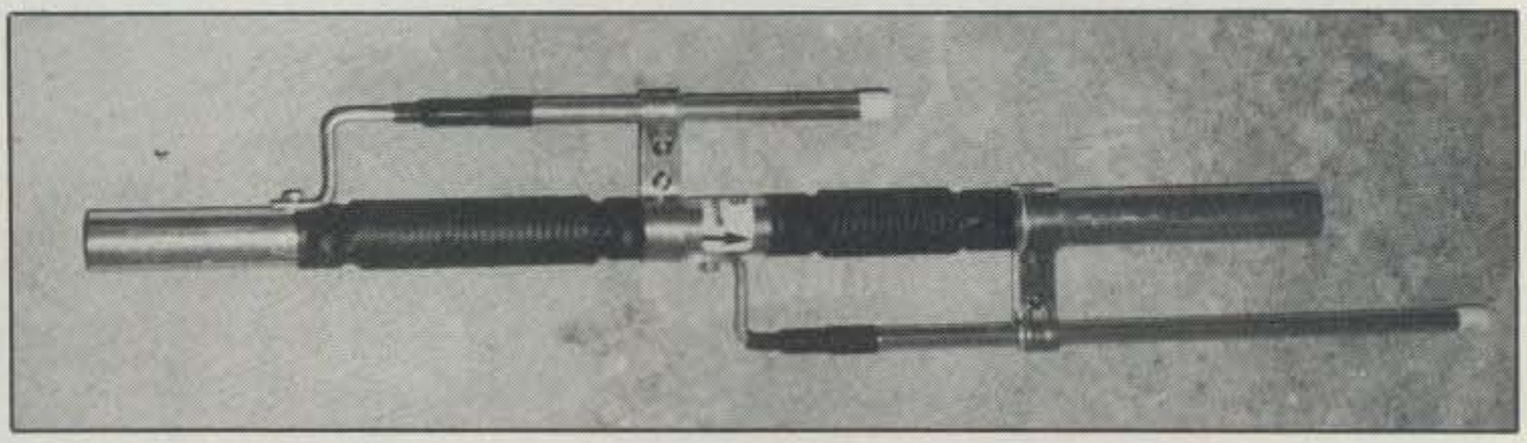
The Cushcraft Model AP8, 8 Band Vertical Antenna

BY JOHN J. SCHULTZ*, W4FA/SV0DX

The AP8 antenna from Cushcraft is, in a sense, a classic trap type vertical, but it is based on some innovative construction ideas. It is a classic trap type vertical in the sense that it uses traps to electrically isolate portions of the vertical antenna such that a ¼ λvertical, starting from the base, is formed on each amateur band starting with 10 meters. Radials are necessary to provide the "missing" ¼ λ length on each band. Its innovative construction revolves around a unique type of trap construction and trap placements such that all bands (except 160), including all of the WARC bands, are covered using only a 26 foot high structure. The specifications for the antenna are shown in Table 1. The SWR bandwidth (for a 1:2 or less SWR) varies from about 70 kHz on 75/80 meters to several hundred kHz on the higher frequency bands. It is rated for full legal power on all bands.

Figure 1 is a diagram showing the construction of the AP8. Starting at the base, one can see a ground ring to which the radial wires are attached. Above it is the base insulator for the antenna and across the insulator is a housing for an RF transformer which simultaneously provides matching to the antenna and places the whole antenna structure at DC ground. The housing also has a SO-239 connector for attachment of a coaxial transmission line. Starting with TQ, which is the 10 and 12 meter trap, one can count a total of seven traps, one for each band except 75/80 meters where the whole antenna structure resonates. There is an X-hat or top loading hat associated with the 40 meter trap, TV. The aluminum tubing sections are held together with worm clamps and the tubing comprising the radiator varies in size from 1.375 inches at the base to 0.375 inches at the top. The base section is dimensioned to slip up to 8 inches over a support pipe which can be up to 1.75 inches in diameter.

c/o CQ Magazine



The traps used in AP8 have a sort of futuristic appearance. They are a bit complicated mechanically but come completely assembled.

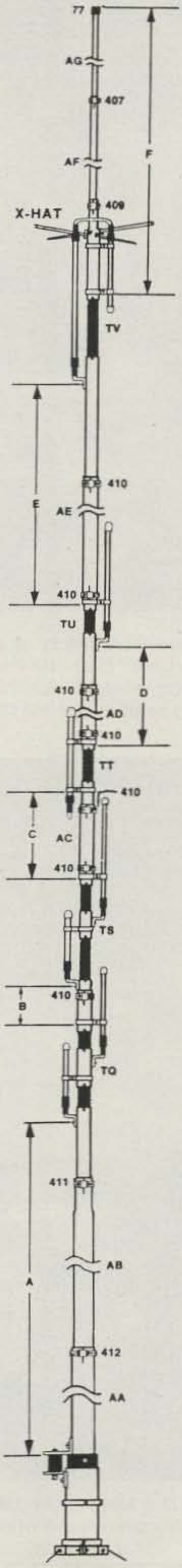
The heart of the antenna is the traps and some are shown in the photographs. The traps are parallel LC networks although they may not appear, at first glance, to be such. The inductance portion of the traps consists of enameled copper or aluminum wire which is wound on an insulator form which is connected to the aluminum tubing at both ends of the insulator. The assembly is covered and bonded with shrink tubing. The capacitors associated with each trap are formed by telescoped but insulated aluminum tubing sections. The inner tubing section is connected to the bottom of the trap inductance and the outer tubing section to the top of the trap inductance. The capacitor assembly is sealed by shrink tubing and top caps on the outer tubing sections. The idea of making a trap capacitor in this fashion has numerous advantages. The telescoped tubing sections provide quite a bit of surface area to each other and a wide range of capacitance values can be developed. The design is simple but sturdy in terms of weather resistance. In case something should go wrong with one of the capacitors, it should be possible to replace them fairly easily at reasonable cost. That is not always the case with trap designs which utilize "transmitting type" ceramic capacitors. Such capacitors can, of course, not be repaired and can be difficult to locate at a reasonable price.

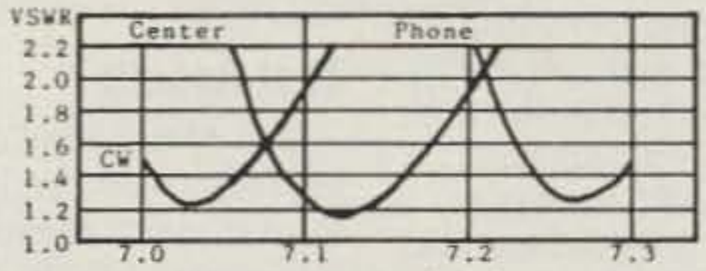
Assembly

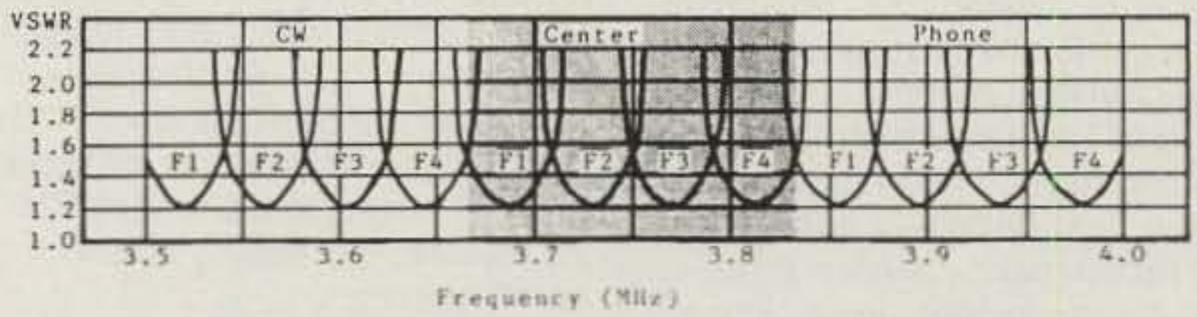
Assembling the AP8 is quite simple

SPECIFICATIONS

Frequency Range, Meters	**80, 40, 30, 20, 17, 15, 12, 10**
SWR	**Less than 2:1**
	80 > 70 kHz
	40 > 150KHz
Traps	**Powerwave Circuit**
Height, ft (m)	< 26 (7.92)
Mount, in (cm)	**Sleeve, 1.75 (4.5)**
Wind Survivability, mph (kph)	**80 (130) plus**
Radiator, in (cm)	**1.375 (3.5) 6063-T832 alum.**
Connector	**SO239**







ANTENNA LENGTH CHART

KEY	CW	CENTER	PHONE	BAND
A	87" (221cm)	83" (210.8cm)	79½" (201.9cm)	10/12 M
B	4¼" (10.8cm)	4¼" (10.8cm)	4¼" (10.8cm)	15/17 M
C	12" (30.5cm)	10" (25.4cm)	8½" (21.6cm)	20 M
D	21½" (54.6cm)	23" (58.4cm)	23" (58.4cm)	30 M
E	36" (91.4cm)	32" (81.3cm)	28" (71.1cm)	40 M
F1	95" (241.3)	80" (203.2cm)	66" (167.6cm)	80 M
F2	91" (231.1)	76" (193cm)	62" (157.5cm)	80 M
F3	86½" (219.7)	72" (182.9cm)	59" (149.9cm)	80 M
F4	82" (208.3)	69" (175.3cm)	56" (142.2cm)	80 M

Fig. 2– Length chart for the AP8 and the type of SWR response typical on 80 and 40 meters.

since all of the traps come pre-assembled and pre-tuned. One basically just puts the aluminum tubing and trap assemblies together in the order shown in fig. 1. The various sections are clamped together by stainless steel worm drive clamps. It took me less than a half hour to assemble the antenna once I had the sections laid out on the ground and my measuring tape, screwdriver and adjustable box wrench in place. The only thing one has to be especially careful about during assembly is to get the various tubing sections dimensions set correctly. If one does a sloppy job in this regard, it may cause all sorts of grief later since the AP8 is an interactive type of antenna such that the dimensioning set up for one band may effect the resonance on other bands.

Cushcraft supplies a very detailed antenna length chart for the AP8 as shown in fig. 2. It's not difficult to follow but one does have to sit back and contemplate for which portion of each band one wants to set up the AP8. This is especially important for 80 and 40 meters where the SWR bandwidth of the antenna is at its narrowest. As shown in fig. 2, for instance, one has a choice of twelve segments on 75/80 meters for which the antenna can be set. One can operate outside any chosen segment and the antenna will radiate some RF. But, the SWR will rise sharply and even if an antenna tuner is used, one cannot use full power without risking damage to some trap. As also shown in fig. 2, the SWR situation improves considerably on 40 meters although one still must decide for which band segment to dimension the antenna. The AP8 which was tested was set up for F1 CW range on 80 meters and the CW segment on 40 meters to correspond to the frequencies available in SV land.

The instruction sheets supplied with the AP8, by the way, very much emphasize a pictorial approach rather than a lot of text. Every component down to the flat washers and package of silicone grease is illustrated. One can very readily take an inventory of the 72 parts which comprise the antenna to be sure everything is there before assembly is started.

Fig. 1– AP8 antenna structure.

Installation

The AP8, as is the case with any vertical antenna, should be installed in an un-

obstructed location as far as that is possible. The manual shows two typical installation possibilities as suggested by Cushcraft. The roof mounted one shows the radial wires above the roof and, generally, that is the preferred method of installation. But, the radial wires can also be strung out in an attic space if necessary. I have done it in some places I've lived and I estimate the radiated signal to be down by no more than 3 to 6 dB for the same number of outside or indoor radials. The convenience of having the radials installed in an attic space may simply be worth the signal loss in some situations.

Speaking of radials, the eternal question keeps coming up of how many radials to use. Well, you definitely need some. Cushcraft recommends *at least* three radials per band except in a ground mounted installation where the radials installed for 80 and 40 meters may also suffice for operation on all bands. Cushcraft does market a radial kit for the AP8. The kit consists of 6 radials of four conductor cable with a maximum radial length of 29 feet. That may give you some clue as to Cushcraft's thoughts on the subject. Personally, I've used trap type multiband verticals with as few as one radial per band and experienced good results as long as the antenna was mounted in a high, clear location and as long as the radials came away from the antenna base at a sloping angle and were evenly distributed around the base of the antenna.

One of the photographs shows how the AP8 which was tested was ground mounted. In the installation used, the radials had to be buried to preclude them from becoming an obstruction. Three radials of 56 foot length (80 meters) plus three radials of 28 foot length (40 meters) were used spaced fairly evenly over a 270 degree arc around the base of the antenna.

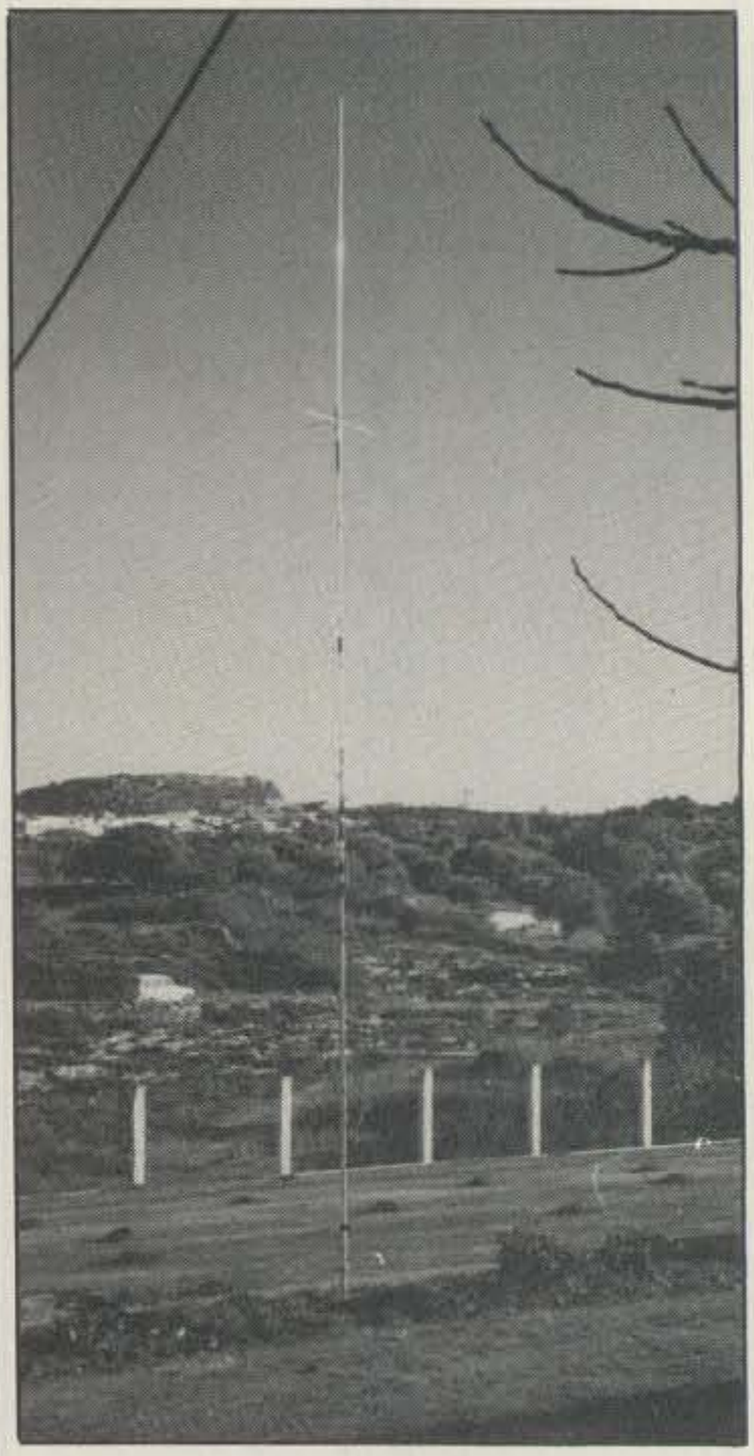
Test Results

The AP8 loaded easily within the SWR limits on each band. On 80 meters the SWR curve achieved was almost exactly that shown for the F1 CW curve in fig. 2. On 40 meters the SWR curve was slightly broader than that shown for 40 meters in fig. 2 for the CW portion of the band. At 7.1 MHz the SWR was 1.6 instead of the 1.9 indicated in fig. 2. On the higher frequency bands, the SWR bandwidth (SWR less than 2.0) was such that it encompassed all of 30 meters and a range of 250 kHz on 20 meters, increasing to about 800 kHz on 10 meters.

Operating Results/Summary

Considering its relatively small size, the AP8 is a very good performer on the lower frequency bands and equals full size groundplane antenna performance on any band above 40 meters, providing one has a good radial system. I worked all sorts of interesting DX on 80 and 40 meters which I could not even hear, much less work, using a random length wire antenna. The AP8 can't possibly compete with a beam antenna but considering its extensive band coverge, reasonable size and good low angle response, I would rate it as an excellent performer. Its sturdy construction and the use of only stainless steel hardware augur strongly for the long term survival of the antenna. The AP8 has an amateur net price of $200.00. It is manufactured by: Cushcraft, P.O. Box 4680, 48 Perimeter Rd., Manchester, NH 03108. CQ

In this installation, the base of the AP8 has been placed over one end of a four foot section of 1¾" aluminum tubing which has been driven into the ground.



The AP8 is a sleek looking antenna and relatively inconspicuous when seen from a distance.

KENWOOD

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415A, TH-205AT

TH-25AT, 45AT

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IC-02AT, 03AT, 04AT, IC-μ2,

IC-28H, 38A, 48A

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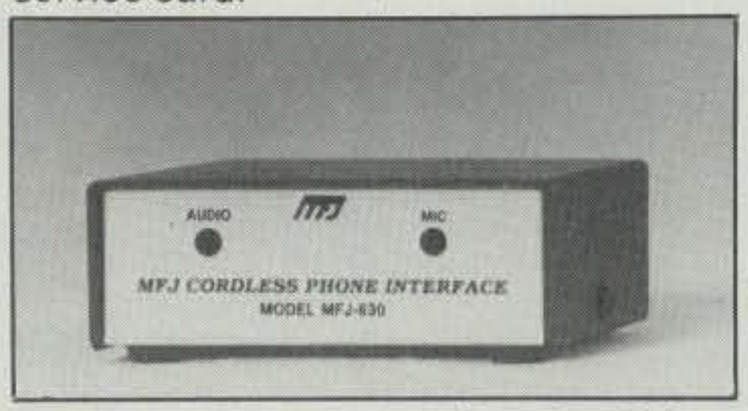

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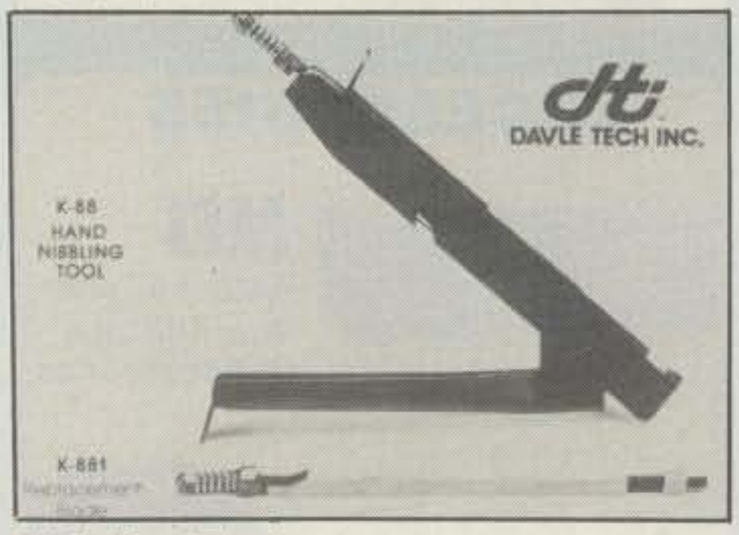

Nibbling Tool

The K-88 Hand Nibbling Tool is ideal for the amateur who likes to build. It cuts sheet metal like a punch and die. Easy to use, the K-88 will cut mild steel up to 0.023″ or soft aluminum sheet up to 1/16″. For more information, contact Davle Tech Inc., 2-05 Banta Place, Fair Lawn, NJ 07410 or check number 107 on the reader service card.

Two New Multifunction Counters

Mercer Electronics, division of Simpson Electric Company, has announced two new frequency counters. The 1 GHz model 9810 and the 100 MHz model 9800 provide a broad spectrum of frequency measurement capability. Both provide period measurement, period average and totalize functions. Both feature a large 8-digit LED display with annunciators. All inputs and functions are front-panel mounted and clearly marked for ease of use. For more information, contact Mercer Electronics, 859 Dundee Avenue, Elgin, IL 60120-3090 or circle number 110 on the reader service card.

Low Pass Filter

Bencher has announced a new low pass filter, the model YA-1, that provides a minimum of 80 dB of attenuation at TV Ch. 2 and higher. Carefully crafted of the highest quality materials, the YA-1 is rated at 1.5 kW continuous duty below 30 MHz. For more information, contact Bencher, Inc., 333 West Lake Street, Chicago, IL 60606, or circle number 109 on the reader service card.

Workhorse Repeater Controller

When the rest of amateur world seems to be offering equipment that emphasizes "bells and whistles," RF Concepts has taken a different approach with the RFC 8-RC repeater controller. The 8-RC

provides all the functions required for standard repeater operation. It also contains facilities for controlling multi-channel links, remote bases, and remote receivers. Other features include auxiliary on/off output and an input to signal alarm conditions. All data is stored in non-volatile EEPROM, which requires no backup battery. Commands to the controller are verified with a CW message. Programming access is via wire line or radio link. An optional autopatch is available. For more information, contact RF Concepts, 2000 Humboldt Street, Reno, NV 89509 or check number 101 on the reader service card.

Super Keyer

Modular Systems has announced The Smart Keyer model CK-1. All features are keypad selectable. The CK-1 has 4 user-programmable memories and 12 "permanent" memories stored in EPROM, which means they are not lost when power is interrupted. Built around the 8749 MCS-48 series microcomputer chip, the CK-1 provides the ultimate in operation versatility. Modular Systems is committed to continually upgrading the keyer software and making it available to all owners. The CK-1 will key any modern transmitter or transceiver. For more information, contact Modular Systems, 1304 Toney Dr., Huntsville, AL 35802, or circle number 104 on the reader service card.

Contest Software Introduced

Winner's Edge Software has begun shipping real-time software packages for the ARRL DX and *CQ* WPX contests. The programs are designed to handle all contest support functions in real time, including duping, logging, multiplier tracking, and maintaining contest statistics. Each is available as a multi-mode program suitable for SSB and CW operation or an integrated CW version which adds a super memory CW keyboard. These programs require a Commodore C64 or C128. For more information, contact Winner's Edge Software, 2003 Sarazen Place, Reston, VA 22091, or circle number 111 on the reader service card.

CQ World-Wide WPX Contest
CW—May 28-29, 1988

Announcing

(from page 8)

teurs are invited to participate in the nets every Saturday at 1600Z on 28.347 MHz, every Saturday at 2000Z on 7.245 MHz, and every Sunday at 2000Z on 14.317 MHz.

• **Benton, KY** – The Marshall County Amateur Radio Association will operate KA4WWS April 4–5 from 1800Z Sunday to 2400Z Monday to commemorate the 145th annual Tater Day Celebrations. Suggested frequencies are near the center of the General phone and CW bands and the 10-meter Novice band. For QSL, send SASE to Clyde Dexter, KA4WWS, Rt 1 Box 486, Benton, KY42025.

• **Shreveport, LA** – The Holiday-in-Dixie QSO Party will be held Saturday April 16 from 1800–2300Z. Exchange consists of name, QTH, RS(T). SSB is primary mode with 7.235 MHz and 14.245 MHz suggested frequencies. CW will be at 7.115 MHz and 21.225 MHz. HID issues an 8½ × 11 certificate to those making contact. SASE to HID QSO Party, c/o WA5ARJ, PO Box 4842, Shreveport, LA 71134.

• **Williamsport, MD** – Special event station WA3EOP will be operating April 18–24 to celebrate Maryland Odd Fellows Week. Suggested frequencies are 3.870, 7.240, 14.265, 21.375, and 28.375 MHz phone and 7.12 MHz CW. FM on 147.09 may be used. A special commemorative certificate will be offered for a QSO plus QSL plus SASE. SWL certificates will also be issued. Send QSL and SASE to Page Pyne, WA3EOP, 109 S. Artizan St. Williamsport, MD 21795.

• **Dubuque, IA** – The Great River ARC will operate N9FVN from 1500Z until 2100Z April 23 at the site of the annual Boy Scouts of America US Grant Pilgrimage in Galena, IL. Frequencies will be in the lower 20 kHz of the General bands. Scouts will be able to send messages to parents and relatives. For QSL after contact, send SASE to N9FVN, RR1, Shullsburg, WI 53586.

• **Cornwall, GB** – The Cornish Radio Amateur Club, Cornwall, England and five additional stations worldwide, representing early Marconi station locations, will celebrate the birthday of Marconi on April 23 from 0000–2400Z. Participating special event stations will be GB4IMD, VO1IMD, VE1IMD, EI2IMD, IY4FGM and K1VV/IMD. Operation will be in the General class bands with special QSLs. A certificate for working 5 of the 6 stations is available for 3 IRCs from the CRAC, PO Box 100, Truro, Cornwall, England.

• **Philadelphia, PA**–The USS Olympia ARC will celebrate the anniversary of the US Submarine Service by operating WA3BAT beginning at 1300Z April 23 until 2400Z April 24. Phone frequencies will be 3.890, 7.240, 14.250, 21.360, 28.325, and 28.600 MHz. CW will be 3.590, 3.725, 7.050, 7.125, 14.050, 21.090, 21.125, and 28.150 MHz. Certificate available for contacts with QSL and SASE (stateside) or IRC (foreign). Olympia ARC, PO Box 928, Philadelphia, PA 19105.

• **Bellevue, WA** – The Issaquah ARC will conduct its annual Crooked Stick and Rat's Nest Contest April 23–24. This is a low key contest for newcomers, old timers, and non-contesters. For more information, contact Martha Stedman, N7IVX, 15423 SE 7th Place, Bellevue, WA 98008.

• **Conway AR** – The Faulkner County ARC will operate W5AUU on Saturday, April 30

from 1500Z to 2100Z in celebration of Toad Daze. Suggested frequency is 14.250 MHz. Send QSL with large SASE to Kelly Boswell, KA5MGL, 599 4th Ave., Conway, AR 72032-5805.

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

Apr. 9, **11th Annual Inland Empire Hamfest,** Red Cross Bingo Hall, Spokane, WA. Contact Inland Empire Amateur Hamfest, 318 East Courtland Ave., Spokane, WA 99207 (509-487-1743).

Apr. 9, **11th Annual Rochester Area Hamfest,** John Adams Junior High School, Rochester, MN. Contact RARC, c/o WBØYEE, 2253 Nordic Court NW, Rochester, MN 55901.

Apr. 9, **1988 Durham Region Amateur Radio and Computer Fleamarket,** Pickering High School, Pickering Village, Ajax, Ontario, Canada. Contact Ronald M. Brown, VE3WZ, Box 34 Martins Road, RR –2, Pickering, Ontario, Canada L1V 2P9.

Apr. 10, **Charleston ARS Hamfest,** Elks Recreation Site, Charleston, SC. Contact Jenny Myers at 803-747-2324, or P.O. Box 70341, Charleston, SC 29405.

Apr. 10, **Madison Swapfest,** Dane County Exposition Center Forum Building, Madison, WI. Contact Madison Area Repeater Assn., P.O. Box 3403, Madison, WI 53704.

Apr. 10, **South Shore ARC Indoor Fleamarket,** Viking Club, Braintree, MA. Contact Hal at 617-335-5777 evenings.

Apr. 10, **16th Annual RARS Hamfest, NC State ARRL Convention and Computer Fair,** Jim Graham Building, NC State Fairgrounds, Raleigh, NC. Contact Rollin Ransom, NF4P, 919-269-4406, or write to Rt. 5, Box 267, Zebulon, NC 27597.

Apr. 16, **Oak Ridge Hamfest,** National Guard Armory, Clinton, TN. Contact Ray Adams, N4BAQ, 4325 Felty Drive, Knoxville, TN 37918.

Apr. 16, **Flemington, NJ Hamfest,** Hunterdon Central High School Field House, Flemington, NJ. Contact Marty Grozinski, NS2K, 6 Kirkbridge Road, Flemington, NJ 08822, or call 201-788-4080.

Apr. 16, **Lawton/Ft. Sill ARC Annual Event,** Comanche County Fairgrounds, Lawton, OK. Contact Edwin, AA5DS, 4624 NE Bell Ave., Lawton, OK 73507.

Apr. 16, **Brazosfest '88,** Brazoria County Fairgrounds, Angleton, TX. Contact Mark, N5KAE, 111 Carnation St., Lake Jackson, TX 77566 (SASE).

Apr. 16, **Auburn ARA Hamfest,** Aurelius Volunteer Fire Dept., Audurn, NY. Contact James Nash, N2DTG, 114 Dunning Ave., Auburn, NY 13021 (1-315-253-0512).

Apr. 17, **Southington ARA Fleamarket,** Southington National Guard Armory, Southington, CT. Contact Chet, KA1ILH, 628-9346 (5–9 p.m.).

Apr. 17, **MIT Research Society and UHF Repeater Assn. Fleamarket,** Albany and Main St., Cambridge, MA. Call 617-253-3776 for more information.

Apr. 17, **Moultrie ARK Hamfest,** Moultrie County 4-H Fairgrounds, 5 miles east of Sullivan, IL. Contact MARK, P.O. Box 79, Sullivan, IL 61951, or call K9SWY at 217-728-7596.

Apr. 17, **Maury ARC Hamfest,** Maury County Park Baker Building, Columbia, TN. Contact George Russell, WB4JCR, P.O. Box 832, Columbia, TN 38402 (615-388-0577).

Apr. 22–24, **1988 International DX Convention,** Grosvenor Holiday Inn, Visalia, CA. Contact Don Bostrom, N6IC, 4447 Atol Ave., Sherman Oaks, CA 91423.

Apr. 23–24, **24th Annual Amateur Radio Extravaganza,** Dona Ana Fairgrounds, west of Las Cruces, NM. Contact Karl Hess, WF5A, 505-646-5132 daytime, or 505-522-1172 evenings.

Apr. 24, **Third Annual Hays Hamfest,** Hays, KS. Contact Andy Oldham, NØFBS, 117 North 8th St., Wakeeney, KS 67672.

Apr. 24, **Willingboro Repeater Group Hamfest,** Stardust Ballroom, Pennsauken, NJ. Contact Willingboro Area Repeater Group, P.O. Box 472, Willingboro, NJ 08046, or call Jack, K2KLM, at 609-877-5249 after 6 p.m.

Apr. 29, **QCWA Banquet at the Dayton Hamvention,** Neil's Heritage House, Dayton, OH. Contact Bob Dingle, KA4LAU, 657 Dell Ridge Drive, Dayton, OH 45429 (513-299-7114).

Apr. 30 to May 1, **Greenville, SC Hamfest,** American Legion Fairgrounds, Greenville, SC. Contact BRARS, P.O. Box 6751, Greenville, SC 29606 (SASE).

Twenty-Five Years of International Service

BY REV. MICHAEL F. MULLEN*, WB2GQW

"This is WA2KUX[1] located in Jamaica, New York opening this session of the International Mission Radio Association Traffic Net. My name is Fr. Mike. We conduct this net from 1830 to 2000 GMT, on or about 14,280 kHz Monday through Saturday. We handle traffic for missioners of all denominations and for other volunteer services. But all are most welcome to join us. This is a directed net. Do not list traffic or make comments until you have been recognized by Net Control. I will now take a standby for any medical, emergency, or time limited traffic only. This is WA2KUZ listening. Are there any relays?"

Monday through Saturday you will hear the above, except that the Net Control person changes daily, as the IMRA operates its net. It has been doing this for 25 years, helping isolated and lonely missioners contact their families and friends through amateur radio. The IMRA, one of the most active of the independent nets, lists approximately 20,000 checkins annually with 12,000 pieces of traffic. The average daily is 75 and 35, respectively. Regular checkins represent 108 cities around the world. This international public service organization claims 1,000 members scattered in 40 countries.

Its primary purpose is to assist missionaries of all denominations in communicating with the States. The IMRA net functions ideally for the missionary who is separated from easy access to phones and suffers from very slow mail delivery. However, the IMRA and its members can readily jump in whenever disaster strikes overseas.

Where the IMRA Jumped in

In June 1970, a few hundred miles north of Lima at Chimbote the mountains suddenly went into convulsions. For 700 miles the road swayed like a rickety, suspended footbridge. At Huarez, Brother Hilary, OA3T, was on the second floor of his house when it collapsed and he fell into the room below. He picked himself up, dug into the rubble, found his radio and thus sped news to the outside world of the quake.

In Lima, Ed Schmidt, OA4SS, an American Jesuit seminarian, and an IMRA member, was preparing the next day's classes when word filtered in about the quake. The next morning he assembled a team of ten people, secured radio equipment and entered the desolated interior. After spending a harrowing few days they were finally at their ultimate location. Ed and another amateur began directing the rescue planes that were trying to land in a cow pasture in the town of Anta. For the next two weeks, while living in a tent, they worked at Anta as bilingual coordinators of the rescue operations.

Four helicopters and two planes were lost, and parachutes bearing supplies would not open because of the rarified atmosphere. American military pilots from the USS Guam risked their lives skirting canyon walls. Were it not for their skills and radio equipment, many more would have died. As it was, 70,000 people perished during the quake.

In December 1972, an earthquake shook Nicaragua, causing untold havoc in and around the city of Managua. The government had designated the IMRA net as the official emergency channel and most of the radio amateurs in the United States worked through that frequency. During that one month, more than 13,000 pieces of health and welfare traffic were handled.

Hurricjane season in 1974 brought Fifi with her 135 mph winds to the shores of Honduras. IMRA members, both there and in the States, joined in the efforts to keep communications open and bring aid to the striken inhabitants.

Ruth Paz, HR2RP, plotted Fifi's course and set herself up for the onslaught. Although her tower rode out the high winds, she could only provide superficial coverage as she passed health and welfare messages. For a time, HJ2RP was the only contact between flood-ravaged Honduras and the rest of the world.

WA2IPM, Br. Bernard Frey, served the victims of Fifi by using this U.S. connections to get enough typhoid vaccine to immunize a quarter-of-a-million people in Honduras. WA2MJE, Fr. Barnabas Eib, who was chaplain at Hancock Field in Syracuse, New York at the time, got some red tape cut with a call to Washington, D.C. and soon the severe shortage of 100 octane aircraft fuel was being alleviated. The planes that had been kept on the ground at Tegucigalpa, Honduras due to lack of fuel, were flying the badly needed food and medical supplies to the out-lying areas.

In 1976, during the disaster of the Guatemala earthquake, the net was again loaded with traffic. At that time, Rev. Byron Lovelady, W5BAH, an IMRA member and a Methodist minister, was on the air continuously for four days handling health and welfare messages. Much of it was emergency traffic between Roosevelt Hospital in Guatemala City and the research department of the Medical Center in Houston. Because of his work, Byron received a letter of appreciation from the government of Guatemala.

In 1979, when Hurricane David slashed through the Caribbean islands it caused a tremendous amount of damage. Slamming across Dominica on the night of August 30th, 150 mile-an-hour winds leveled almost every home. When the storm reached the Dominican Republic, its savage fury left 80,000 people homeless. Then, a few days later, Hurricane Frederic hit the latter island with even heavier rains. Normal communications were wiped out and so the radio amateurs took over. A Hurricane Traffic Net was set up on 14,303 MHz and continued with health and welfare messages for the next few weeks until ordinary operations could be restored. Many IMRA members were involved.

I was asked to help Catholic Relief Services, which had a plane loaded with supplies but couldn't make contact with its directors on the two islands. Communications were established with the amateur radio station at the American Embassy in Santo Domingo, and another at the Red Cross headquarters in the capital of Dominica. For six days messages went back and forth with regard to planes flying down, supplies being distributed, outlets being organized, and government clear-

*IMRA, St. John's University, Jamaica, NY 11439

ances being secured. After a week normal communications were reinstated.

On September 19, 1985 a massive earthquake rocked Mexico City. It registered 7.8 on the Richter Scale, the most severe ever to hit the city. A second one of 7.3 occurred later. City officials reported 700 buildings destroyed and over 4,000 deaths as a result of the disaster.

Amateurs from all over joined in a huge effort to keep communications open as they passed more than 320,000 health and welfare pieces of traffic into and out of the city. One IMRA member, Sheila Saltiel, XE1E, for the first five days after the quake struck, was on the air 12-14 hours daily, ultimately handling over 1,000 messages. Many state-side IMRA members also gave of their time assisting her through the net.

I received phone calls from the New York headquarters of two national Church agencies asking for assistance. Catholic Relief Services had an immediate $50,000 allotment ready to send but couldn't move because its officials could not contact their Mexico City director. The National Council of Churches needed to get in touch with their people in Mexico City to determine if they had to postpone an "International Assembly of Youth" scheduled in a few weeks. Fortunately, through the net both organizations' personnel were located and the required information passed on.

On October 10, 1986 another earthquake hit San Salvador. There had been four others throughout Central America since 1965 killing over 23,000 people. IMRA members were involved in health and welfare communications in all of them.

Fr. Bob Reidy, YS9DZ, with the help of Fr. Frank Klamet, YS9FK, both IMRA members, arranged for a special net to be set up on 14.345 MHz. For the next week this would be one of the few channels into the outside world. During that time both of them worked at the rig for eight to ten hours daily as hundreds of calls poured in from the States seeking information. That week they handled almost 900 pieces of health and welfare traffic. Many other state-side IMRA members assisted in passing the traffic.

The IMRA net provides communications not only during the occasional major disaster but with other daily medical problems and those requiring further treatment. The following are examples of this activity.

On-Going Emergency Support

Andrew Bartilucci, W2NKC, an IMRA member and School of Pharmacy Dean, arranged to help missioners through the net in a special way. For the past three years his professors at St. John's University in New York have made themselves available providing guidance and instruction on the use of medicines. Since many drugs are donated to missionaries, and they have no knowledge of the potency or life or even the effects and uses of some of them, to be able to converse with knowledgeable individuals saves both pain and even lives. Whenever a situation arises which requires a doctor, the net members contact the Medical Center at the University of Alabama in Birmingham. The generosity of such professionals, some of whom are not even members or amateurs, illustrates the cooperation with non-amateurs in a unique way.

Ruth Paz, HR2RP, an IMRA member since 1971, is one of those rare people who has a tremendous capacity to give after surviving their own serious illness. Ruth had been surrounded by pain for about two years after undergoing 14 operations. As a result, she has developed a great deal of sympathy for the suffering on this earth. She now helps two local hospitals, two orphanages, and three medical groups from the States in San Pedro Sula in Honduras. Ruth coordinates medical treatment for thousands, supplying hospitals and orphanages with food, medical supplies and clothing through her many friends.

One group Ruth works with is "Interplast," a band of US surgeons who annually travel to Honduras to perform free reconstructive surgery on poor children. Over the past ten years they have helped 3000 children. Some of these children are sent to the States for more extensive treatment. Ruth assists their parents in contacting them through the net, where she checks in every day.

History

The IMRA began on a very small scale in 1963 in Hudson, New Hampshire. There 50 Catholic priests and Brothers, all amateurs, gathered to formalize their efforts in linking overseas missionaries to their families via amateur radio. At first they called themselves the CMRA—The Catholic Mission Radio Association. Within a year they changed the title to the International Mission Radio Association, had themselves incorporated as a nonprofit organization and opened up the membership to the laity and missionaries of all denominations.

This nucleus of 50 has grown to a total of 1000 members with 100 overseas. The membership includes 200 religious and clergy of all denominations with the majority being people from all walks of life—engineers, teachers, housewives, retirees, etc. It has tripled in the last six years due to increased promotional and organizational work. The promotional work ranges from articles appearing in 80 publications to a half hour videotape, "Making Contact," airing on two national satellite systems. The combined potential readership and viewing audience is almost 70,000,000.

Along with its communications link with and for missionaries, the IMRA loans

the radio equipment to get them on the air. Over the years this has amounted to $50,000 worth. Most of this was donated by individual members, particularly through their bequests. The equipment loaning arm is supported by 85 institutional sustaining members—dioceses, religious communities, and Church groups. These organizations give in order to acknowledge the aid received from the work of the IMRA.

The leadership of the IMRA is provided by a board, and under the board's direction, the officers operate the day-to-day functions. There is also a bimonthly newsletter and a biannual convention.

A few key IMRA members are Warren Mulhall, WA2BPV, chairman of the board and in charge of the coordination of equipment; Walt Walker, WA4LEX, net manager; and Roy Stanchfield, N4ATU, a board member and a net control.

A Few Key Members

Warren Mulhall, WA1BPV, is in charge of the equipment committee for the IMRA. He gathers and repairs radios and ships them to missionaries in the field. Warren served as president and now acts as chairman of the board and net control on Saturday.

He was licensed in 1967 while working as a machinist for the Signal Corps at Ft. Monmouth, New Jersey. His job was designing communication equipment to fit military vehicles, track and wheel. This required a large amount of skill since the space is limited. With this background Warren is ideally suited to take care of the radio needs of the IMRA and the missionaries. Now retired, he can devote more of his time to the activity, which he has performed since 1972.

Warren spoke recently about his work: "It is very gratifying to see the equipment we have loaned being used on the air. We have had quite a few instances where it has even saved lives. A missionary's wife on the Gold Coast of Africa was having a problem. A doctor, an IMRA member, was able to get on the air with instructions that saved her life. She and her husband were 200 miles from civilization."

The IMRA's Net Manager is Walt Walker, WA4LEX. Walt has been working with radio all his adult life. For over 25 years he served in the U.S. Air Force as a radio and TV technician. He has lived in parts of Europe, Africa and Asia but never in Central or South America. He was Chief Engineer for the Armed Forces Radio and Television Service in Libya while he was stationed there.

In 1952, the Korean War broke out and he was called to serve. His job was to sit in a jeep acting as a radio control tower at the end of a runway and directing the planes as they landed and took off evacuating the wounded.

Walt received his amateur license in 1953 and joined the IMRA in 1976. With his experience he was asked to serve as Net Control and eventually took over as Net Manager in 1978.

Roy Stanchfield, N4ATU, became interested in amateur radio just as his sight deteriorated to the point of legal blindness. He rushed to work on getting his license in 1976 and joined the IMRA in 1978. Today he is a member of the board and net control on Friday.

Roy reaches out to people every day over the air. "It is uplifting to help people outside the U.S. to make third party calls," he says. He recalls one incident when, by chance, he helped save the fingers of a girl in Sayaxche in Guatemala who had been slashed by a machete. "They couldn't get a doctor so Elam Stoltzfus, TG7XQS, a Protestant minister, contacted me. I called around here in Bradenton (Florida) and was able to find a pediatrician who would come over and give instructions over the radio."

Another time Roy helped Marines contact their families and let them know they were on a ship returning from the tragedy in Lebanon. "I spent four hours running phone patches for 70 to 80 people. I didn't want to cut their time. You know how it is for boys coming home like that." Roy received letters of commendation from both the captain of the ship and the Secretary of the Navy.

For 25 years people like these mentioned above have served in matters both large and small with their skills and equipment. There is no way to count the lives saved, the sick who have received needed medicines, the hungry who have been fed, the sad messages of death that have been delivered—all though the patient and encouraging work of amateurs spending long and nerve-racking hours at their rigs.

"This is WA2KUX closing this session of the International Mission Radio Association Traffic Net. We thank all who have checked in and helped us today and we hope you will join us again tomorrow."

Notes

[1]Callsign of the St. John's University Radio Club.

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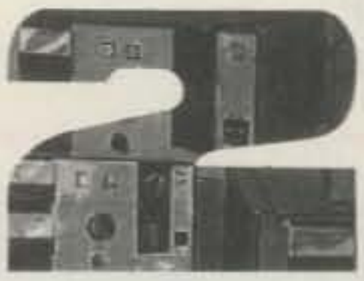

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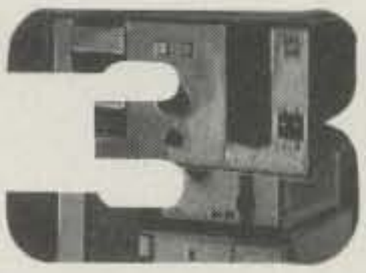

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DAYTON **Hamvention**®

April 29, 30, May 1, 1988

Early Reservation Information

• Giant 3 day flea market • Exhibits
• License exams • Free bus service
• CW proficiency test • Door prizes

Flea market tickets and grand banquet tickets are limited. Place your reservations early, please.

Flea Market Tickets
A maximum of 3 spaces per person (non-transferable). Tickets (valid all 3 days) will be sold IN ADVANCE ONLY. No spaces sold at gate. Vendors MUST order registration ticket when ordering flea market spaces.

Special Awards
Nominations are requested for "Radio Amateur of the Year", "Special Achievement" and "Technical Achievement" awards. Contact; Hamvention Awards Chairman, Box 964, Dayton, OH 45401.

License Exams
Novice thru Extra exams scheduled Saturday and Sunday by appointment only. Send FCC form 610 (Aug. 1985 or later) - with requested elements indicated at top of form, copy of present license and check for $4.35 (payable to ARRL/VEC) to: Exam Registration, 8830 Windbluff Point, Dayton, OH 45458

Hamvention Video
VHS video presentation about the HAMVENTION is available for loan. Contact Dick Miller, 2853 La Cresta, Beavercreek, OH 45324

1988 Deadlines
Award Nominations: March 15
Lodging: April 2
License Exams: March 26
Advance Registration and banquet:
USA - April 4 Canada - March 31
Flea Market Space:
Orders will not be processed **before** January 1

Information
General Information: (513) 433-7720
or, Box 2205, Dayton, OH 45401
Flea Market Information: (513) 898-8871
Lodging Information: (513) 223-2612
(No Reservations By Phone)

Lodging
Reservations received after Housing Bureau room blocks are filled will be returned along with a list of hotel/motels located in the surrounding areas of Dayton. The reservation will then become the responsibility of the individual.

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

Lodging Reservation Form

Dayton Hamvention - April 29, 30, May 1, 1988
Reservation Deadline - April 2, 1988

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

Arrival Date _____
[ ] Before 6 pm [ ] After 6 pm
Departure Date _____

Rooms: [ ] Single [ ] Double (1 bed, 2 persons)
[ ] Double Double (2 beds, 2 persons)

Deposit required - Room deposit must be paid directly to the hotel or motel by date shown on the confirmation form sent to you. Use canceled check for confirmation.

Mail to - Lodging,Dayton Hamvention, 1880 Kettering Tower, Dayton, OH 45423-1880

(PLEASE SEPARATE)

Advance Registration Form

Dayton Hamvention 1988
Reservation Deadline - USA-April 4, Canada-March 31

Name _____

Address _____

City _____ State _____ Zip _____

	How Many		
Admission (valid all 3 days)	_____	@ $8.00*	$_____
Grand Banquet	_____	@ $16.00**	$_____
Women's Luncheon			
(Saturday)	_____	@ $6.75	$_____
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Flea Market (Max. 3 spaces)	_____	$23/1 space $50/2 adjacent	
Admission ticket must be ordered with flea market tickets		$150/3 adjacent	$_____
		Total	$_____

* $10.00 at door ** $18.00 at door, if available

Make checks payable and mail S.A.S.E. to -
Dayton Hamvention, Box 2205, Dayton, OH 45401

If you have a stamp collection complete with an inverted Jenny airmail, then go to the next article. If not—and you would like an additional hobby that can be enjoyed even when the bands go dead—then this is the article you've been waiting for—read on

Philately Please

BY NATE WILLIAMS*, W9GXR

Years ago, well at least twenty-six, the expense to QSL direct to dx stations was minimal. If you were an average DXer, lo and behold, a small accumulation of envelopes with foreign stamps affixed would build up in some corner of a desk drawer. The rationale for keeping the envelopes was to show any non-believer of your QSL. Yes, indeed, the card did come from a ham in a far away corner of the world. What in the world do you do with this small accumulation after a period of years? Well, if you happen to have a spouse such as mine, who is neat and tidy, she would encourage you to dispose of the accumulation by providing a basic world stamp album. Then you realize that there are literally thousands of stamps issued worldwide each year. To attempt to collect each and every one would be akin to counting the sands of a desert.

Perhaps, you have a few stamps mounted in a world album, what next? Maybe, you have just embarked into the radio hobby in recent years and are experiencing the inflationary effect of direct QSL to DX stations? The ARRL bureaus and the various DX QSL managers have alleviated the cost of DX QSLing. In spite of this, today's world stamp collector still has a way to add to a general collection and not go broke in the process.

Enter into a few DX contests, or just make some DX contacts. Then make a small notation on your QSL that you are a stamp collector and/or that you would like to exchange spare stamps. Bundle up those QSLs, send them to the bureau of a DX QSL manager and you will be absolutely amazed at the response.

Within the past two years, I have received and exchanged stamps with people located in Germany (East and West), Sweden, Belgium, Brazil, Spain, France, Japan, Canada, Denmark, India, Great Britain, Italy, Ascension Island, Scotland, Bulgaria, Romania, Russia, Poland, New Zealand, Yugoslavia, Hungary, Crete, Australia, Norway, Canal Zone, San Marino, Mexico and, of course, the United States.

These people are not necessarily the ham per se in the DX location. Many times it is a member of the family, a friend of the family, the DX station's QSL manager or in cases where a club station was contacted it might be a member of that club.

Early on, in replying to someone who might be desireous of exchanging stamps with you, you should establish just how serious a collection that person is wanting to complete. Personally, my collection is a basic general foreign used collection. My wallet tells me not to attempt to exchange mint (unused) stamps with some extremely serious collector abroad.

Many responses are such that some stamps will be sent to you if you would be so kind as to send them a small item. These are the more frequent requests: rock 'n roll albums, bluejeans, integrated circuits, table tennis paddles, radio handbooks, and the most recent callbook, foreign or U.S. Use your best judgement on how to handle those situations. Most sound innocent enough and not too demanding until you check into what postage would be required to send a callbook abroad by registered mail.

For the more serious minded collectors, arrangements can be made to exchange complete yearly issues if desired. However, one can derive as much enjoyment over exchanging used stamps worldwide. It is usually best if the stamps are off the envelope when sending, to keep the overall weight of your letter down.

Stamps can be easily extracted off envelopes in your bathroom sink. Fill with cool to cold water and put the stamps to be removed into the sink for soaking. Care should be exercixed here to make sure that the envelopes the stamps are affixed to are non-colored or you might get an envelope dye stain on the stamps in the sink. It's like sorting your laundry, don't mix the colored envelopes with the white ones.

Let the stamps/envelopes soak until the glue releases the stamps from the envelopes and then carefully put the stamp (face down) on a dry towel until it dries out. If the face is in the up position when the stamp dries out, many times it will adhere to the towel as all of the glue might not have been completely washed off the back of the stamp. You will also run across some foreign stamps that are affixed with unuaul glues—akin to rubber cement. For those, the described procedure will not be a one hundred percent effective method.

Sure the family will think you've "flipped your trolley" with that arrangement in the bathroom. What the heck! We all have our peccadillos. Sometimes other things are hanging around to dry—right? Attempting to rush the drying process will just tend to introduce curling of the stamp, itself.

The best stamps you can send to another collector are the commemoratives. They have, usually, the large pictures of trees, cactus, space, Edith Wharton, James Hoban, etc. However, many of the larger denomination U.S. stamps are somewhat rare and make good contributions. When you send a QSL to a DX QSL manager use a large commemorative. Then when you get back that rare QSL, you will also get one stamp that will be a valuable addition to somebody's collection.

Duplicate foreign stamps which you

*6915 Prairie Drive, Middleton, WI 53562

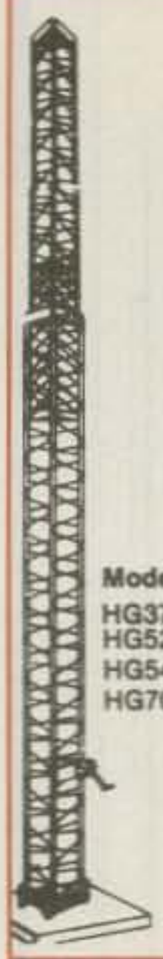
receive by exchange can be passed on to others. If the DX stamps received are really common, you might consider donating them to a local grade school. Many have beginner stamp collecting clubs that would welcome your donation.

The value of most stamps, off paper, lies between one-half to two cents. Hence, don't feel you are going to amass a rare and valuable collection. Then too, there is no direct correlation between the rareness of the DX location radiowise and the rareness of the stamps that particular country offers. Many small countries issue multitudes of stamps that really are not intended for postal use but just for collectors.

It is a great hobby to enter into, especially when the bands are dead. In fact, you might receive exchange. Interestingly enough, many of the correspondents will pen a page or two or comments, which is a heck of a lot more information than is exchanged in the average DX QSO. If a letter is received in a language unfamiliar to you, it might be best to contact a teacher at the local high school or college and explain the situation. Most will assist in returning a brief note back to the writer.

Get those stamps out of a dark corner. Start a collection or circulate them to someone who collects. You will derive much satisfaction at dovetailing the two hobbies. CQ

ANTENNA/TOWER SALE!



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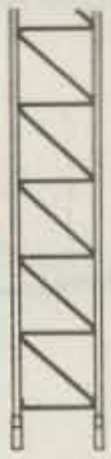
ROHN

Guyed Tower Packages



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90'	1069	1999	2249
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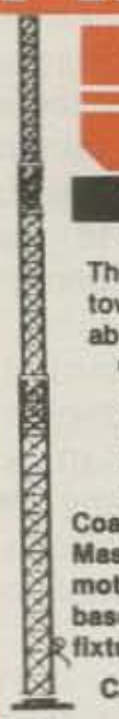
110'	1359	2329	2839
120'	1429	2499	3039



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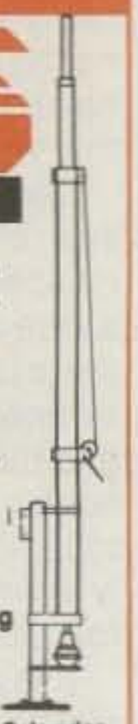

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Note-US Towers Shipped Freight Collect From Visalia, CA Factory

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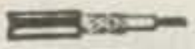

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- RG8X—95% Bare Copper Shield • Low Loss
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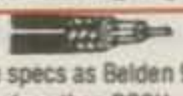

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RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
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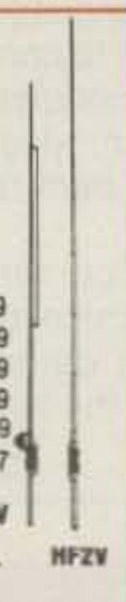

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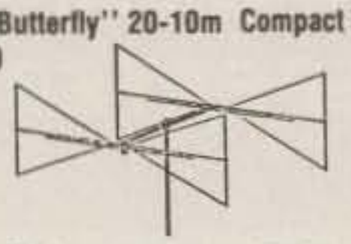

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FK4544	44 ft.	34.8 sq. ft.	1389.
FK4554	54 ft.	29.1 sq. ft.	1469.
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25G Double Guy Kit			$279.
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RS7A	5	7	49
RS12A	9	12	69
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RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
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425 Titan Amplifier	$ CALL

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B23A	2M	Yes	2W	30W	$129
B108	2M	Yes	10W	80W	$159
B1016	2M	Yes	10W	160W	$259
B3016	2M	Yes	30W	160W	$229
D1010N	440	No	10W	100W	$319

rfconcepts

rfc 2-317 2M
30W In = 170W out
LIST $299.00

Model	Band	In-Out	List Price
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2-217	2M	2-170W	$299.00
2-117	2M	10-170W	$299.00
2-417	2M	45-170W	$299.00
3-22	220	2-20W	$112.00
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Antennas & Accessories

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

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

IBM Utilities III, the Crew at 22 and Antenna Mail

First, let's take a look at three Solid IBM-PC Utilities. **Mirror II®**: Mirror II is a high powered telecommunications utility for the IBM-PC that is compatible with most modems, offers a choice of file transfer protocols, and includes automated sign-on procedures and TTY terminal emulation. The program is a clone of the popular (and much more expensive) Crosstalk XVI® program.

Mirror II, which is designed mainly for business use but which is jam-packed with features that the "landline BBS user" will find attractive, features automatic dial and answer modes; emulation for many popular terminals; a wide selection of file transfer protocols, including Kermit, XMODEM and YMODEM; password security and control features; online help screens; an integrated full-screen text editor; a transaction and activity log; a highly developed communications script language; and full support of hard disk (HD) drives. Except for a redesigned status screen, menus and terminology are the same as for Crosstalk, and commands are identical.

The Mirror II program has a well organized status screen which consists of four sections. Current communications parameters are displayed at the top of the screen; a message in one corner tells you whether you are on- or off-line. At the bottom of the screen is a window that is used to display variable information and a recap of the most-used commands. The command line is at the bottom of the screen; you can enter direct commands here if you choose.

A novel feature is the background/multitasking mode, which can be used either in the call or answer mode. This feature allows you to operate Mirror II in the background, while you work with another application program. You could, for example, begin your work session by starting the transfer of a long file, then loading another application program, such as a logbook, wordprocessor, or propagation program. When you're done with the application program, you bring Mirror II to the foreground and continue with the file transfer. Packet enthusiasts might find this feature useful for "reading the mail" for future reply while doing something more productive with the computer.

317 Poplar Drive, Millbrook, AL 36054

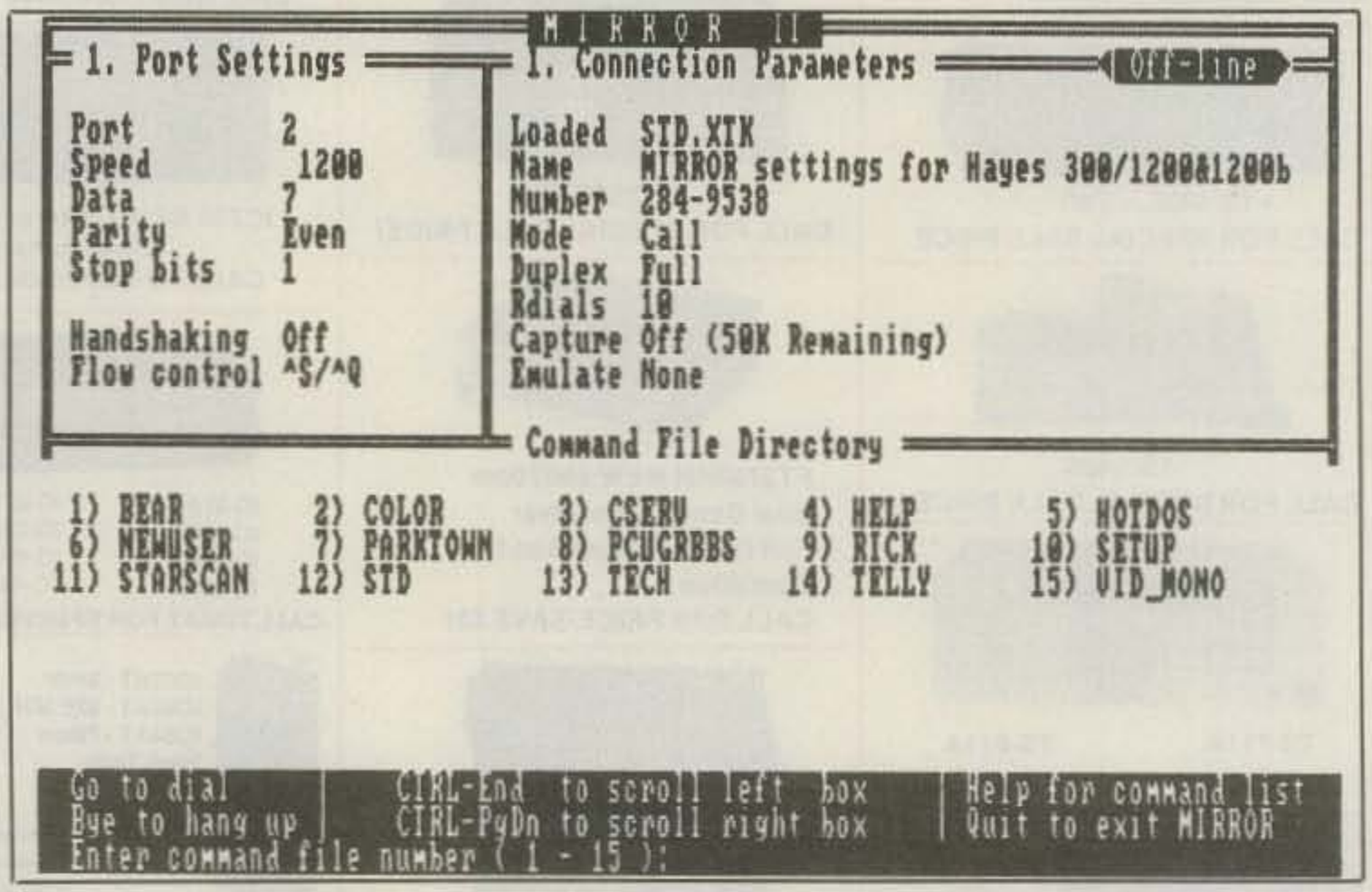

Figure One: Mirror II Status Screen. Shown above is the four-section status screen for Mirror II, the telecommunications terminal from SoftKlone. The program may have use as a Packet terminal, so we'd like to hear from anyone who has successfully used Mirror II for that purpose.

Another feature, and the one I like most, is the auto-learn mode for automatic script file generation. What a mouthful! That just means that the program allows you to easily create sign-on script files for automatic dialing and logging-on to bulletin boards and communications services such as CompuServe and The Source. Mirror II has a unique "Learn" command which allows the program to observe and capture the log-on procedure as you go through it in signing onto a new BBS or communications service. By saving the log-on procedure, the need to actually program the log-on procedure in the script language is eliminated. You can use the WordStar® -like text editor for such chores as editing script files or downloaded text files.

The program is blessed with a thick, logically organized user's guide, something that's often hard to come by in this type of technically oriented software. Too, the on-line help feature is a strong point, and it offers real help rather than just unconnected "tips" that on-line help typically offers. At $69.95, the program is priced low enough to give popular shareware communications programs such as ProComm®, my favorite IBM-PC terminal, some real competition. It's no secret that many amateurs are using ProComm as a fancy packet terminal; I'd like to hear from anyone who is successfully using Mirror II in this hamshack application. Mirror II is available from SoftKlone Distributing Corp., 336 Office Plaza Drive, Tallahassee FL 32301. Fig. 1 shows Mirror II's four-section status screen.

Polaris Zoo Keeper® : I hadn't realized what a mess (read: "zoo") my hard disk had become after about six months' worth of building it up to more than 25 MB (megabytes) of programs and files. I was wasting my time searching for files in my HD's various directories and becoming aggravated in trying to retrieve files when I couldn't remember their exact name, extension, and subdirectory location.

Although the program's ad hype that it "tames your hard disk directory and civilizes the listings jungle" may be a bit much, the hard disk file-finder program really does help you to find files quickly and easily, on any drive and in any directory. Zoo Keeper isn't a DOS shell or enhancer, and it doesn't go about sorting your disk's directories.

The program is a RAM-resident file-finder, meaning that it can be "brought up" on key-stroke command even while working with other application programs.

```
                    Polaris Zoo Keeper - Search Profile

Drives to be checked:  A  B  C  D  E  F  G  H  I  J  K  L  M  N  O  P  Q  R  S  T  U  V  W  X  Y  Z
                       N  N  Y  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N

     File Extensions Zoo Keeper will include in its data base:
  TXT  TST  WKS  DOC  WKT  ME?  PRN  WK1  COM  EXE  BAS  BAT  SYS  BAK  1DR
  DIR  CFG  ME   ME?  DAT  CMD  PTR  TMP  HB$  FIL  PR   PDF  PRM  OLD  OUL
  USR  ARK  DB   DCT  FRM

                        User Defined Quick Keys

 A- AUM PROJECT          F- BACKUP               K- CQ ARTICLE
 B- DOCUMENT             G- BASIC                L- FILE
 C- GRAPHICS             H- HAM                  M- DOS
 D- GAME                 I- BACKUP               N- LETTER
 E- MISCELLANEOUS        J- SYSTEM               O- HIDDEN
 F- PRINTER              K- DIRECTORY            P- RESIDENT
 G- DISK                 L- BATCH FILE           Q- UTILITY
 H- WORDPROC AID         M- WORKSHEET            R- SHELL
 I- DATABASE             N- UNKNOWN
```

Figure Two: Polaris Zoo Keeper Search Profile Screen. The above screen is used to record the disk drives that Polaris Zoo Keeper monitors, the types of files for which it creates entries in its database, and the "quick keys." All these choices are user settable.

Each time a new file is created, the program automatically pops up asking for a tag of up to three keywords and up to 40 characters of descriptive comments. You can assign your own tags and comments; there is no predefined structure that must be used. Once the tag is complete, you are returned to the exact spot you were in the application program; you don't have to exit the program to invoke Zoo Keeper. The program doesn't modify your files; rather, it sets up a specialized database of its own to help in finding them.

When you're looking for a file, you pop up Zoo Keeper's search screen and type in one or more of the key words (or even a partial key with just a few letters of the keyword); the program displays the description of every file on the HD that meets the search criteria. Pointing to the file and pressing **RETURN** or **ENTER** on the keyboard will load the filename at the location of the cursor into the application program if you so choose.

The program allows you to construct up to 26 file macros that automatically reproduce the keystrokes needed to access a specific file with an application program. The result is to allow you to load a program such as Lotus 1-2-3® with the desired worksheet first up on the screen, or a logbook program with the log file ready to go when you load the program.

At first I was skeptical as to the real value of such a utility to an individual user, believing that it would be of most value to a business oriented user who needed a better description of a file's contents than the eight-character name that DOS (the disk operating system) allows. But I find that I'm using Zoo Keeper almost every day to keep track of the many different types of utility programs and associated documentation files that I've accumulated.

Remembering what all these utilities did and where I had put them on my 30 MB HD was beginning to require the memory of an elephant, but became a breeze with Zoo Keeper. Having gone through all my utility programs and setting up classification tags, all I need do when I add a new program to the hard disk is to immediately tag and describe it; it's then readily "findable" with enough of a memory tickler to be useful. I find that the program also helps to keep the HD "cleaned up," since whenever a file that Zoo Keeper tracks is erased, the Zoo Keeper entry is also deleted.

Zoo Keeper is $75 from Polaris Software, 63 West Valley Parkway, Suite 323, Escondido CA 92025. Fig. 2 shows the program's search profile screen. It is used to record the disk drives that the program monitors, the types of files for which it creates entries in its database, and the user defined "quick keys."

Cruise Control® : This is a handy, inexpensive utility that can make life behind a PC screen a lot easier. It's a multipurpose program, one that doesn't have as its objective one overriding preoccupation. Rather, Cruise Control does a number of "little things" that most of us find helpful—things that DOS just doesn't offer or doesn't do very well. It has at its heart a keyboard accelerator program that can vary the repeat rate from a snail's pace to a rate that is much faster than you would care to handle. It is most useful with so-called "cursor intensive" programs, such as spreadsheets, outliners, word processors, and database managers.

The program has six major features, which the designers rather cleverly accord automobile-like designations. The features are (1) Screen Runner, which adjustably increases the speed of the cursor keys and other auto-repeated keys in most programs; (2) Anti-Skid Braking,

```
                          Table of Contents

1         What's New in Cruise Control 3.02 ..........................  1
2         Tested Application Programs ................................  1
 2.1        Control Strategy A ......................................  1
 2.2        Control Strategy B ......................................  2
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Instructions: [↑], [↓], [PgUp], [PgDn] to select topic.  [Enter] to view.
   [Esc] to quit.     [F1] to print topic.     [F2] to print manual.
```

Figure Three: Cruise Control Read Me File Table of Contents. Shown above is the Table of Contents from Cruise Control's READ ME file, which includes detailed troubleshooting tips and installation considerations. The disk-based file supplements the 22-page printed user's manual.

which eliminates the tendency of the cursor keys and other auto-repeated keys to overshoot or run-on after they're released; (3) Cruise Control, which adjustably repeats the cursor keys and other key combinations, without having to hold them down; (4) Chronometer, which inserts the system date or time into an application program at the point where your cursor is located; (5) Dimmer Switch, which dims the display screen under keyboard control when you want privacy for what you're doing; and (6) Auto-Dimmer, which automatically dims the screen after a user-programmable time delay (great for saving your screen from burn-in if you leave your computer on unattended for long periods).

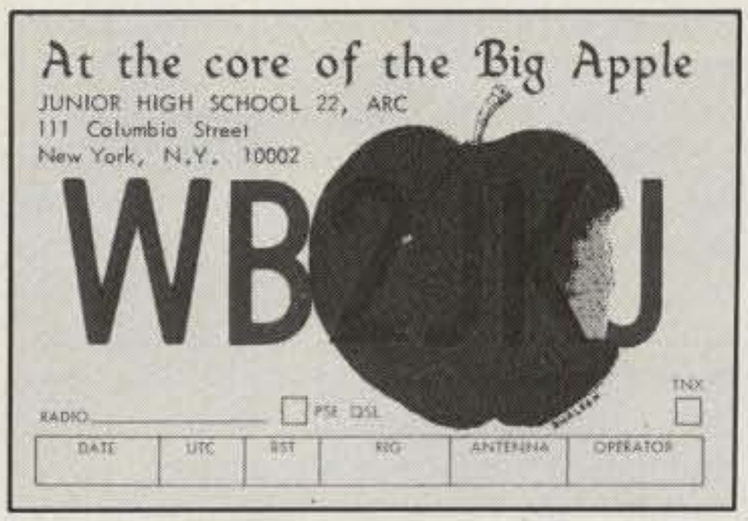
The program enhances keyboard and screen action by reconciling the oft-conflicting actions of the keyboard's type-ahead buffer and the auto-repeat function. The problem occurs when the application program you're using can't process keystrokes as fast as the auto-repeat rate. When this happens, the 15-character type-ahead buffer overflows and causes a "beep" to be issued from the computer's speaker. When you release the offending key, which is usually a cursor key, the cursor doesn't stop but skids or runs-on an extra 15 characters while the keyboard buffer empties. Through some sophisticated pattern recognition techniques, the program senses the rate at which your application program processes keystrokes and dynamically adjusts the auto-repeat rate to match it and to keep the buffer empty.

The result is to increase the auto-repeat rate above the standard setting to the maximum speed that your application program allows, thus dramatically increasing cursor speed. This can take the drudgery of working with lengthy database and logbook files, spreadsheets, documents, and the like. Since different application programs work in varying ways, you can select one of several predefined "control strategies."

The other features the program offers, such as the Chronometer, Dimmer Switch, and Auto-Dimmer are secondary but add nice finishing touches. The ability to insert the system date and time at the cursor with a two-finger keystroke, and to blank (and thereby protect the monitor screen) in a way that doesn't interrupt printer or modem operation, are handy features indeed. The program is priced at $39.95 from Revolution Software, Inc., 75 Route 10 East, Randolph NJ 07869. Fig. 3 shows the Table of Contents screen from Cruise Control's "READ ME" file which contains installation and troubleshooting tips; a 22-page printed user's manual is also included.

The Crew at 22

An interesting "success story" is found in the amateur radio education



"The Crew at 22."

project of Joseph J. (Joe) Fairclough, WB2JKJ. Joe has been an amateur radio operator since 1962 and a high school English teacher since 1968. He found that, in his teaching job, using the conventional methods of teaching English at New York City's Junior High School 22 just didn't work well with the students with which he was working. Thinking that there must be a "better way" for the youngsters to want to learn, Joe decided to combine the school's English curriculum with amateur radio.

He did this in rather unique ways, using a three-point program. He taught the children Morse code in the beginning of the term, to get them to where they could copy their spelling and vocabulary in code. He also used the ARRL's *Tune in the World* Novice handbook as the English textbook for his class, having it illustrate the mechanics of English instruction. He also made reading assignments from the various amateur publications and magazines, including, of course, *CQ*.

How did this come about? In 1979, Joe wrote up his proposal for the New York City Board of Education, using the three-pronged approach we outlined. The Board approved his proposal to begin the course, which was called "English Through Ham Radio." They backed their approval with a $600 grant so that Joe could buy equipment and put his plan to the test. Joe purchased a transceiver and went on the air from the school in September 1980 with 120 students signed up. Attendance at Joe's classes has been very high, and his students have learned the language to an extent no one thought possible.

The students enrolled in Joe's English course (now called "Education Through Communication") not only use amateur radio as a learning tool, but they also work and plan lunchtime and after-school projects involving the hobby as an alternative to drugs, gangs, vandalism, and other sordid realities of inner city life. Joe told me that before this past Christmas break, the students decided to design and construct an antenna specifically for use on the last day of school before the break. Dubbed the "Holiday Hotrod," it took the form of a homemade, student-decorated Christmas tree which actually contained a disguised 40- and 15- meter antenna. After the festivities the antenna was to go home with one of the school's many Novices for use over the long Christmas vacation. Sounds like great fun!

As you might expect, there have been ups-and-downs in the program, including budget cuts which threatened its very existence, as well as the theft of the radio equipment from the classroom. But the program has survived more than seven years and has been the subject of high level support, including that of President Reagan, ex-Senator Barry Goldwater, K7UGA, and New York City's Mayor Ed Koch.

If you're interested in helping out on the air, the project is active every school day with The Classroom Net on 7.238 MHz from 7-9 a.m. Eastern time. They are also on 7.110 MHz CW from 9-10:30 a.m., and on 21.395 MHz SSB and 21.110 MHz CW from 10:30 a.m.-3:30 p.m.

The program receives no funds from any government agency or from the school system; all of the equipment was purchased through the fundraising efforts of Joe and his students. Joe's project has been incorporated in New York as a nonprofit corporation, and has been granted status as a publicly supported charitable organization so that contributions of cash or used gear qualify as tax-deductible. Joe indicates that the project can only survive through property donations; if you're interested in disposing of ham gear or other property the organization might make good use of, contact him. The official name of the organization is The Radio Club of Junior High School 22, N. Y. C., Inc., and it's located at 111 Columbia St., New York NY 10002, phone 516-674-4072.

Hopefully, I've aroused your interest in this worthy project. What has succeeded in New York has potential for succeeding elsewhere; the only way to find out is to try it.

We Get Letters

Beam Problems: A letter we received from Edward T. Ang, DU1TV, is illustrative of some of the maintenance problems that can occur with any antenna exposed to the elements, especially when the antenna has been in place for some time. Ed wrote with this tale of woe and perplexity:

"I recently bought a used KLM KT-34XA antenna from a fellow ham. The antenna was taken down from his tower and disassembled, then transported to my place. The 'disassembly' was not complete, though; the six elements were just disconnected from the boom together with the insulators, then moved as complete elements to my place."

"The elements were [then] stripped of accumulated grime and dirt using sand-

paper. After the general cleaning of the antenna was finished, each of the elements was inspected to make sure its dimensions were according to the manual. Finally, all the elements were connected back to the boom according to the specifications of the manual. The antenna was then hoisted up and installed on my tower."

"VSWR checks revealed the following: 28 MHZ, 1.3:1; 21 MHZ, 1.7:1 to 2:1; and 14 MHZ, 7:1 (yes, 7:1!). On a couple of evenings, I noticed that the VSWR on 14 MHZ dropped down to [as little as] 2:1 after it rained. However, the next morning, it climbed right back to 7:1. What did I do wrong? And what are the possible causes of such a high VSWR reading on 14 MHZ and yet acceptable levels on the other two bands?"

I suspected mechanical loading/phasing network problems, but not being a KT-34XA owner solicited the expert opinion of Gary Gordon, WA6IKF, antenna technician at Mirage/KLM. Here's what Gary suggested to Ed as a remedy:

"Start [your checks] with a possible harmonic length of coax feeding the antenna. Terminate the coax with a 50-ohm dummy load and check it at 14 MHZ, or add 10 feet to the coax line and check 14 MHZ again. The balun is a possibility but usually [troubles with it] will create problems on all bands."

"The next point to check is the connection between the ¾" × 5" tubing and the ½" tip section unique to 20 meters only; moisture may be [affecting] the connection. Check the phasing strap for connections for one that may have only a couple of ohms of resistance; again, this should create problems on all bands."

"Last, check the entire antenna for any connections that are not less than 0.5 ohm. This can be done using a good volt-ohm-meter set to the "ohm × 1" scale and placing a probe on each side of every metal-to-metal connection. There are no secondary DC paths on the antenna from the butt end of an element to the tip. Any connection with [just] a couple of ohms resistance can cause problems."

While the suggestions WA6IKF made were tailored to the KT-34 × A, the general procedures are applicable to other beams of similar design. Much as we would like to think otherwise, aluminum does corrode!

G5RV Problems de W4EWS: We've mentioned the G5RV many times; the popularity of the antenna is no secret with *CQ* readers. Most of the problems we've been apprised of relate to matching difficulties on certain bands, especially when the design is that which uses an openwire matching section, balun transformer, and coax feed. The matching problem is typified in the problems experienced by Dick Lahey, W4EWS:

"I picked up a made-up G5RV antenna from Amp Supply. This is the standard model with a 102-foot flattop and a 31-foot 300- ohm line [matching section] to 60 feet of RG-8X. Luckily, my new location is surrounded by high trees so I was able to raise it 45 feet on one end and 40 feet on the other, thus enabling me to drop the 300-ohm ribbon almost vertically. Results were unstable, necessitating using my Kenwood AT-230 antenna tuner to get the SWR down on 75 and 40 meters, [but with a] usually higher SWR on 20, 15, and 10. As I had a surplus of RG-8X I cut off 30 feet which helped bring the SWR down and made [the antenna system] more stable. Signal reports with a SWR of 1.5:1 on 75 meters are very good."

Dick wrote to ask about G5RV's suggestion (in the July 1984 issue of the British publication *Radio Communication*) that one try "trapping" the coaxial cable lead-in with a small coax choke. Would the choke tame the system?

The choke that Louis Varney, G5RV, suggested involves winding the coax feeder into a coil of 8 to 10 turns about 6 inches in diameter, immediately below the point of connection of the coax to the base of the matching section; the turns may be taped together or secured using nylon cord. The choke is something to try, but I doubt that using it will result in a cure for the band-to-band matching problems.

Although we've published the G5RV variant that uses the openwire matching section to allow coax feed, including one version that uses a balun at the point of transition, we now feel that it's advisable to go with openwire or ladderline all the way to the hamshack, using an antenna tuner at the transmitter or transceiver. Although experimenting with the coaxial choke may be fruitful in some cases, the best results (at least, good results achieved with minimum aggravation) will be had using an all-parallel-feeder design. And, while I could recite several theoretical guidelines for the optimum length of the feedline, the best practical guidance I can give is to start long and experiment with the feedline length for most consistent band-to-band results.

MINIPROP Follow-Up: How much success is "too much?" Apparently, people are reading our column, as evidenced by this letter from Sheldon C. ("Shel") Shallon, W6EL, regarding our mention of MINIPROP in a previous column:

"The response to the MINIPROP [propagation prediction program for the IBM-PC] in your October column was phenomenal. Requests for the program have been averaging about two per day, which is very good by comparison to other mentions of MINIPROP. A few of the requestors even sent contributions, sight unseen, which is more than I expected. Perhaps the background information about shareware is what made the difference. In any event, I have enjoyed making MINIPROP available to your readers, and many thanks for the plug."

"There was a negative side, however. I was shocked at how many of those who responded did not observe what I consider to be the basic courtesies." Sheldon went on to describe folks who sent unformatted disks, didn't place labels on the diskette jackets, and sent beat-up mailers. Some sent poor quality or even bad disks, and one amateur didn't enclose either a return mailer or postage, just a diskette! Shel asks us to advise readers of some of the courtesies he feels should be followed when they ask someone to make copies of software for them:

"Send a quality diskette that is preformatted and labeled. Send an unused, self-addressed, stamped mailer; the mailers are usually available in stationery supply stores. The unsealed mailer, with the disk inside, should be sent in a large envelope or other enclosure. It's too late for this to help me, but perhaps someone who offers software in the future will find it easier."

Amen, Shel! We're sorry for any inconvenience we may have caused you. We're very much concerned each and every time that we mention a public domain or shareware program that can be had for the price of a mailer, postage, and disk, because of the overwhelming effects the kind offer may have on the offeror. Enough said!

Overheard: The next best thing to knowing something is knowing where to find it!

Next time, more *Antennas & Accessories* topics of current topical interest. See you then.

73, Karl, W8FX

We've mentioned the G5RV antenna many times in the column. It's a great multiband antenna, but some amateurs have had problems with it when trying to feed it with coaxial cable through a parallel-wire matching section, as noted by W4EWS in this month's column. We now suggest that you use openwire or ladderline all the way to the shack, to minimize band-to-band loading difficulties. Doing so will, of course, require the use of an antenna tuner or transmatch near the transmitter or transceiver. (Photo courtesy MFJ Enterprises, Inc.)

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World of Ideas

a monthly feature by
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A LOOK AT THE WORLD AROUND US

OSCAR Satellites: The Thrill is Back!

1988 is truly proving to be a super year in the world of amateur radio. Sunspot counts are rising. 10 meters is jumping with good DX openings, longpath signals are rolling in on 20, and yes, an increasing number of amateurs are joining 30 meter action with their classic rigs and beautiful sounding bugs. That's only part of the story, however. The really big news involves our presently flourishing OSCAR satellites and an exciting new "bird" poised and awaiting its launch into orbit during the few weeks "straight ahead." Tune up those multimode VHF/UHF rigs, GaAsFET preamps and antennas, gang. The good times are here again!

Overviewing the present action and coming attractions while also receiving numerous requests for bound reprints of our previous OSCAR articles inspired yet another "spare time"(!) project at this end. During recent months (and with XYL WB4OEE's assistance), we put together a minibook entitled "OSCAR SATELLITE REVUE". It includes copies of my past articles on satellite station assembly and OSCAR operations plus "updating additions" on everything from RS-10/11 to the upcoming OSCAR 13/14 satellite. Keplerian data, clever antenna ideas, tracking notes, etc. included. The book is also advertised in this month's CQ (information right when you need it, eh?). We trust you find this friends-helping-friends endeavor beneficial and look forward to QSOing you on the new satellite!

This does not mean we've "sidetracked" publication of the GOLDEN CLASSICS OF YESTERYEAR book mentioned in our February *CQ* column. Indeed not! It's progressing "full steam ahead", but additional time has become necessary for documentation. Barring unforesen circumstances, we hope to have it ready for sale by May. No funds for GOLDEN CLASSICS have been or will be accepted until it is printed (ethics, you know), but we are continuing adding names/orders to its "reserved copy" list.

Fun With RS-10 and RS-11

If you have been thinking of joining today's OSCAR action and need a slight "prodding" or if you presently lack multimode VHF/UHF capabilities, RS-10 and RS-11 are a grand "starting point." This clever example of USSR technology is actually two satellites on one spacecraft, each sporting three separate transponders and a unique robot operator.

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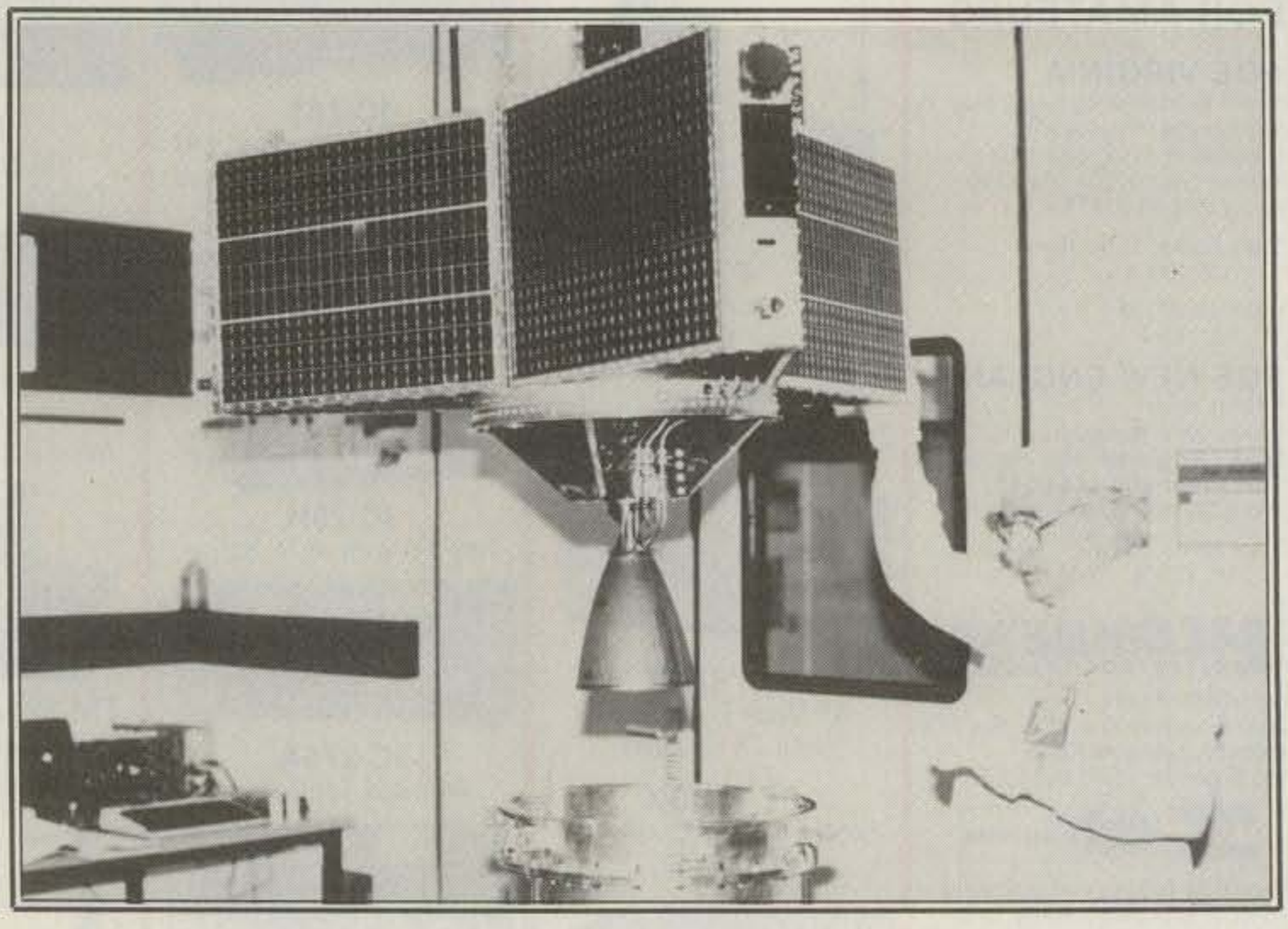

Fig. 1– Our upcoming Phase IIIC/OSCAR 13/14 satellite being lowered into attach-fitting and prepared for launch. Photocells cover outside areas. "Antenna Farm" on top of satellite. Electronics inside each "wing area" with kickmotor in bottom. Jan. '88 photo courtesy WA2LQQ and AMSAT.

An unusual and impressive feature aboard both RS-10 and RS-11 is their inclusion of a 15 meter input - 10 meter output transponder. As shown in fig. 2, you transmit between 21.160 and 21.250 MHz while receiving between 29.360 and 29.450 MHz. Only one of these Mode K transponders is active at a time and each covers a different frequency span, so stay alert to surprise RS-10/11 operating schedule shifts. Monitor the AMSAT Net (Sundays at 1900 UTC on 14.280 MHz), keep a full set of frequency relation charts by your setup, then be ready to change operating ranges on a moment's notice. Stay attuned to operating ranges and frequency/mode allocations of your license, as Novice, Technician and General Class licensees can use 21.100 to 21.200 MHz, Extras only can work SSB from 21.200 to 21.225 MHz, and Advanced licensees can use SSB from 21.225 to 21.250 MHz. Tuning for callers rather than "sitting on your transmit frequency" also holds merit here. Likewise, some operators may be using only one transceiver (with dual VFOs split between 15 and 10 meters) and can thus be off-frequency).

RS-10 and 11's Mode A transponders are "classic" in nature and require minimum explanation. This concept has been very popular since the days of OSCAR 6. The Mode T transponders, however, are particularly interesting: 15 meters up, 2 meters down. Add a bit of today's good HF propagation, a few unfamiliar operators curiously scanning 145 to 146 MHz, and watch those Bozo-of-the-Year awards fly. (I did, I did! I heard a JA on 2 meters!) Another fun side of RS-10/11 action comes into play when two uplink or downlink units are activated simultaneously. Mode K sometimes relays both 15 and 2 meter-uplinked signals to 10 meters or relays 15 meter-received signals to both 10 and 2 meters . . . a quasi mode A treat for amateurs without VHF gear.

The high receiving sensitivity and low orbits of RS-10 and RS-11 make them ideal for fixed, mobile and portable operations using barefoot transceivers and basic antennas. Indeed, operators are encouraged to compare their downlinked signal's strength to that of the satellite's beacon and reduce RF output as neces-

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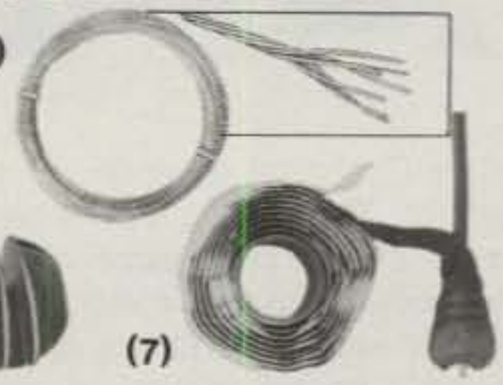

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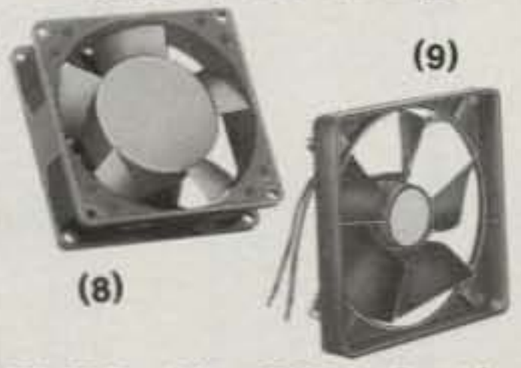

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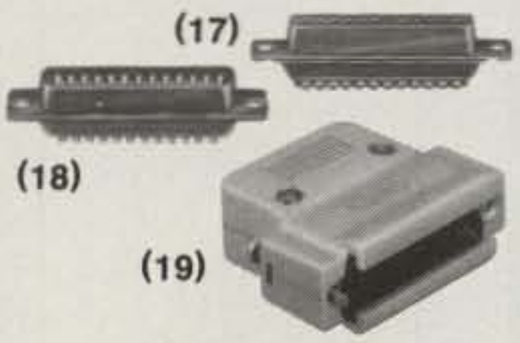

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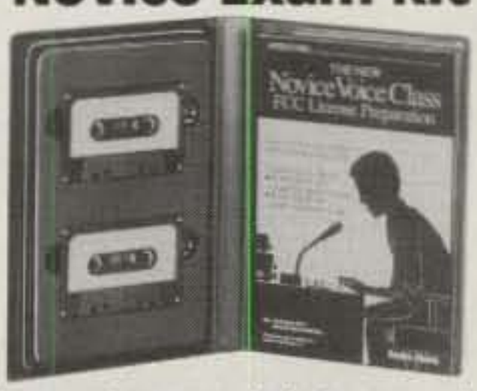

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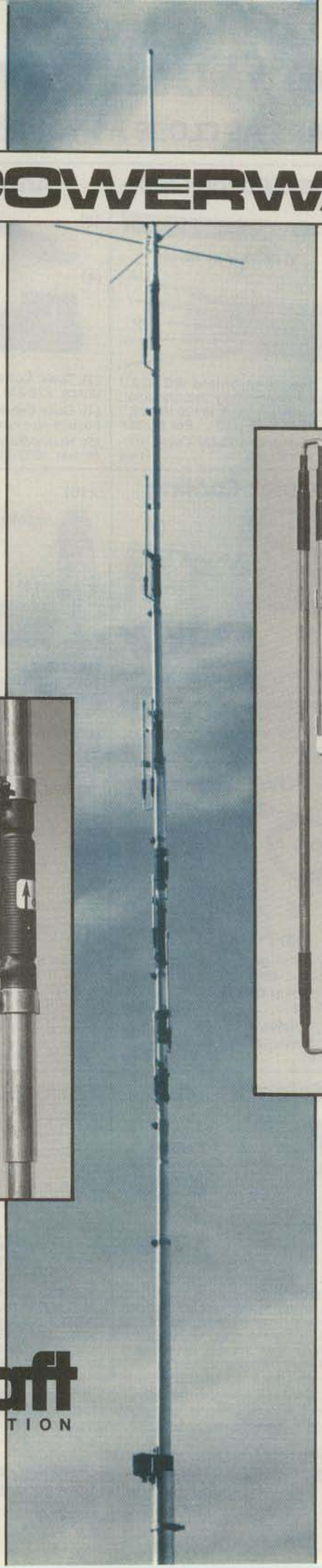

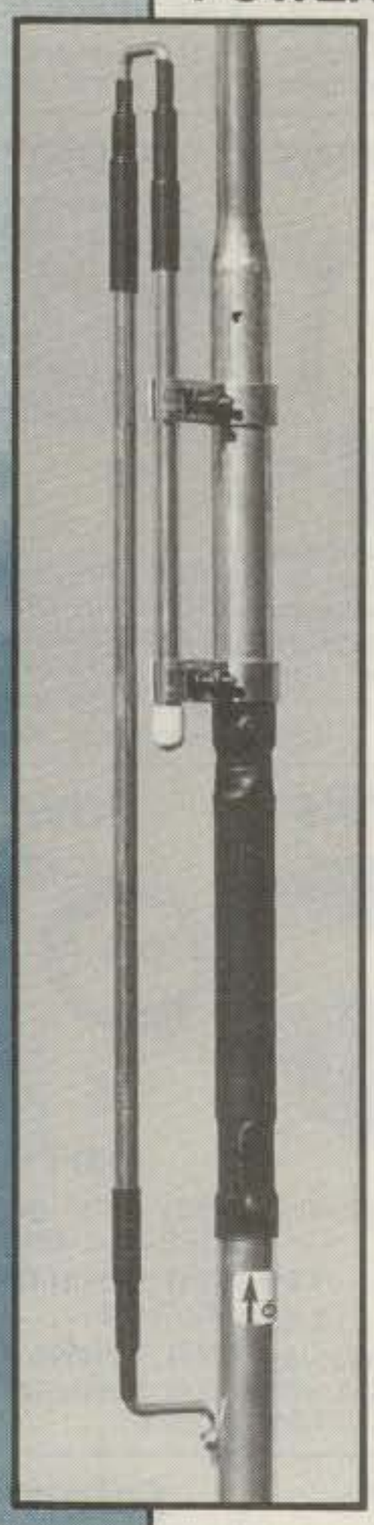

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	21.200	29.400	21.250	29.450
Mode A		29.357 Beacon		29.407 Beacon
	145.860	29.360	145.910	29.410
	145.900	29.400	145.950	29.450
Mode T		145.857 Beacon		145.907 Beacon
	21.160	145.860	21.210	145.910
	21.200	145.900	21.250	145.950

Fig. 2– Operating transponders aboard RS-10/11 satellites. Full discussion in text.

sary to avoid overloading a transponder. Several amateurs have reported uplinking good signals to the satellite using 2 meter talkies. **Do not, however, transmit FM via satellite . . . that's taboo!** Personally, I'm anxious to team Santec's all mode 2 meter talkie with AEA's new 10 meter SSB "DX Handy" for a complete handheld satellite setup. Visualize the unique glamor of working through a Russian satellite while stretched out on a warm Gulf beach with a pair of talkies. Even string bikinis are not that attractive . . . well, maybe there are a few exceptions.

The full story of RS-10 and 11's robot operators would require a separate CQ column, so we will necessarily condense details in the following overview. As shown in fig. 3, the robot transmits on 10 meters and receives on 15 or 2 meters. Listen for this automated DXer during an RS-10/11 pass, then follow its instructions to the "Tee". You must wait for the robot to call CQ and specify a receiving frequency before calling (typically "CQ DE RS11 ROBOT QSU 21130 KHZ K"). You then call with (exactly): RS11 DE (your call) AR, sent at 20 to 30 WPM. Perfect Morse and no QRM are vital. Use an electronic keyer (programmable types are great), and listen on the robot's 10 meter frequency while transmitting. You will hear your own call (along with any "damaging QRM") being relayed exactly as the robot hears it. As you'll see, the robot can copy only one station at a time. Do not QRM others! Sequential calls/QSOs are the only route to success. If you wrangle a QSO, listen close for your QSO number (the robot will send it twice), note the robot will sign, and give other callers a chance. Again, wait for "Robbie" to announce its listening frequency (equal time is allowed for 15 and 2 meters, but the robot also "leans toward" the most active band.

RS-10 ROBOT	
Uplink	**Downlink**
21.120	29.403
RS-11 ROBOT	
Uplink	**Downlink**
21.130	29.453

Fig. 3– Operating frequencies of the space age robot operator aboard RS-10/11.

Working "Robbie" is challenging! You program your keyer for RS-11, tune 29.453, the satellite "comes over" and no robot . . . you quickly tune RS-10 on 29.403; and there it is calling CQ with no takers! Next pass you're ready, but "Robbie's" only working the pileup on 2 meters . . . or 15 if you're on 2. The next time, "Robbie" may sit quietly until the pass has almost ended. Then, too, "damaging QRM" often sends one scurrying for "middle of night" or "far horizon" passes. DXing supreme! I love it!

Tracking RS-10/11's orbits is a relatively easy matter. You can obtain a tracking program for your home computer from the AMSAT Software Exchange (P.O. Box 27, Washington, DC 20044) and initialize it with keplerian data announced on weekly AMSAT nets, or use your own "mental calculations". Let's assume we have only two net-announced parameters of "mean motion" and inclination, for example, and add some "numerical magic". RS-10/11's inclination of 82.92 degrees indicate its orbit's position with respect to the Equator. Use your world globe and some stiff wire to "mock up" that orbit. It never changes; the earth merely rotates beneath it, creating what we visualize as "westerly progressions". RS-10/11's "mean motion" is 13.71 (orbits per day). Now: 24 Hours PerDay: 13.71 = 1.7505 Hours Per Orbit:60 minutes = 105.03 minutes per orbit. Thus each orbit "begins" 105 minutes after the last orbit (as "seen" from your QTH). The earth is also separated into 180 degrees west and 180 degrees east longitude, thus 180 + 180 = 360 ÷ 13.71 = 26.25 degrees "westerly progression per orbit" (Note: This is for north-south passes: south-north passes move "easterly" . . . follow your "wire mockup for clarity). Assuming we now monitor for an RS-10/11 "reference orbit (one in range of our QTH), or learn from a friend/net member what time they heard RS-10/11 recently, we can use the previous data to estimate future orbits . . . time and longitude! One final note: 13.71 (orbits) × 105.03 (minutes) = 1439.96 (minutes) ÷ 60 = 23.9 hours: less than 24 hours, so listen for RS-10/11 a few minutes "earlier" each day. If your "39.95 calculator watch" is like mine, it will add time. Each press of its "equals" button then displays times of subsequent orbits. That same method also works grand for latitude positions. Computers are nice, but genuine "ham ingenuity" is hard to beat!

A New Super Satellite!

As this column is being written, the most exciting and deluxe satellite in amateur radio history is "lined up" for launch just like airplanes line up at O'Hara or Dallas-Ft. Worth airports. After several previous delays, we are "number two in position for take-off" aboard the European Space Agency's mission 22. Monitor news media and AMSAT net reports closely. If mission 21 gets off the ground early, our new OSCAR could be moving toward orbit during the upcoming weeks.

After the new "bird" successfully achieves orbit, its designation will be changed from Phase IIIC to OSCAR 13 or 14 (are we superstitious?). OSCAR 13/14 will create the equivalent of three new and totally unique amateur bands. Each will support numberous local and worldwide DX QSOs for 5 to 10 hours each day on a fully reliable and predictable basis. Antenna tracking will involve only slight movements every hour or two. Can you visualize bands that "stay open" more hours than you can stay on the air? Fantastic! We're talking "Big Time" DXing here, gang. U.S. amateurs holding Technician and higher class licenses will be able to work other amateurs from the Phillipines and India to Europe and Africa with the same ease as working neighboring states. As XYL WB4OEE also points out, OSCAR QSOs are special "getting to know you experiences" rather than 20 meter-type name and QTH exchanges. I can only add that VHF/UHF bands and satellites are the "wave of the future", and a technical background is not necessary to join the action.

As shown in fig. 4, four transponders plus a packet radio digipeater are aboard OSCAR 13/14. Due to widespread availability of multimode 2 meter and 70 cm gear and antennas, mode B and J promise to be main activity areas. Mode L will start off as a more quiet area but quickly "pick up speed" as 1.2 GHz equipment rises more in popularity. Mode S is a pioneer's paradise. Homebrewed CW gear will "start things rolling" here, but upcoming commercially manufactured gear will soon allow everyone to join the action. All tests at this time indicate that 50 watts to 10 element antennas will be quite suitable for modes B and J while 10 watts to loop yagis or small "snow scooter" dishes will work great for mode L and S. These small antennas are good news

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SP-3 External speaker	65.00	
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IC-27H Compact 45W 2m FM w/TTP mic	459.00	**399.95**
IC-37A Compact 25W 220 FM, TTP mic	499.00	**439.95**
IC-47A Compact 25W 440 FM, TTP mic	549.00	**489.95**
PS-45 Compact 8A power supply	145.00	**134.95**
UT-16/EX-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	
IC-28A 25W 2m FM, **TTP** mic	469.00	**409.95**
IC-28H 45W 2m FM, **TTP** mic	499.00	**439.95**
IC-38A 25W 220 FM, **TTP** mic	489.00	**429.95**
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HM-14 Extra TTP microphone	59.00	
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UX-59A 6m 10W unit	349.00	**319.95**
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IC-3200A 25W 2m/440 FM w/TTP	695.00	**579.95**
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BC-35 Drop in desk charger for all batteries	79.00
BC-16U Wall charger for BP7/BP8	21.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

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Fig. 4– Frequency relations of the wideband transponders aboard OSCAR 13/14.

for amateurs living in antenna-restricted locations. Two-four foot long antennas can be mounted on a foldup camera tripod and placed on a balcony for worldwide satellite DXing. The setup could also be used portable on a moment's notice.

Mobile OSCAR 13/14 activity is another exciting possibility. Most modern VHF/UHF gear operates from 12 volt DC sources. Gain whip antennas for 2 meters, 70 cm and 1.2 GHz are also readily available. Add a linear amplifier for increasing your ERP to 500 watts, a GaAsFET preamp for good reception, and you're set for action.

Setting up an OSCAR 13/14 station is a relatively straightforward situation. First decide which bands/modes you prefer to operate and what size antennas you can use. Next, secure the gear and antennas plus coax cables and a good GaAsFET receiving preamp. There are two options here: you can use super-small antennas and compensate for (transmitting and receiving) signal losses with a linear amplifier and two receive preamps, or you can use larger antennas and "barefoot" rigs with only one receiving preamp. Remember the slogan "if you can't hear them, you can't work them", and always place the most emphasis on a good receiving setup. Likewise, use only very short "runs" of the best/low loss coax you can find (20 feet maximum).

OSCAR 13/14 is due to be placed in a highly elliptical orbit inclined approximately 57 degrees with respect to the Equator. This orbit is very similar to the one originally planned for OSCAR 10 (see Figure 5). Two daily orbits, each roughly 12 hours in length, are planned with apogee 22,000 miles above the world's most active amateur radio areas. Tracking will basically equate to pointing your antennas north, tilting them up 25 degrees (if you're in the mid U.S.), then "tweaking" their azimuth and elevation while listening to satellite relayed signals. Follow our previous notes and suggestions, tune in the AMSAT net on 14.182 MHz Sundays at 1900 GMT for exact transponder operating plans/schedules, and we will be looking for you on OSCAR 13/14!

Closing Notes

Gosh . . . we're out of CQ column space 'afore we're out of satellites! Since I'm always analogizing amateur magazines to monthly in-home hamfests, I'll simply say this forum's space must now be relinquished and our discussion will continue with my new "OSCAR SATELLITE REVUE" book advertised elsewhere in this issue. As we "head for the door", I'll add that JO-12 and OSCAR 10 also continue alive and well. That's *four satellites and nearly a dozen transponders to enjoy* . . . more than ever before and enough to captivate any amateur's interest! Come on in and join the action! Satellites are super fun!

73, Dave, K4TWJ

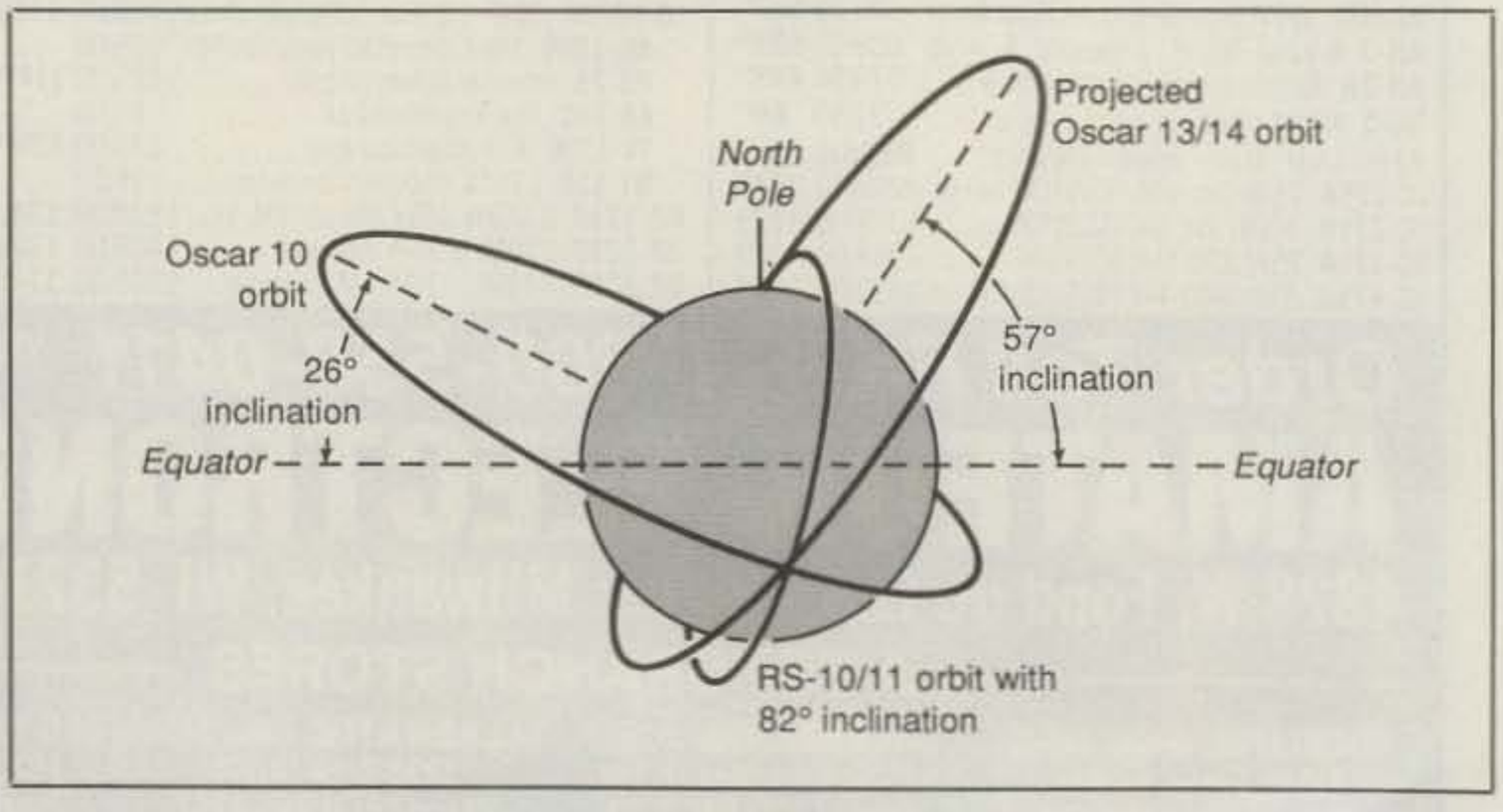

Fig. 5– Overview of orbits and their positions. OSCAR 10, RS-10/11 and Phase IIIC/OSCAR 13/14 exemplified.

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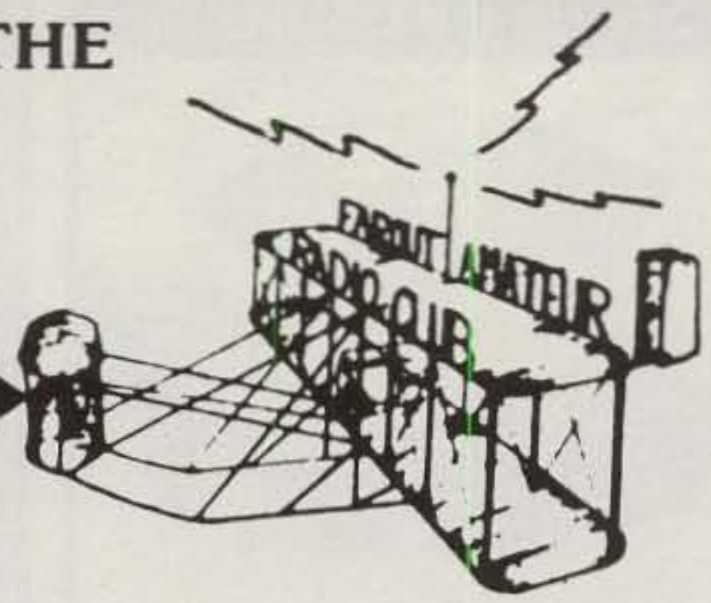

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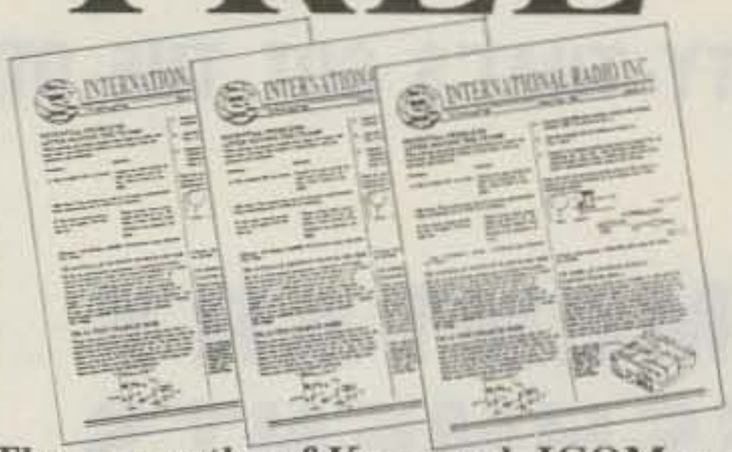

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"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Long-Wire Antennas—Part I of II

Beginning with this month's column, the title is changed from the "Novice" column to "Bill's Basics." Most of our American amateurs started out as Novices, since the Novice license was established in 1951. Recent (March 1987) changes increased the scope and complexity of the Novice written examination, causing many candidates to go from unlicensed to Technician with little or not operating time as a Novice. The previous Novice column has been broadened to include all beginning amateurs, Novice through Extra class. The Novice license is now valid for a maximum term of ten years, and it has been renewable many years. It is now the same as all other classes of amateur radio operator licenses. The time has come to shift from a Novice column to a beginner's column for all classes of licensees. Novices are not being abandoned; these columns will be of increased usefulness to Novices, since the range of subjects is being increased. The readers of this column have always included many Technician, General, Advanced, and Extra class amateurs.

This is Kelley Lane, KB4TSA, of East Point, Georgia. He obtained his Novice ticket during July 1986. Kelley has contacted amateurs in more than 40 states, plus 4 countries. His station includes a Drake TR-4C transceiver, MFJ antenna tuner, 15/40/80 meter dipole, and a 10 meter inverted-Vee antenna. Kelley likes DX, ragchewing, and contest operating. He intends to get involved in traffic handling and satellite communications after he upgrades. Kelley is the music director for a private school, and he is also a piano tuner/technician.

The long-wire antenna is best defined as being several (at least 2.5) wavelengths long in regard to the lowest frequency at which it is to be used. However, it is more commonly considered to be an antenna that is at least one-half wavelength long relative to the lowest frequency at which is it to be operated. This latter definition indicates a minimum length of 133 feet 7 inches for use at 3.5 MHz.

Long-wire antennas are also referred to as **harmonic** antennas, because they also resonate at harmonics (full number multiples) of their lowest resonant frequency. As an example, the 3.5 MHz antenna can also be used on 7 MHz (second harmonic), 14 MHz (fourth harmonic), 21 MHz (sixth harmonic), and 28 MHz (eighth harmonic). **Random wire** is the term that is commonly applied to end-fed single-wire antennas that are not cut to a specific half-wave resonant point. The material in this article generally applies to both random-wire and long-wire antennas. This is true because the antenna tuner used with long-wire and random-wire antennas makes them the correct electrical length to resonate on any desired frequency.

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Advantages

Random/long-wire antennas provide multiband operation without the use of traps. A single-wire antenna can usually be made to be precisely resonant (apparent 1-to-1 standing-wave ratio) at each desired operating frequency. These antennas can be used on all frequency of every amateur band above their lowest resonant point. No feedline is used with a random/long-wire antenna; consequently, there is no feedline loss. These antennas radiate more power than other half-wavelength antennas in their most favorable direction(s). Long/random-wire antennas can be configured (bent) to fit sites that are too small to accommodate standard dipoles. The all-frequencies capability of these antennas permits amateurs to operate all bands with no feed line and just one antenna, which is very important to amateurs living in crowded quarters. The single wire is not as objectionable in appearance as other types of high-frequency (3 to 30 MHz) antennas. It is the lowest cost all-band, all-frequency antenna system.

The random/long-wire antenna is electrically and mechanically simple. It has no critical dimensions or adjustments. It accepts power well on any frequency at which the antenna is at least approximately one-quarter to one-half wavelength long. Its vertical and horizontal directivity patterns are sharp, whereas many antennas only have sharp horizontal directivity. These antennas tend to concentrate energy at low fire (transmit and receive) angles, making them better for working DX (distance). Comparisons often show that these antennas are more sensitive to weak signals than other types of antennas; this is due to their greater signal capture area (length), which results in higher levels of signal energy being received from the ionosphere (refracted signals being returned to earth from distant points).

A few comparisons to dipoles are appropriate. The input impedance of a random/long-wire antenna does not vary as drastically as the input impedance of a dipole or multi-element array at heights that are less than one-quarter wavelength above RF ground. Random/long-wire antennas function satisfactorily at heights as low as about 30 feet above ground. They work better when they are installed further above ground, but it is good to know that their height above ground is less critical than with most other antennas. Random/long-wire antennas are as useful as dipoles in most azimuth directions, and they are better than dipoles in their favored (major jobe) directions. This is because random/long-wire antennas have minor (side) lobes that provide reasonable communication capability in other than the directions of the major lobe(s).

Disadvantages

These are nonrotatable antennas. Their main lobe(s) cannot be swung to optimize reception and transmission in several specific directions without using phased groups of random/long-wire antennas. One has to live with the directivity characteristics (such as north-south or east-west) that result from the installation configuration and the resonance condi-

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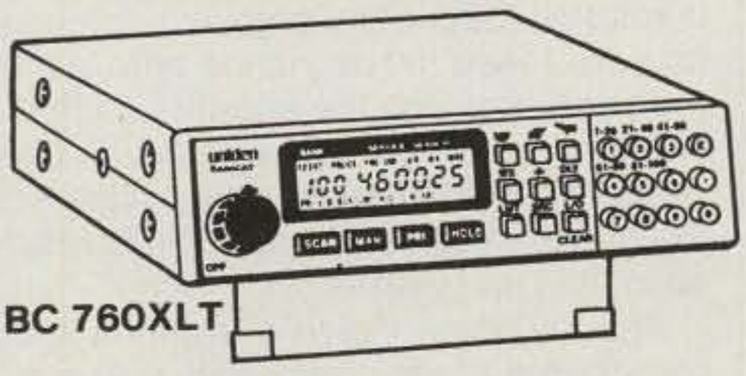

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PRO540E-SA *Uniden* 40 channel CB Mobile $119.95
PRO640E-SA *Uniden* 40 channel SSB CB mobile . . . $159.95
PRO710E-SA *Uniden* 40 channel CB Base $119.95
PRO810E-SA *Uniden* 40 channel SSB CB Base $179.95

★★★ Uniden Radar Detectors ★★★

Buy the finest *Uniden* radar detectors from CEI today.
RD7-SA *Uniden* visor mount radar detector $109.95
RD9-SA *Uniden* "Passport" size radar detector . . . $129.95
RD9XL-SA *Uniden* "micro" size radar detector . . . $159.95
RD25-SA *Uniden* visor mount radar detector $59.95
RD500-SA Uniden visor mount radar detector $79.95

NEW! Bearcat® 200XLT-SA

New Product...Available May, 1988
List price $509.95/**CE price $299.95**
12-Band, 200 Channel • 800 MHz. Handheld
Search • Limit • Hold • Priority • Lockout
Frequency range: 29-54, 118-174, 406-512, 806-956 MHz.
Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.
The *Bearcat* 200XLT sets a new standard for handheld scanners in performance and dependability. This full featured unit has 200 programmable channels with 20 scanning banks and 12 band coverage. If you want a very similar model without the 800 MHz. band and 100 channels, order the **BC 100XLT-SA** for only $219.95. Includes antenna, carrying case with belt loop, ni-cad battery pack, AC adapter and earphone. Order your scanner now.

Bearcat® 800XLT-SA

List price $499.95/**CE price $259.95/SPECIAL**
12-Band, 40 Channel • No-crystal scanner
Priority control • Search/Scan • AC/DC
Bands: 29-54, 118-174, 406-512, 806-912 MHz.
The Uniden 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9¼" x 4½" x 12½." If you do not need the 800 MHz. band, a similar model called the **BC 210XLT-SA** is available for $196.95.

Bearcat® 145XL-SA

List price $189.95/**CE price $98.95/SPECIAL**
10-Band, 16 Channel • No-crystal scanner
Priority control • Weather search • AC/DC
Bands: 29-54, 136-174, 406-512 MHz.
The *Bearcat* 145XL is a 16 channel, programmable scanner covering ten frequency bands. The unit features a built-in delay function that adds a three second delay on all channels to prevent missed transmissions.

Bearcat® 175XL-SA

List price $279.95/**CE price $156.95/SPECIAL**
11-Band, 16 Channel • Weather Search
Priority control • Search/Scan • AC/DC
Bands: 29-54, 118-174, 406-512 MHz.
The *Bearcat* 175XL has an automatic search feature to locate new frequencies. Priority, lock out, delay and scan speed are all included.

Regency® Informant™ Scanners

Frequency coverage: 35-54, 136-174 406-512 MHz.
The new *Regency* Informant scanners cover virtually all the standard police, fire, emergency and weather frequencies. These special scanners are preprogrammed by state in the units memory. Just pick a state and a category. The Informant does the rest. All Informant radios have a feature called *Turbo Scan*™ to scan up to 40 channels per second. The **INF1-SA** is ideal for truckers and is only $199.95. The new **INF2-SA** is a deluxe model and has ham radio, a weather alert and other exciting features built in for only $239.95. For base station use, the **INF5-SA** is only $149.95 and for those who can afford the best, the **INF3-SA** at $209.95, is a state-of-the-art, receiver that spells out what service you're listining to such as Military, Airphone, Paging, State Police, Coast Guard or Press.

Regency® HX1500-SA

List price $369.95/**CE price $179.95/SPECIAL**
11-Band, 55 Channel • Handheld/Portable
Search • Lockout • Priority • Bank Select
Sidelit liquid crystal display • EAROM Memory
Direct Channel Access Feature • Scan delay
Bands: 29-54, 118-136, 144-174, 406-420, 440-512 MHz.
The new handheld *Regency* HX1500 scanner is fully keyboard programmable for the ultimate in versatility. You can scan up to 55 channels at the same time including the AM aircraft band. The LCD display is even sidelit for night use. Includes belt clip, flexible antenna and earphone. Operates on 8 1.2 Volt rechargeable Ni-cad batteries (not included). Be sure to order batteries and battery charger from the accessory list in this ad.

★★★ Uniden Cordless Phones ★★★

A major consumer magazine did a comparison study on cordless phones. The check points included clarity, efficiency and price. *Uniden* was rated best buy.

XE300-SA *Uniden* Cordless Phone $69.95
XE500-SA *Uniden* Cordless Phone with paging. . . . $84.95
XE700-SA *Uniden* Cordless Phone with speaker . . . $114.95

★★★ Extended Warranty Program ★★★

If you purchase a scanner, CB, radar detector or cordless phone from any store in the U.S. or Canada within the last 30 days, you can get up to three years of extended warranty service from Warrantech. This service extension plan begins *after* the manufacturer's warranty expires. Warrantech will perform all necessary labor and will not charge for return shipping. Extended warranties are non-refundable and apply only to the original purchaser. A two year extended warranty on a mobile or base scanner is $29.99 and three years is $39.99. For handheld scanners, 2 years is $59.95 and 3 years is $79.95. For radar detectors, two years is $29.95. For CB radios, 2 years is $39.99. For cordless phones, 3 years is $34.99. Order your warranty for your merchandise today.

OTHER RADIOS AND ACCESSORIES

NEW! **BC 55XL-SA** *Bearcat* 10 channel scanner . . . $114.95
BC 70XLT-SA *Bearcat* 20 channel scanner $169.95
R1090-SA *Regency* 45 ch. scanner . . . **CLOSEOUT** $119.95
Z60-SA *Regency* 60 ch. scanner . . . **CLOSEOUT** $129.95
UC102-SA *Regency* VHF 2 ch. 1 Watt transceiver . . . $117.95
BPS5-SA *Regency* 16 amp reg. power supply $169.95
MA549-SA Drop-in charger for HX1200 & HX1500 . . . $84.95
MA518-SA Wall charger for HX1500 scanner $14.95
MA553-SA Carrying case for HX1500 scanner $19.95
MA257-SA Cigarette lighter cord for HX12/1500 . . . $19.95
MA917-SA Ni-Cad battery pack for HX1000/1200 . . . $34.95
BP205 Ni-Cad battery pack for BC200/BC100XLT. . . $49.95
B-8-SA 1.2 V AA Ni-Cad batteries (set of eight) $17.95
FB-E-SA Frequency Directory for Eastern U.S.A. $14.95
FB-W-SA Frequency Directory for Western U.S.A. . . . $14.95
ASD-SA Air Scan Directory $14.95
SRF-SA Survival Radio Frequency Directory. $14.95
TSG-SA "Top Secret" Registry of U.S. Govt. Freq. . . . $14.95
TIC-SA Techniques for Intercepting Comm. $14.95
RRF-SA Railroad frequency directory. $14.95
EEC-SA Embassy & Espionage Communications . . . $14.95
CIE-SA Covert Intelligenct, Elect. Eavesdropping . . . $14.95
MFF-SA Midwest Federal Frequency directory $14.95
A60-SA Magnet mount mobile scanner antenna . . . $35.95
A70-SA Base station scanner antenna. $35.95
USAMM-SA Mag mount VHF ant. w/ 12' cable. $39.95
USAK-SA ¾" hole mount VHF ant. w/ 17' cable. . . . $35.95
USAK450-SA ¾" hole mount UHF ant. w/ 17' cable . . . $35.95
Add $3.00 shipping for all *accessories* ordered at the same time. Add $7.00 shipping per radio and $3.00 per antenna.

BUY WITH CONFIDENCE

To ***get the fastest delivery from CE*** of any scanner, send or phone your order directly to our Scanner Distribution Center.™ Michigan residents please add 4% sales tax or supply your tax I.D. number. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 10 billing. All sales are subject to availability, acceptance and verification. All sales on accessories are final. Prices, terms and specifications are subject to change without notice. All prices are in U.S. dollars. Out of stock items will be placed on backorder automatically unless CE is instructed differently. A $5.00 additional handling fee will be charged for all orders with a merchandise total under $50.00. Shipments are F.O.B. Ann Arbor, Michigan. No COD's. Most products that we sell have a manufacturer's warranty. Free copies of warranties on these products are available prior to purchase by writing to CE. Non-certified checks require bank clearance. Not responsible for typographical errors.

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CIRCLE 72 ON READER SERVICE CARD

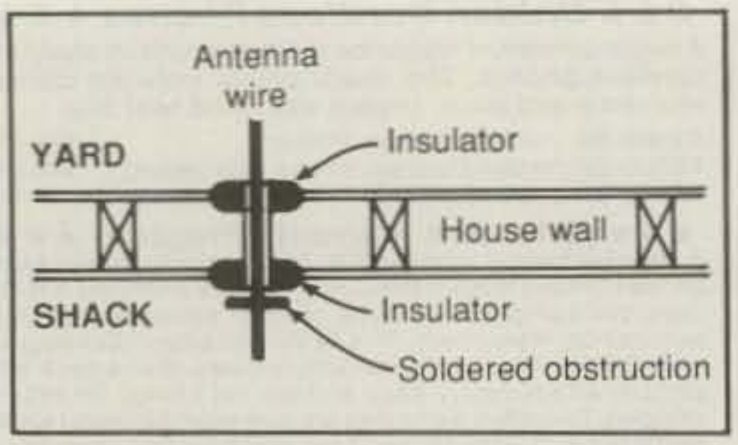

Fig. 1– How to secure a random/long-wire antenna at the station end.

tion. Care must be taken to secure the wire at the station end to prevent it from tending to pull on the antenna tuner.

To enjoy maximum frequency agility (selection), the random/long-wire antenna must be used in conjuction with a good antenna tuner. A standing-wave-ratio (SWR) meter/bridge is required to enable the operator to properly adjust the antenna tuner when varying the electrical (not physical) length of a long/random-wire antenna to make it resonant at a desired frequency. An SWR meter is built into many modern transceivers and antenna tuners, but one must be obtained if it is not an integral part of those units. Since the entire antenna resonates, radio frequency (RF) power is in the shack, starting at the output terminal of the antenna. RF energy in the shack can increase the possibility of interference to radio, television, VCR, hi-fi, and other electronic entertainment devices in the home. However, the RF at the output of the antenna tuner (with the antenna resonated) is at the maximum current and minimum voltage points; consequently, the possibility of interference is not high. An excellent RF ground is essential to optimum operation of random/long-wire antennas. Despite all of these factors, the single-wire antenna is a valuable part of the antenna system.

Ground

The station's RF ground system must be a good one to enable the random/long-wire antenna to function well. A poor RF ground can cause an appreciable amount of transmitter output power to be wasted in the ground system, reducing the effective radiated power (ERP). The station's RF ground is normally connected directly to the ground stud on the rear chassis of the transceiver. However, when using a random/single-wire antenna, the station's RF ground is connected to the ground stud of the antenna tuner. RF ground is usually several inches to several feet below the surface on which we walk.

Bandwidth

Using larger diameter conductors (wire or tubing) increases the frequency range (bandwidth) over which any type of antenna functions satisfactorily. This factor also applies to random/long-wire antennas. However, conductor size is not as important with random/long-wire antennas as it is with other types of antennas, because the antenna tuner can resonate them to any frequency. The tuning characteristics of a large-diameter random/long-wire antenna are broader than they would be with a small-diameter wire. A 14-to 18-gauge wire is suitable for use in making random/long-wire antennas. Any copper (or copper clad) wire can be used, with or without insulation. It is recommended that Copperweld® wire be used, if you can get it. Copperweld® has a steel center, which gives it high strength and minimizes stretching. Copper is coated over the steel core, providing low-loss conductivity of the RF currents. Skin effect causes RF to travel primarily along the outer surface of conductors, making the higher resistivity of the inner core (steel) unimportant. If an insulated wire is used, strip is down to bare wire at the connection points, which are usually just the output terminal of the antenna tuner and the insulator at the far end of the wire.

The bandwidth of a resonant circuit doubles as frequency doubles. If the bandwidth of a particular antenna is 50 kiloHertz at 3550 kHz, it is 100 kiloHertz at 7100 kHz. In other words, it is satisfactory for use between 3525 to 3575 kHz and 7050 to 7150 kHz. Bandwidth is usually stated in some maximum standing-wave ratio (SWR) that is not exceeded within the specified frequency range. The maximum acceptable SWR is commonly three-to-one (3:1), but 2:1 is also popular. When a larger conductor is used, capacitance (**C**) increases, Inductance (**L**) decreases, and **Q** (sharpness of resonance, for our purpose) decreases, increasing the antenna's bandwidth. The higher the resistive component of the antenna's input impedance, with regard to the reactive component, the broader the bandwidth of the antenna.

Installation

As is true for all antennas, it is important to erect a random/long-wire antenna as high as possible, and to install it clear of any nearby metallic objects. Do not position it parallel, and in close proximity, to electric-power feedlines, telephone lines, CATV cables, or any other wiring. If the antenna must be positioned near such wiring, get as close as possible to a 90-degree angle to minimize interaction between them. In addition to unwanted pickup between such wires, nearby conductive and semiconductive material can change the resonant length of an antenna. However, this factor is not important in relation to random/long-wire antennas that are tuned to resonance before they are used. Position the antenna so that it cannot come in contact with power lines if either should break loose and fall. Failure to observe this precaution has resulted in fires and injuries.

The random/long-wire antenna must be secured at the shack end. It exerts a very strong mechanical force which tends to pull the antenna tuner out of the shack. I have found that the easiest way to do this is to solder something (usually wire) to the antenna to prevent it from physically pulling out of the shack. Fig. 1 shows this installation technique.

I have experienced better results with random/long-wire installations in which I have not reversed the direction in which the wire is installed. (The directivity coverage in this article explains why this is so.) In other words, if the wire is installed at an initial upward slant, do not later slant it downward. If it is installed east to west, do not also run it west to east. Very short reversals (such as where the antenna leaves the shack) seem to make little difference, but it is advisable to minimize the length of reversed wire runs. Fig. 2 shows a typical good installation. The antenna wire is simply threaded through one eye of the insulator that supports the antenna outside the shack, as shown in fig. 3. Do not loop the wire a second time through the eye of this insulator; let it run free. At the far end of the antenna run, loop the wire through one end of an insulator, wrap it back along the wire next to the insulator, and solder it in position. If you do not solder it, noise can occur in windy conditions as metal moves against metal. Use nylon (or some other strong nonconductive) cord to secure the far

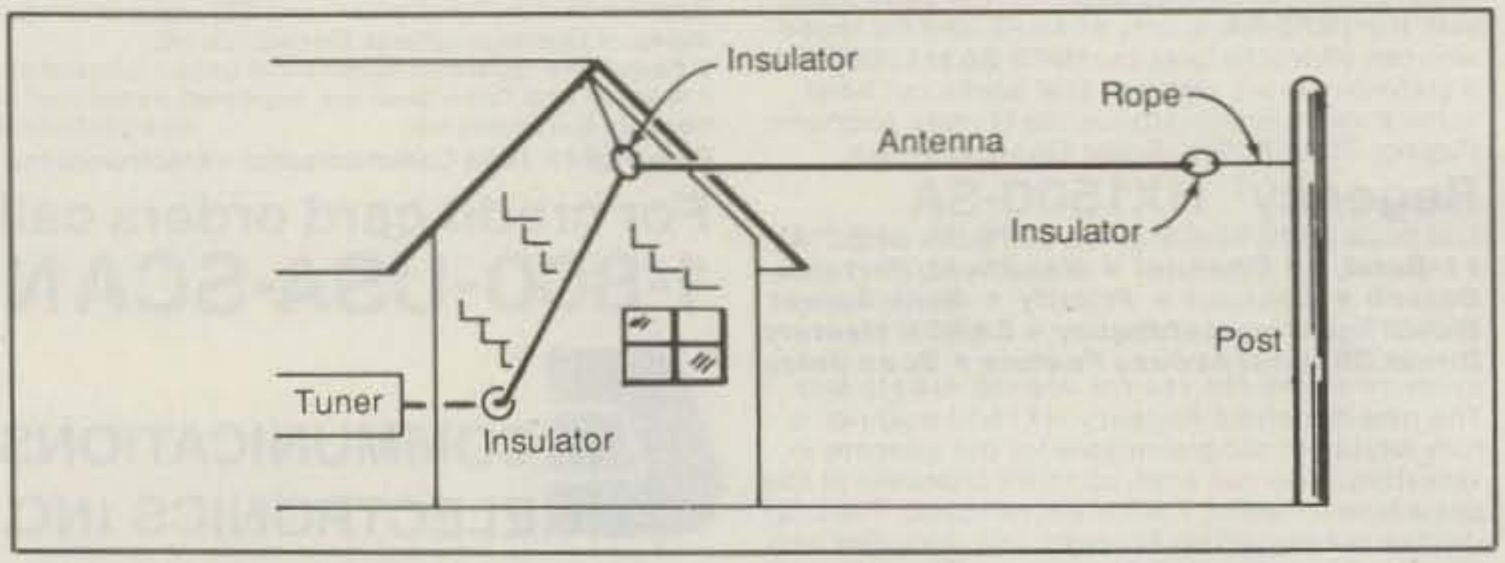

Fig. 2– A typical random/long-wire antenna installation.

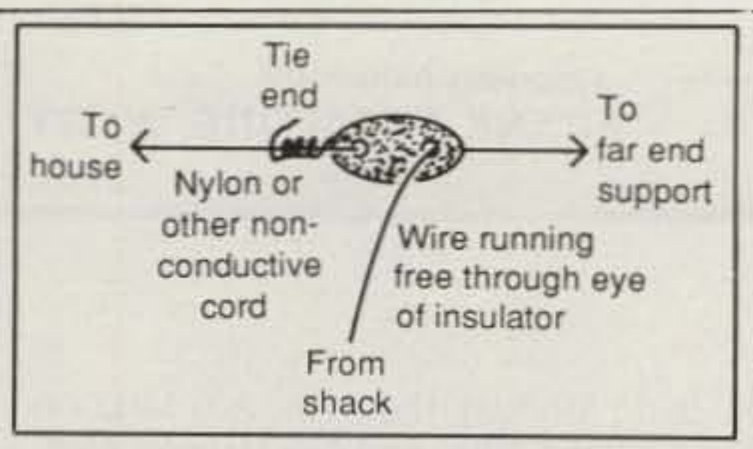

Fig. 3– The antenna wire is run through the eye of the support insulator.

end of the antenna. Tie it to the unused eye of the insulator. If you have an immovable structure (such as a building) to which you can secure the far end of the antenna, attach the cord to it. If you do not have a conveniently located stationary structure to which you can attach the far end of the antenna, run the cord through a pulley and attach it to a suitable weight. Attach another piece of cord to the pulley eye and haul the antenna up into position. Tie the pulley support cord at some convenient point, to permit easy lowering and raising of the antenna in the future. Fig. 4 shows such an installation.

The weight required to hold the antenna reasonably flat depends on the gauge and length of the wire used to make the antenna. I have been able to use as little as 15 pounds in some installations, whereas about 50 pounds is the value needed in other cases. If you are going to attach the far end of the antenna to some object that moves very little, you can use a heavy-duty large spring in lieu of the pulley-and-weight arangement. If you use the pulley, leave enough cord to enable you to lower and raise the end of the antenna; do not cut the pulley haul cord so short that you cannot lower the end of the antenna to where you can reach it. A properly installed random/long-wire antenna should not require maintenance (repair) for at least a decade. Take the time to make a good installation, and avoid kinking the wire.

This completes the first half of the two-part article about long-wire antennas. Next month's column covers length, directivity, fire angle, shack installation, and tuning of these antennas.

73, Bill, W6DDB

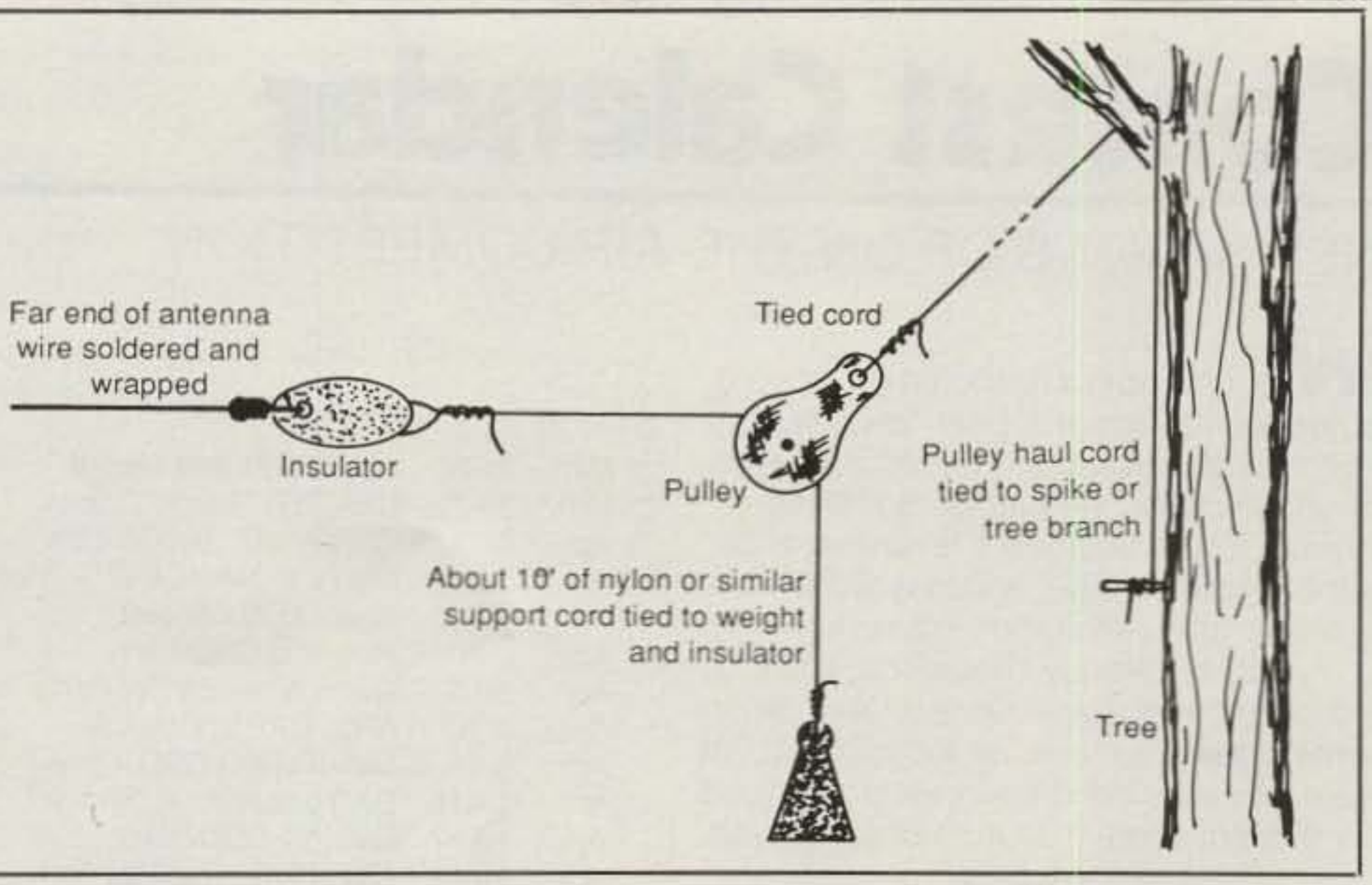

Fig. 4– The end support configuration for a random/long-wire antenna where the far end is adjustable.

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

With the rapid advancement of computor technology the past few years, it was bound to eventually become a part of amateur radio contesting. Speaking for myself, it has reached a level that is beyond my capabilities, and that of the average operator and station I'm sure.

I've invited Randy Thompson, K5ZD/3, Editor of the *National Contest Journal*, to write a guest editorial on the subject. I'm sure you will find it interesting and food for thought about the future of contesting.

Technology or Sport?
by Randy Thompson, K5ZD/3

In a world of computer designed bobsleds, golf clubs with square grooves, and instant replay, there is no denying the effect of technology on sport. As a "techno-sport," radio contesting has certainly felt its share of the technology boon. Increased scores have been the result, but has the hardware begun to overshadow the operators?

Fifteen years ago, a 2-element 40 meter beam was the mark of a big station, the Signal One was ahead of its time and the Japanese were just introducing their first solid-state radios. The radios of choice among contesters were made by Collins and Drake. Keyers were becoming common, but one with memories was still a luxury. The personal computer, online logging, and packet radio were still years away.

Contrast this to the competitive contest station of today. Japanese radios have virtually eliminated vacuum tubes and most American radio manufacturers. Instant band changing, frequency memories, split frequency opertion and multiple VFOs are "must haves." Never mind the 2-element 40 meter beam, now it takes a 3-element full size to be king of the hill. A 2- or 3-element 80 meter beam is only a Mastercharge away. Not only are there CW keyers with memories and programmable functions, the "digital voice keyer" has arrived. Personal computers have invaded every aspect of our lives and contest logging and duping programs abound. Leading clubs are using Packet radio to establish elaborate multiplier spotting networks.

The ultimate integration of technology and contesting was accomplished in 1986 by N6TR, who actually programmed a Z80 microprocessor to tune a radio, find a station, and make a completely automated QSO. No longer a science fiction fantasy, he did it with available computer technology and software savvy. Is this where we wish the technological orgy to lead?

A contest should ultimately be the test of an operator's skills, experience and stamina against all others. Hardware is important as even a great operator can not overcome the limitations of an inferior station. However, the station should not become the sole determinant of winner and loser.

Many contests today are nothing more than strings of CQs, call signs and 5NNs. Easily automated - especially on CW. The operators of today are using superior radio stations. Working a station has become just a matter of busting the pile-up. Once again, the level of hardware becomes the dominant factor.

The contest community needs to consider its future. Do we maintain the current trend toward simple contest and bigger stations which de-emphasize operator skill? Or do we move toward more complex contests with rules and exchanges that reward the operator's skills and judgement?

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	**Mar.**	**26-27**	**CQ WW WPX SSB Contest**
**	Mar.	26-27	UBA SWL Phone Trophy
	Apr.	2-3	Polish "SP" DX Contest
	Apr.	6-8	DX YL to NA YL CW Contest
	Apr.	9	Israel ARC Contest
	Apr.	9-10	Alabama QSO Party
	Apr.	9-10	North America CW Party
	Apr.	9-10	ARCI QRP Spring CW
	Apr.	9-11	Connecticut QSO Party
	Apr.	13-15	DX YL to N.A. YL Phone
	Apr.	16-17	Georgia QSO Party
	Apr.	16-17	North America SSB Party
	Apr.	16-17	IBM QSO Party
	Apr.	23-24	Swiss "Helvetia" Contest
	Apr.	23-24	North Carolina QSO Party
	May	14-15	USSR CQ-M Contest
	May	14-15	MARC County Hunters SSB
	May	14-15	Utah QSO Party
	May	14-15	Michigan QSO Party
	May	28	ARCI QRP CW Sprint
	May	28-29	CQ WW WPX CW Contest
	May	28-29	UBA SWL CW Trophy
	June	4	YLRL Novice/Tech. Day
	June	18-19	All Asian Phone Contest
	July	10	ARCI QRP Summer CW Sprint
	July	16-17	CQ WW WPX VHF Contest
	Aug.	14	ARCI QRP Summer SSB Sprint
	Aug.	27-28	All Asian CW Contest

* *Rules in January issue.*
** *Covered last month.*

During the month of April the ARRL has scheduled three UHF Spring Sprints. 144 MHz on Monday the 11th. 220 MHz on Tuesday the 19th. And 432 MHz on Wednesday the 27th. See *QST* for details.

For you who will be attending the Dayton Hamvention in April this year be sure to check in at the *CQ* booth. Steve Bolia, N8BJQ will be presenting Contest Plaques to the deserving at the Contest Forum. Unfortunately I will not make it this year.

We also expect that Bob Cox, K3EST/6 will be doing a similar job at the International DX Convention a week earlier in Visalia.

Deadline for material for the July issue is April 15th, and May 15th for August announcements. To my home address please.

73 for this time, Frank W1WY

Polish "SP" DX Contest

1500Z Sat. to 2400Z Saturday, April 2 - 3

Sponsored by the Polski Zwiagek Krotkofalowcow this one usually held the 1st weekend of April, has always generated a good level of activity by the SP's.

Unfortunately however the overseas response has not been too good, mainly due to lack of information from the PZK. We did receive a confirmation of the dates from a reliable source. (Billy Lunt, KR1R of the ARRL)

Following is the format that was used in previous years.

Classes: Single operator, single and all band. Multi-operator, single transmitter, all band only. And SWL.

Exchange: Signal report plus a 3 digit QSO number. Polish stations will include 2 letter denoting their province.

Scoring: Three points per QSO, times the number of SP provinces worked. (max. of 49)

Bands: 10–160 meters. (No WARC bands)

Awards: Certificates to winning stations in each class in each country.

Mailing deadline for logs 30 days after end of contest. To: Polski Zwiazek Krotkofalowcow, Contest Committee, P.O. Box 320, 00-950 Warsaw, Poland.

DX-YL to NA-YL Contest

CW: April 6–8 SSB: April 13–15
1400Z Wednesday to 0200Z Friday

This is a YL activity in which DX YLs will be contacting YLs in the North American continent. (KH6 and KL7 are DX.)

All bands may be used. However, cross-band, nets and repeater or con-

1987 All Asian Phone Contest
North America Results*

U.S.A.		**All Band**	
3.5 MHz		**K3EST/6**	**516,076**
W6RJ	**2,852**	**JM1CAX/W7**	**238,869**
		WN4KKN/5	**177,760**
7. MHz			
K6NA	**31,916**	**Multi-Opr.**	
		N6TU	**318,600**
14 MHz		**NR5M**	**241,900**
KI6EZ	**33,264**	N6AW	185,370
WB7FDQ	**14,950**	**W1AW**	**9,570**
W6OH	13,980	**KM7U**	**936**
W2HG	**13,715**		
W2FCR	9,464	**Dom. Rep.**	
K9RHY	**7,896**	**14 MHz**	
K3ZJ/4	**7,011**	**HI8LC**	**1,200**
KM1R	**5,824**		
W3GG	**4,142**	**Alaska**	
KØBJ	**2,847**	**All Band**	
WF5E	**2,520**	**AL7IJ**	**81,501**
W8EX	**1,944**		
KB2MK	1,296	**Costa Rica**	
K8PYD	1,215	**14 MHz**	
KA1DWX	1,118	**TI2LTA**	**20,952**
N6JM	777	TI2ANL	16,640
WU4G	598		
N2ATT	468	**Canada**	
WB4UBD	285	**14 MHz**	
W1QV	266	**VE3XN**	**13,532**
WD5CHB	100	VE6AGV	5,704
N4MM	36	VO1SA	4,800
		VE1CYL	2,310
21 MHz			
KA5W	**880**	**All Band**	
		VE7FJE	**11,340**
28 MHz			
K7SS	**4,485**	*Certificate Winners in Bold Face.	
WB6RZK	**4,472**		

tacts with OMs will not count. The same station may be worked on each band and mode for QSO credit. Phone and CW are different contests and require separate logs. Only 24 hours out of the 36-hour contest period may be used for scoring. Off times must be indicated in the log.

Exchange: Station worked, QSO no., RS(T), and US state, VE province or DX country.

Scoring: One point per QSO. Multiply total by sum of states, provinces and countries worked. Multiplier is counted once only, not once per band.

There is a power multiplier of 1.25 for stations running 150 watts or less on CW and 300 watts PEP on SSB. Multiply your score by 1.25 for your Final Score if you qualify.

There is a penalty of 3 additional contacts for each duplicate QSO removed from your log for which credit was taken.

Frequencies: CW—3555, 7055, 14055, 21195, 28195. SSB—3955, 7255, 14295, 21395, 28595 (plus or minus 15 kHz, and other frequencies used by DX stations.)

Awards: Four cups will be awarded to 1st place winners, DX and NA, on both phone and CW. And two plaques to the highest combined CW/SSB score, both DX and NA winners. Certificates to the 2nd and 3rd place winners.

Submit separate logs for each contest including a summary sheet showing the scoring, transmitter power and other essential information. The usual signed declaration is also requested. Entries with 200 or more QSOs should use a separate sheet for each band and include a dupe sheet.

Entries must be postmarked no later than May 2nd. This year they go to the new YLRL V.P.—Carol Shrader, 4744 Thoroughgood Drive, Virginia Beach, VA 23455 USA.

Israel A.R.C. DX Contest

0001Z to 2400Z Saturday, April 9

This is a new one organized to celebrate the 40th Anniversary of Israel's Independence. The objective is to work as many Israel stations on CW and SSB as possible.

Single operator category only. The same station may be worked on each band and mode for QSO and multiplier credit.

Exchange: RS(T) and QSO number starting with 001. Israel stations will include a three letter Zone code.

Points: Five points for each QSO.

Multiplier: (A) One for each prefix worked on each band. 4X1, 4X4, 4X6, 4X8, 4Z4, 4Z9, plus special ones activated for the contest. (4Z9 is the Novice prefix, CW on 7. & 21 MHz.)

Final Score: Total QSO points X Multiplier A + Multiplier B. (Multiplier A is counted on each band. Multiplier B only *once* regardless of contacts on other bands.)

Bands: All six bands, 1.8 - 28 MHz. CW 30 kHz up from bottom edge of CW bands. SSB should avoid net frequencies.

Awards: Certificates to Top scoring stations in each country, and Top three in each continent. Also to each station scoring at least 3,000 points. Special awards are also being considered.

There is a penalty of 10 points for each duplicte QSO not removed from the log, disqualification if overall score is reduced by more than 2 percent.

Use a separate page for each band and mode and a summary sheet showing the scoring and other essential information. Include 4 IRCs if you wish a copy of the results.

Entries must be postmarked no later than May 9th and go to: Israel Amateur Radio Club, P.O. Box 4099, Tel Aviv, 61040 ISRAEL.

Alabama QSO Party

1600Z Sat. to 2300Z Sun., April 9–10

This year's party is again sponsored by the Birmingham Amateur Radio Club, but is being held in April instead of the August date in previous years.

Each station can be worked on each band and mode, and mobiles and portables in each county change.Alabama to Alabama contacts are permitted for QSO and multiplier credit.

Exchange: RS(T) and QTH. County for Alabama; state, province, or country for all others.

Scoring: Two points for phone QSO, 3 points if on CW.

Alabama stations multiply total by number of states, provinces, countries, and Alabama counties worked. All others use Alabama counties for their multiplier (maximum of 67).

Bonus: Mobiles can add 500 points for each county from which 10 or more QSOs are made.

Frequencies: CW—1810 and 50 kHz up from bottom of each band. Phone—3900, 7260, 14300, 21360, 28400, 50110, 148.2, and 146.50 MHz. Novice—10 kHz up from low edge of each Novice band.

Awards: Certificates will be issued to *all* participants. Special endorsements for the Top scorers in each Alabama county, US state, VE province, and DX country.

Mailing deadline for all entries is May 15th to: Bill Levey, WA4FAT, 3164 Cahaba Heights Road, Birmingham, AL 35243. Include a large SASE for your certificate and contest results.

ARCI QRP Spring CW Contest

1200Z Sat. to 2400Z Sun., Apr. 9–10

Contest is open to members and non-members. Operating is limited to 24 hours out of the 36-hour period. The same station may be worked on each band for QSO and multiplier credit. Entries may be single or all band.

Exchange: RST and state, province, or country. Members will include their QRP number; non-members their power.

Points: Contacts with a member 5 points, with a non-member in the same continent 2 points, but 4 points if on a different continent.

Multiplier: US states, VE provinces and DX countries from all bands.

Power Multiplier:

4 to 5 watts output— × 2
3 to 4 watts output— × 4
2 to 3 watts output— × 6
1 to 2 watts output— × 8
Less than 1 watt out— × 10
Over 5 watts output—check log.

Power Supplier Multiplier:

Battery supply × 1.5, Solar or wind × 2.

Homebrew Bonus:

Transmitter + 200. Receiver + 300. Transceiver + 500.

Final Score: Total QSO points × (states + provinces + countries) × power supply multiplier + bonus.

Frequencies: 1810, 3560, 3710, 7040, 7110, 14060, 21060, 21110, 28060, 28110, 50060.

Awards: Certificates to the Top 10

scorers overall, Top score on each band for single band entries and Top score in state, province and country with 2 or more entries and score of at least 40% of average top 10.

Use a separate sheet for each band and a summary sheet showing the scoring, power output and other essential information.

Detailed rules and sample log form samples are available from K5VOL. Also copy of the results. Include a large SASE for each one please.

Logs must be postmarked no later than 30 days after end of contest and go to: Red Reynolds, K5VOL, 835 Surryse Road, Lake Zurich, IL 60047 USA.

North American QSO Party

CW: April 9 - 10 SSB: April 16 - 17
1800Z Saturday to 0600Z Sunday

Organized a couple of years ago to fill the void when the ARRL dropped its QSO party, the National Contest Journal is making this an annual affair.

The objective is to work North American stations but also open to other world areas. Non-N.A. countries do not count as a multiplier but may be worked for QSO credit.

Classes: Single and Multi-operator, both single and multi transmitter. Single operators are limited to 10 hours out of the 12 hour contest period. Off times a minimum of 30 minutes each. No limit of time for multi-operators.

Exchange: Name and QTH; state, province or country.

Scoring: Multiply total QSOs by the sum of the multiplier worked on each band.

Multiplier: US states, VE call areas (VO1, VO2, VE1 - VE8, VY1) and N.A. countries. (Do not count US, VE, KH6, KL7.)

Bands: All six bands 10 -160 meters.

CW: 1815 and 35 kHz up from edge of each band.

SSB: 1865, 3850, 7225, 14250, 21300, 28600. Try 10M at 1900Z and 2000Z, 15M at 1930Z and 2030Z, and 160M at 0430Z and 0530Z.

Awards: Certificates to Top scorers with at least 200 QSOs in each US state, VE area and N.A. countries. Three Trophies to Top CW, SSB and combined score from both CW/SSB.

There are penalties for taking credit for unmarked duplicate and unverifiable QSOs, and illegal or unethical operation. A score reduction in excess of 5% will be disqualified.

Use a separate check sheet for each band and a summary sheet showing the scoring and other essential information.

A more detailed copy of the rules and log forms are available from K8CC by sending a large SASE.

All entries must be postmarked no later than 30 days after each party and go to: Dave Pruett, K8CC, 2727 Harris Road, Ypsilanti, MI 48198.

Connecticut QSO Party

2000Z Sat. to 0200Z Mon., April 9–11
Off Period: 0500Z to 1200Z Sunday

Again sponsored by the Candlewood A.R.A. with the same rules as previous years except the multiplier. Now it's states instead of ARRL sections.

The same station can be worked once on each band and mode, portable and mobiles in each county change.

Exchange: QSO number, RS(T) and QTH. County for CT stations, state, province or country for others.

Scoring: One point for phone contacts, 1.5 points for CW, and 3 points if on Oscar. Club station W1QI is worth 5 points per band/mode. DX can be worked for QSO points but only 1 multiplier.

Final Score: CT stations multiply total QSO points by number of states worked and one DX multiplier. Others use CT counties for their multiplier (max. of 8).

Frequencies: CW—40 kHz up from low band edge. Phone—1860, 3927, 7280, 14280, 21370, 28370, 50.110, 144.200, 146.55 MHz. Novice—25 kHz up from low end of Novice bands.

Awards: Certificates to highest scorers in each state. And the WACC certificate for stations working all 8 CT counties.

Mailing deadline for logs is May 11th to: C.A.R.A., P.O. Box 143, Bethel, CT 06801.

Georgia QSO Party

2000Z Sat. to 2400Z Sun., April 16–17

Sponsored by the Dixie DXers the Club intends to make all 159 Georgia counties available. Special encouragement will be given to mobiles and Novice/Tech. stations.

Classes: Single operator fixed, mobile/portables both on CW and phone.

Exchange: RS(T), and QTH. County for Georgia stations; state, for non-GA, and country for DX.

Points: One point for phone QSOs, 2 points for CW, 5 points for Novice/Tech. The same station can be worked on each band for QSO points.

Multiplier: States, VE provinces (60 max.) plus DX countries (10 max.) for GA stations. Georgia counties (159 max.) for non-GA stations.

Final Score: Total QSO points from all bands times the sum of the multiplier.

Frequencies: C.W.—1810, 3550, 7040, 14050, 21040, 28050 kHz. Phone: 1860, 3830, 7230, 14280, 21340, 28450, 28550 kHz.

Awards: Certificates in each class to the Top scorers in each state and Georgia county, and Top scoring DX station in each continent.

Mailing deadline for logs is June 1st to: Al Roloff, N4UZ, Route -1, Box 204, Bremen, GA 30110 USA.

IBM QSO Party

0000Z Sat. to 2400Z Sun., April 16–17

This activity is open to present, retired, and immediate family member employees of the IBM Corporation. Competition is world wide for single operator and IBM Club stations.

Competing stations will call "CQ IBM." It is suggested that you send a large

SASE to Roger Root, KC7LZ, 6851 N. Skyway Drive, Tucson, AZ 85718 for a detailed list of rules and operating suggestions.

Following is a brief summation.

Categories: Single operation and IBM Club stations. CW, SSB, and Mixed. USA, Europe and other countries. Single operator stations are limited to 36 hours out of the 48 hour contest period, no limit for club stations.

Exchange: RS(T), QSO no. and IBM division, and location. Retirees use "retired" for their division.

Scoring: One point per QSO with stations in same country, 3 points if in another country but same continent, 5 points if country in another continent.

Multiplier: Is determined by number of different countries worked per band, and 4 US districts. (W1, 2, 3. - W4, 5, - W6, 7, - W8, 9, Ø.

Frequencies: CW—3550, 7030, 14050, 21050, 28050. SSB—3760, 3892, 3660 (DX), 7060, 7260, 14260, 21310, 28560.

Awards: A large assortment of certificates and plaques in several categories. (Check official rules).

Entries must be postmarked no later than May 30th. North America logs go to: Paul Burton, AA6Z, 877 Buchser Way, San Jose, CA 95125.

Other countries to: J. Motte, F6HMJ, 1185 Route de La Colle, 06570 Saint-Paul, France.

Swiss Helvetia Contest

1300Z Sat. to 1300Z Sun., Apr. 23–24

The Swiss usually try to activate some of the rare Cantons, so this offers a good opportunity to build up your totals for the attractive Helvetia Award. Confirmation of all 26 Cantons is required. Only contacts made after January 1, 1979 are valid.

All bands may be used, 1.8–28 MHz, phone or CW (but not the new WARC bands). The same station may be worked on each band for QSO and multiplier credit, but only on one mode, either phone or CW.

Exchange: RS(T) plus a three-figure QSO number. Swiss stations will also include two letters identifying their Canton. Abbreviations of the Cantons are as follows: AG, AI, AR, BE, BL, BS, FR, GE, GL, GR, JU, LU, NE, NW, OW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG, ZH.

Scoring: Each HB contact is worth 3 points. The sum of Cantons worked on each band is your multiplier (a possible total of 26 on each band).

Final Score: Total QSO points multiplied by the sum of Cantons worked on each band.

Awards: Certificates to the top scorers in each country and each USA and Canadian call area.

Indicate a Canton in a separate column for each band the first time it is worked. Check your log for duplicate contacts and include a summary sheet showing the scoring and your name and address in block letters. The usual signed declaration is also requested.

Mail your log within 30 days to: USKA Traffic Manager, Walter Schmutz, HB9AGA, Gantrischweg 1, CH-3114 Oberwichtrach, Switzerland.

Applications in the form of QSL cards for the Helvetia Award go to: Max Bindschedler, HB9MX, Strahleggweg 28, CH-8400 Winterthur, Switzerland.

1987 Helvetia Contest
North America Results

N8DE	6138	W5FO	612
WØZV	5304	WK4F	468
KA1DWX	4998	W5EIJ	192
K4MF	4182	WA3JXW	27
WAØUHQ	3078	NO4W	27
W1WY	1344	VO1AW	1782
W1END	1152	VO1CA	264

North Carolina QSO Party

1200Z Sat. to 0400Z Sun., April 23–24

The Alamance ARC (K4EG) of Burlington, NC is again sponsoring this one. The same station may be worked on each band and mode, and mobiles on each county change.

Exchange: RS(T) and QTH. County for NC stations; state, province, or DX country for others.

Points: One point for SSB contacts, 2 points for CW, and 5 points if with a Novice/Tech.

Scoring: NC stations multiply total QSO points by (states + VE provinces + DX countries + NC counties) for their final score.

Others multiply NC QSO points by number of NC counties worked (maximum of 100).

Frequencies: CW—3540, 3740, 7040, 7140, 14040, 21040, 21140, 28040, 28140. SSB—3860, 7260, 14260, 21360, 28360 kHz.

Awards: Awards and certificates will be made depending on number of entries received.

Keep logs in cronological order showing time, band, mode, call and exchange. Number each new multiplier in a separate column as worked and include a multiplier check list and a summary sheet showing the scoring and other essential information. Log forms available from K4EG for SASE.

Mailing deadline for logs is June 30th to: North Carolina QSO Party, c/o K4EG, Box 3064, Burlington, NC 27215. Include large SASE for copy of results and certificate.

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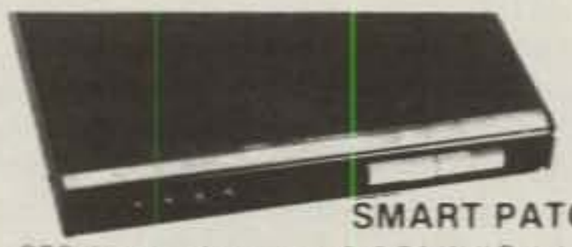

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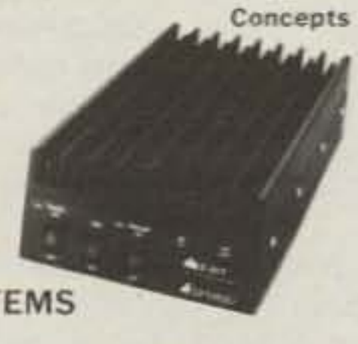

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DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATION AROUND THE WORLD

The wind passeth over it,
And it is gone,
And the DXCC thereof shall know it no more.
Deleted!

The Old Timer was in good spirits last week, stopping on his run down the hill and clapping us on a shoulder. "Sonny, the hounds of Spring are fast on DX traces," he jovially advised us, and we then knew that the long winter was over. It had been a hard one. Twice we had risen at daybreak and found frost on rooftops down the hill from us. But everything was now in bloom, the world gone green again and those harsh days of winter forgotten.

It was a time when DXers feel good and the Old Timer was showing it, filled with plans for the coming year and the DX to be worked. For awhile he sat and talked of other days and other Springs, even telling of the DX club down the peninsula. They were so overcome by the vernal months and the rites of Spring, that they would join in wild dances around their towers, weaving an intricate pattern with coax cables. When the Old Timer gets to such stories, we are at the limits of believing—at the limits, but we do not let him know. And now, even if he was beyond believing, it was good to listen to his DX tales. But all DXers know this and enjoy the tales the Old Timers tell. They just don't quickly believe them.

Once back in another decade we were tied into a weekly DX bulletin, and as DXers are known to be, we were shy about listing the subscription rates. To camouflage the harsh facts, long and involved recountings of DX happenings were used to soften the unwary DXer. While we softened the blow, we also found that many thought the tales were fables, parables, or perhaps even outright fabrications—like fiction. Our protests were in vain, our arguments that DXing is filled with wit and humor were not accepted, and our bespoken premise that every DXer is a treasure of funny stories was dismissed. But all of it was true, and all one has to do is get three or four DXers together and listen. We have listened for years and often to the Old Timer. It is always enjoyable when a couple of DXers get together. That is why most everywhere you go you will find ad hoc DXer luncheons. Look for them. That's where the good times always are. But this needs not be told again. Every true-blue DXer knows it. It comes with the DXCC certificate.

The hill here is a great spot for walkers and joggers, it rising almost a thousand feet from the center of the village. Even DXers are known to have walked the wooded roads or the hillside trails. And while we talked with the Old Timer, one of the time-worn DX types came by to pause and help remember the good times and the good stories being shared. This one delighted in telling of those other days, rolling off what to him were scraps of relevantly irrelevant DX information and gossip. As always, such are a delight to hear, the great days and the great times that have been long gone. He loved to talk of those who mattered in his DX world, but we had come to realize that his DX world was some years back. Still, he had seen DX in many forms and knew the shape of it from long memory. These days he was not very active.

77 Coleman Drive, San Rafael, CA 94901

When the Italians go DXpeditioneering, they go prepared. Here on a trip to the boundary of Mt. Athos and hoping for permission is on the left Dr. Giuseppe d'Aurelio, I0DUD. Pino is also an operator at HV3SJ and handles the station's QSLs. On the right is Tony Privitera, I0IJ, who has been on a large number of DXpeditions over the years. Look at the grip on the microphone! Look at the supplies in the back. They go prepared for DXing!

"A real DXer always builds his own equipment," we had heard him say many times. If you had lived in those days when much of the amateur equipment was home-built, or could be built, you would sit and nod your head in agreement. Eventually one remembers the changes, how about the time that sideband came in and AM went out, there were changes far beyond just the changing of the voice mode. *Homebrew* was a term less heard as the circuits became more complex. Even those trying to change over to sideband with the aid of an outboard kit encountered recurring problems. Technology was changing, and the advent of the semiconductor speeded up the changes. Amid all this there developed a wariness in investing in components to build your own gear, and more so when the chances of success or even satisfaction were unsure. The trade-in value of such homebrew efforts was minimal, often leaving the industrious amateur with little more than frustration."

But a real amateur can build his own gear," this vintage DXer would insist, and sometimes we agreed with that premise. But first we wanted to know just what a "real amateur" might be, and we quickly learned that included in the basic qualifications was an EE degree. "But those are not amateurs," we protested. "They are professionals." We were sharply set down with the retort: ". . . but they build their own gear, don't they?" The rebuttal had such unanswerable logic that we had to drop the subject.

Another qualification applied to the standard used to judge amateurs was the callsign. All true-blue DXers would have 1×2 calls. While a 1×3 call might be acceptable sometimes, it was at all times suspect. We could yet remember his smile of triumph when the first "K" prefixes were issued. "See," he had said gloatingly, "the FCC is even identifying them these days. By their calls ye shall know them!"

What could be said to beliefs such as that? After all, a 1×3 K-call could be better than no call at all, couldn't it? But many thought otherwise, and old issues of *QST* from the mid-fifties still smoke from the indignant letters written by some receiving the first "K" callsigns. You can imagine the shock felt by those receiving the "WA-" callsigns. Unbearable! At least some thought so back then.

This might seem to be reaching back a bit, but one still encounters the thought. Years back we got a different perspective, getting acquainted with another amateur on 75, this one living out on the coastal area of the county, now part of the Pt. Reyes National Seashore. As he said he was less than mobile, he suggested we come over for a visit. After all, this one had a "WB6" callsign and might really need some solace.

Taking another DX type along, we found his home up the side of a mountain, a burro braying in the back. This one was called "Doc"—not medical, the PhD type. He had some medical problems, losing a leg below the knee from diabetic complications. He was a delight in conversation, and we spent the morning talking about most anything at all. Seems that Doc was retired, obviously, but he had been the Director of Research at the Chevron Refinery installation across the bay. Prior to that he had been with Dr. Lawrence at the University of California at Berkeley and had worked with Lawrence in the early work on radiation. Doc held three advanced degrees—mathematics, physics, and chemistry—two of them PhDs. And he had a WB6 callsign.

In our own mind we always remember Doc Stewart as perhaps the perfect amateur. He could build his own gear and his own TV set. He could build his own house and shoe his own burro. He could also make jokes and tell humorous tales, and that was perhaps the best of all. And he offered to prove even the most obtuse matters mathematically, such as how we could have worked Don Miller on Heard Island with the beam at 350°. It was something about the van Allen belt and the energy sphere around the earth being somewhat doughnut shaped. As we could not have understood the mathematics, we passed up the opportunity. Later on all we had for our memory was the fact that ". . . it might have been possible." If only Don was there!

All of this ability with a WB6 prefix. Some might still wonder what Doc might have done had it been a 1×2 call. Even the time-worn DXer still on our hands might have been impressed if such had happened.

So on a constructive move, we asked, "Doing much DXing these days?" He admitted that he was not active. "It's the Sears Roebuck op-

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Endorsements

VPX: 550 WDX4KEF. 600 WDX4KEF. 650 WDX4KEF.

Mixed: 450 HA0DU, K5HYB, G3DCC. 500 HA0D7, K5HYB, G3DCC. 550 KA8MVJ, HA0DU. 600 OZ4ZT, HA0DU. 650 OZ1ACB, HA0DU. 850. HA0DU, VE3NBE. 900 HA0DU, W9IL, VE3NBE. 950 HA0DU, KB0G, W9IL. 1000 HA0DU, KB0G, W9IL. 1050 JA1-20784, HA0DU, KB0G. 1100 JA1-20784, HA0DU, I2YWR. 1150 HA0DU, N2CIC. 1200 HA0DU. 1250 HA0DU, OK3IF. 1300 HA0DU, OK3IF. 1300 HA0DU, OK3IF. 1350 HA0DU. 1400 HA0DU. 1450 HA0DU. 1500 HA0DU. 1550 HA0DU. 1600 HA0DU. 1650 HA0DU. 2150 N2AC.

S.S.B.: 350 G4SVB, K3NEE, JF2MVI, KY3V. 400 N7JB, G4SBV, G0DZS, KY3V. 450 G4SVB, KY3V. 500 K3ZPG, G4SVB, K8KUH, KY3V. 550 KY3V. 600 NE8Q, KF4FP. 650 KB0C. 700 KB0C, KS3F. 750 CT1CDL. 800 K9BQL, SM5BMB, CT1CDL. 850 SM5BMB. 900 SM5BMB. 950 SM5BMB. 1000 SM5BMB. 1050 SM5BMB, N2CIC, KZ2P. 1150 KK0L. 1200 KKOL, I1HAG. 1250 KK0L. 2400 K2POA. 2550 ZL3NS.

CW: 350 K0SI, JA7OYM, LZ2VP, G3DCC. 400 K0SI, JA7OYM, LZ2VP, G3DCC. 450 K0SI, LZ2VP, NK2W. 500 K0SI, LZ2VP, SM5BMB. 550 K0SI, LZ2VP, SM5BMB. 600 LZ2VP, SM5BMB. 650 ZS6BCR, SM5BMB. 700 SM5BMB, ZS6BCR. 750 ZS6BCR, G3VQO, SM5BMB, EA5QR. 800 ZS6BCR, OK2BFX. 850 OZ5EDR, JA7FFN, OK2BFX. 900 SM5DAC. 1050 W9PWM. 1500 OK1TA. 1550 OK1TA. 1650 K8MFO, OK1TA.

10 Meters: HA0DU, SM5BMB
15 Meters: JA7OYM, HA0DU, SM5BMB
20 Meters: HA0DU, OK2PBN, SM5BMB, OZ4RS
40 Meters: JA1-20784, HA0DU, PY2DBU, SM5BMB
80 Meters: JA-20784, SM5BMB
160 Meters: SM5DAC

Asia: OZ4ZT, K3UA, JA7DYM, SM5BMB
No. America: K0SI, G3VQO
So. America: OK3MB
Europe: K0SI
Oceania: K3UA, K0SI, SM5BMB

Award of Excellence Plaque: PY2DBU

Award of Excellence Plaque Holders: K0JN., W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN41, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, WL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, WK9NS, DE0DXM, DK4SY, UR2**, AB9O, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU.

Award of Excellence Plaque Holders with 160 Meter Endorsement: LA7JO, W4VO, K6JG, W4CRW, N4MM, SM0AJU, KF20, K5UR, OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY, W5UR, N4NO, W8RSW, N4KE, I2UIY, W8ILC, W1BWS, NN4Q, G4BUE, LU3YL/W4, I4EAT, VE7WJ, W9NUF, N4NX, VK9NS, DE0DXM, K9BG, AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I3JQJ, W3ARK.

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.

How does one tell a DXer? Some say very easily. Just look for those wearing the seat of their pants cut knee length. But this photo of the National Capitol DX Association does not seem to fit that pattern. Perhaps we should have asked them to turn around. From the left: Craig Stevens, KZ3H, secretary; Tom Hutchinson, W4PBC, vice-president; Henry Herman, W3UJ, treasurer; and Kenneth Miller, K6IR, president. With 75 DXers, the Capitol DX Association is often heard in contests and DXpeditions.

erators you find on the air these days that get me," was his reply. "All they are capable of is buying the gear and getting someone to help them put it on the air. And they think they are amateurs. Heck! Most of them don't even work CW. That's what cools me off. Maybe I'll listen once in awhile, but I won't be bothered with those appliance operators. Not me. You betcha!" We could almost date his thinking by his words. Sears Roebuck has been known as simply "Sears" for some decades.

When one is in the presence of such venerable wisdom it is often a good policy to withhold comment. But this was not enough for the Old Timer. "How about CW?" he had to ask "Aren't you still working your favorite mode?" The visitor shook his head. "Try to work someone these days, and all they do is criticize your signal. None of them know what a good signal sounds like. That's something else that burns me. DX simply has gone to the dogs, and that includes CW!"

There was no effort to push the point. Most DXers learn that while the times might change, there are those who themselves have not changed with the times. The technology as well as the gear has changed tremendously in the last quarter-century, but some cling to the past, and usually an idealized past. Mostly one will learn that those days were hardly as good as they are remembered, and the CW signals back then were not as clean and sharp as they are now.

Later when the silenced but not yet Silent Key had gone, the Old Timer lingered to enjoy the April sunshine. "Do you ever wonder if he will get active again?" we asked, and the Old Timer shook his head. "We live in many worlds," the Old Timer said, "and his world, the one he remembers, is gone forever, but he is reluctant to admit it." When we were silent in thinking about this visitor's world and our current world and the changes, the Old Timer waited for us to get our slow thought processes moving.

We knew that this one still wished to live in a DX world he once knew, a DX world a quarter-century or even more gone. He always prided himself on building his original gear and was quick to mention the fact. But the DX and the amateur picture changes. Definitely the technology has changed, and many if not most do not now consider it a sin or a technical weakness to seek professional help and commercial gear. Often a DXer can deduce the cause of a problem and can do what might be needed to right things. But there are limits to what many can do without professional help and sophisticated test gear, and a DXer learns his limits and where and when he might need help. Often they are not very smart to cling to beliefs that things are otherwise.

All this was mentioned to the Old Timer. One can earn an amateur license, at times even a high class one, but still not be deeply competent in electronics. Many can assemble a station, operate their gear and do it well, understanding how the components should work making them work. They learn a great deal about antennas, feedlines, ground systems, and antenna tuning. They learn a lot of other things that make them competent. But they do not build their own gear. We pointed all this out to the Old Timer, and he nodded in agreement.

"During the winter I talked with a DXer from down county," he said, giving the DXer's call.

The WAZ Program

15 Meter Phone

251	JA4OYR

20 Meter Phone

639	KS3L	642	AA4AH
640	N5BCL	643	NT9H
641	JA1ASO	644	DL1RBW

40 Meter Phone

43	JH1QYT

15 Meter CW

121	SM4FZC	122	I4EAT

20 Meter CW

274	NY2E	277	VE7DX
275	KA8JZR	278	I4EAT
276	OH4OJ		

40 Meter CW

69	JA1UPT	70	JA8DNV

80 Meter CW

12	W0ZV	14	JA3FYC
13	JA8DNV		

All Band WAZ

SSB

3160	JA7FWR	3164	I8LWL
3161	WA7CYP	3165	JS1HEM
3162	AA4AH	3166	I2HOZ
3163	KA3GMP		

Phone/CW

6222	JI1XTZ	6233	N6IV/KL7
6223	JA7FWR	6234	DJ8ET
6224	HG19HB	6235	DJ2PT
6225	WD5COV	6236	DL8OL
6226	JO1QUB	6237	SM3GSK
6227	JA2AHH	6238	JA2IHS
6228	HB9DAX	6239	SM7BYP
6229	OK1DKW	6240	IK2AGX
6230	WB3AVN	6241	DF2VO
6231	WA0GUD	6242	YU2ZZ
6232	JJ2BBZ		

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

"And last year he bought one of those Ten-Tec amplifiers. Maybe you know about it?" We did not, but were ready to learn.

"Well," the Old Timer continued, "the Mighty Titan did not seem to be working right when he set it up, even the needles not moving as expected. Calling on the expertise of the local DXers did not help. Guess what he did then." And while we had more than once been dazzled by the technical levels of some amateurs, we also knew that sometimes they were not around when needed. "Sent it back to the factory?" we ventured. The Old Timer shook his head.

"Not quite. But he did go back to the Dayton Hamvention just so he might talk with a factory rep. Would you say that was an expensive trip?" We had to think over that one.

The Old Timer was not going to wait for us to work out that one. "You know, of course, that linear has a pair of 3CX800A7 tubes, don't you?" We acknowledge that fact was known to us, naturally.

"You are up on things," the Old Timer graciously conceded, "but do you know the list price on those tubes?" We did not, but suspected that it might be a reason why a DXer with a new Titan amplifier might approach it with a lot of caution, especially if there were any possibility of blowing one or both of those ceramic beauties.

We had a final question when the Old Timer made a move to depart. "How about the eternal question of building your own gear? Isn't that sort of implied in the license, the amateur license?" The Old Timer let the question dangle a bit before deigning to reply.

"You know, the times do change, but many of the questions do not," he finally said. "Years back when you were really young, there was little commercial amateur gear on the market. The circuits used then were comparatively simple, the construction not too complicated, and the investment minimal. And while some may voice the idea that one should build, test, and operate only what they themselves have built, in the light of present-day technology the idea is a bit far-fetched. Don't you think so?" We did. In fact, we could not even recall one of our acquaintances who was running homebrew gear.

"As for your amateur license," the Old Timer continued, "how many times before have I asked you the question '. . . does the FCC issue an operator's license or a constructor's license?' Don't you remember?"

Of course we remembered. We even remembered when an FCC engineer had told us the same thing. But we liked to hear it again. Perhaps it was a need for reinforcing.

Later when the Old Timer had continued down the hill and we were thinking of our discussions, we got to thinking of what it might take to build something simple, say something approximating a Ten-Tec amplifier. That would be nice with those big ceramic, air-cooled tubes. Then we got to thinking of how much it would cost for parts and whether we would be willing to pay for the experience.

Then we thought of what it would be like should you blow one of those tubes. And maybe if you blew both of them.

We thought also of the experience one could gain and the fun it would be. Any true-blue DXer would consider the cost of a couple of 3CX800s, maybe even more, well worth the cost. Right?

Long a moving force in DX, this is Bill Bennett, W7PHO, who became a Silent Key in December. A true-bluer DXer, W7PHO suffered a heart attack while at his rig. Here, in another day, Bill is working DX on the Family Hour. He was always where there was DX and DXing. (N6AIT photo)

W7PHO

Bill Bennett, W7PHO, became a Silent Key on December 23rd, suffering a heart attack while in communication with TI8CBT and discussing the TI9-Cocos operation heard in December.

In the northwest W7PHO was a DX mover, and he moved a lot of DX over the years on the W7PHO Family Hour. This was an especially good area to watch for Pacific DX, but it also drew in DX from a lot of other areas. One had but to see Bill in action at a DX convention to realize that this was a big gun in DXing, ready to push where needed, quickly and loudly to advise when anything affecting DX might show. He was a DXer and he did not hesitate to let anyone know it. Most DXers instantly recognized his call. Bill was also quick to recognize a lot of DXers.

In early years Bill had been a businessman in the construction industry, being a contractor in sheet-metal. Retirement hardly slowed his drive and enthusiasm. He traveled extensively with his XYL, Ruth, in a large recreational vehicle, and he was at the Northwest DX Convention every year. He lived in the southern part of Seattle.

Many feel a loss at the passing of W7PHO. He was a DXer who worked hard for DXing. He also worked hard to help others. Bill was one of the best.

Zanzibar

5H1HK has received his amateur license and will be on the island until the Spring of 1989—maybe even longer. Initially only on 40 CW, Mas moved on to the other bands when he got his antennas set up. He likes both CW and SSB and contests and indicated his intention his intention to jump in on the *CQ* WPX Test and the *CQ* WW DX Tests. The gear includes an FT757, an FL2100Z, a TA33 tribander beam, plus dipoles for the lower bands. QSLs are handled by Junichi Tanaka, JH4RHF, whose call is okay in the late callbooks, but you will also find it in the information section of this month. Check around 379 kHz after 2215Z.

Some might remember that up until 1974, 5H1 Zanzibar was a counter for DXCC, it also being worked under the VQ1 prefix while under British control. Now it counts for Tanzania, that coming when Tanganyika and Zanzibar were combined into one country. For years after the ongoing changes on the edge of the Indian Ocean DXers would loudly ask why Zanzibar was still counted as a DXCC country when obviously the country criteria was not being met. They finally got their answer. It doesn't.

DX Nets/World List

Dieter Konrad, OE2DYL, has recently completed his seventh edition of "DX Nets Around the World, List 7." It lists more than 100 active nets in DX activity. Three dollars (U.S.) brings the latest edition. His address is: Dieter Konrad, OE2DYL, Bessarabierstr 39, A-5030 Salzburg, Europe.

Conventions

There are always the big ones every Spring, these starting with the International DX Convention at Visalia, California, which this year runs Friday, April 22nd to Sunday, April 24th. Again it will be held at the Grosvenor Holiday Inn. The Southern California DX Club will be the host club.

If you are planning to attend the DX Convention, hotel reservations should be made directly and not through any 800 number. As practically the entire hotel is reserved for DXing, those calling any 800 number usually get the information that there are no reservations. Go directly and tell them that you are a DXer, and the magic kingdom will be opened to you. Don Bostrom, N6IC, 4447 Atol Avenue, Sherman Oaks, CA 91423 is handling the convention registrations, so go directly to him. The program, always extensive, will include G3FXB talking on his travels in the Soviet Union.

A week after the International DX Convention will be the Dayton Hamvention, this running through the last weekend in April (April 29th to May 1st). The Southwest Ohio DX Association will again host the DX dinner during the Hamvention weekend, this being held at Stouffers Dayton Plaza Hotel on Friday, April 29th. Jay Slough, K4ZLE, will be the Master of

5 Band WAZ

As of January 1, 1988 158 stations have attained the 200 zone level.

New recipients of the 5 band worked All Zones:

N5DX

The top 11 contenders for 5 Band WAZ are:

1. N4WW, 199
2. K6YRA, 199
3. SM0BZH, 199
4. W8UVZ, 199
5. K4CEB, 199
6. SP6JCY, 199
7. FM5WD, 199
8. W2YY, 198
9. W7UR, 198
10. K9GX, 198
11. G4BWP, 198

441 Stations have attained the 150 Zone level, as of January 1, 1988.

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FLASH

MIRAGE NEWS

NEW PRODUCT NEWS

Vol. MCMLXXXVIII — Fact Sheet — February 1988

Morgan Hill, CA

NEW IMPROVED HEAT SINKS FOR ALL MIRAGE AMPLIFIERS

One of the biggest problems with transistor amplifiers is thermal overload – during extensive key down operation the amplifier will shut down due to excessive transistor heat build up. MIRAGE'S new heat sink uses a special manufacturing process to imbed copper in the aluminum body. Copper is 2.5 times more conductive than aluminum and ensures more rapid and even heat dissipation throughout the heat sink. By reducing the amount of heat in the amplifier, transistor life has been significantly improved. The extra margin of safety means you don't have to worry about shut down during long winded FM conversations or RTTY operation.

Morgan Hill, CA

NEW 360 WATT 2 METER AMPLIFIER

Here's a new amplifier active 2 meter operators will want! Designed with the DX'er in mind, the new B3036 amplifier gives a full 360 watts output with just 30 watts of drive power. Also includes a low noise (.5dB) GaAs FET pre-amplifier with a helical resonator front end. Uses MIRAGE'S new copper/aluminum high dissipation heat sink with built-in fan for extra protection and heat transfer. The unit measures approximately 13" x 5⅜" and is powered by 13.6 volts DC at 40 amps. Carries the MIRAGE five year warranty, one year on transistors.

Morgan Hill, CA

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RG-213	.31/FT.	"	.29/FT.
RG-8X	.19/FT.	"	.17/FT.
RG-214	.80/FT.	"	.75/FT.
Ladder Line, 450 OHM			.12/FT.
8 Wire Rotor Cable			
Reg. (2, #18 & 6, #22 GA)			.20/FT.
Hvy. Duty (2, #16 & 6, #18 GA)			.30/FT.
Connectors			
Amphenol PL-259	$.80 ea		10/$7.50
Silver Plated	$1.20 ea		10/$11.50
Teflon	$1.30 ea		10/$12.50
"N" Type Connector For 9086-9913	$3.75 ea		4/$13.00

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MODEL 1422 - For any channel between 14(A) and 22(I) (Tuning range 120 - 174 Mhz)

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The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00 (U.S.) for each mode, with no fees required for up-dates.

MIXED

3272	YU2AA	2007	YU1AB	1515	N6JM	1185	W4UW	904	YU7DR
3252	F9RM	2006	K0BLT	1484	SM3EVR	1159	AI8S	892	K9BQL
2953	K2VV	2006	WA8YTM	1470	K8LJG	1156	N8BJQ	883	I2EAY
2875	W2NC	2002	I8YRK	1458	W8UMR	1156	N2CIC	877	I2CZO
2661	K6JG	1946	EA2IA	1451	KL7AF	1153	N2AIF	872	W2XQ
2606	VE3XN	1945	W9NUF	1436	I1POR	1150	YU1GR	846	W9JBR
2502	K6XP	1924	K5UR	1415	G4FAM	1127	JA6GWU	839	I5ZTC
2416	W9DWQ	1915	YT7DX	1405	DK5AD	1102	VE5FX	812	G4SDJ
2402	W4BQY	1859	PY1APS	1374	W6OUL	1083	DF6EX	791	YT7WW
2401	N4NO	1799	IN3ANE	1366	K2POF	1080	WD9IIC	759	OE1KJW
2488	YU2TW	1776	PY4OD	1345	YU7AJD	1074	VK9NS	747	KD8IW
2297	N4MM	1764	K9BG	1304	AB9O	1067	I1WXY	729	G4OBK
2270	N6JV	1736	W0SFU	1300	AC2J	1066	NE6I	726	KI8B
2128	N6CW	1701	I2UIY	1293	SM0AJU	1054	I1EEW	715	K6UXO
2123	I2PJA	1676	KF2O	1279	SM6CST	1010	I0AOF	700	YU1PJ
2204	N9AF	1675	N5TV	1279	3A2LF	1007	AI6Z	696	W9IAL
2072	I2PHN	1659	HA0DU	1269	K2OLG	1007	KS0Z	695	W5ASP
2056	YU7BPQ	1593	I2MQP	1246	YU1SZ	1004	PY2DBU	668	N3KR
2047	W1NG	1553	SM6DHU	1227	WB8ZRL	1000	KI3L	665	KC7EM
2032	N2AC	1549	IT9QDS	1193	YU2TY	914	EA1CIM	637	F6HMJ
2020	SM7TV	1541	W5PWG						

SSB

3174	F9RM	1681	WF4V	1258	W2NC	1035	WB8ZRL	759	K8ZZU
2837	I0ZV	1655	CT1LN	1257	KK0L	1032	PY4VX	758	I3ZSX
2509	K2VV	1638	K5UR	1249	EA8AKN	1020	SM0AJU	755	IT9ONV
2442	ZL3NS	1578	I4CSP	1207	I1POR	1020	I8WYD	726	NE6I
2368	K6JG	1573	I2MQP	1204	KC8YM	1003	I1EEW	721	KB0C
2334	K2POA	1553	W1NG	1200	KL7AF	993	AG2K	710	N2AIF
2262	CT1UA	1549	WA8YTM	1187	W4UW	984	W0ULU	698	KC2FC
2210	K6XP	1538	ZP5JCY	1178	SM6DHU	981	K8LJG	698	G4KHF
2191	I0AMU	1533	NJ0C	1172	CT4UW	972	WA2FKF	698	I2KKL
2120	I2PJA	1532	WA4QMQ	1167	K5RPC	962	W3GXK	694	AI6Z
2073	N4MM	1507	W9NUF	1144	I5ZJK	942	I2EOW	675	IK2DUU
2053	I2PHN	1457	CT1FL	1131	N6FX	930	N4IB	661	VO1AW
2048	W0YDB	1450	G4CPJ	1129	N2AC	900	I2TZK	659	I4UFH
2005	I3ZKD	1412	W3ARK	1122	CT1BY	848	K3IXD	657	KE6KT
2000	WD8MGO	1406	KF2O	1110	EA4KK	828	W6OUL	652	CP8HD
1872	VE1YX	1399	EA2IA	1106	AB9O	825	G4SDJ	650	W5ILR
1844	OZ5EV	1397	I2UIY	1081	IK5ACO	813	WN5MBS	642	OE5BGL
1825	N4NO	1387	XE1OX	1060	CX9CO	808	KK5P	631	YV1CP
1820	CT4NH	1350	N5TV	1055	N2CIC	792	Y3CEV	622	SM6CST
1808	W4BQY	1350	G4CHP	1050	F6BVB	790	K9BQL	611	HR1FC
1761	I8YRK	1343	AC2J	1048	PP2ZDD	779	CT1AHU	605	VK9NS
1750	W9DWQ	1305	I8KCI	1047	EA3AQC	766	I0PSB	600	KB4HU
1717	I8YZP								

CW

2621	W2NC	1674	YU7SF	1289	JE1JKL	984	DJ1YH	777	EA5QR
2415	K2VV	1672	YU7BCD	1259	IT9VDQ	969	LA9XG	753	I2EAY
2271	WA2HZR	1659	LZ1XL	1224	N6FX	969	G4FAM	743	NE6I
2247	N6JV	1584	N4MM	1160	K2POF	967	SM5DAC	743	G3VOO
2134	ON4QX	1554	VO1AW	1151	SM6CST	940	SM0AJU	715	W2XQ
2092	N4NO	1548	EA2IA	1138	I2UIY	940	W6OUL	707	WB8ZRL
2029	W3ARK	1525	K5UR	1131	KF2O	934	TI4SU	709	W0JIE
2014	W9DWG	1519	PY4OD	1125	SM6DHU	915	AB1U	707	WB8ZRL
2010	K6JG	1500	W9NUF	1117	I7PXV	905	VE1ACK	705	OE1KJW
2004	VE7CNE	1488	I1YRL	1050	KL7AF	871	AI6Z	656	K6UXO
1973	N6CW	1414	N4YB	1047	W1WAI	854	KN7K	644	JA2GCW
1895	W4BQY	1394	WA8YTM	1026	K8LJG	849	CT1LN	634	OZ5UR
1889	G2GM	1350	N5TV	1026	F6HKD	839	ZS6BCR	625	W6YMH
1880	K6XP	1327	KA7T	1011	AK9Z	813	VE4AEX	622	LZ2VP
1801	N2AC	1309	I2DMK	1001	AK2H	800	I8YRK	602	VK9NS
1779	OZ5EV	1292	W1NG	997	W9PWM			602	G4SSH

Ceremonies for the DX banquet. The Southwest Ohio DX Club will also be working to put the DX Forum together. The banquet runs $20.00 per person, and you can nail down a spot by making a reservation with K4ZLE, 8183 Woodward Drive, West Chester, OH 45069.

Any DXer thinking right will make sure that these events do not get by him unnoticed. The good times roll when DXers get together. At the above you will find DXers five deep. The Southwest DX Association has been out to help the Deserving. W8KKF and W6CDR were at C6A for the *CQ* WW DX SSB fling in October signing W8KKF/C6A. In November a big delegation of the honorable DXers headed for St. Lucia to sign J6DX in the *CQ* WW CW DX Test, making over 10K contacts. They had enough energy left to try the 160 Test, but report things did not develop as hoped. Wynn Rollert, W6CDR, heads the club as the president. Steve, WD8IXE, is the vice-president, W8OK is the secretary, and Jay Slough the treasurer. Jay states that they are not only honorable, but also Deserving. They must be DXers. All DXers are honorable and Deserving.

From The U.K. Desk

Some months back there was mention of the possibility of a visitor to England obtaining a temporary operating permit. It was possible then; it is not now. Jerry Bliss, G0CLY/K6SMH, advises that a few months back when he tried to line up a temporary license for W2NSD, alas, things have changed. The word came back to go via the reciprocal license route. Jerry phoned the G licensing authority and the change was confirmed.

Jerry is at the Menwith Hill Station. The locals at the base have the Darley Amateur Radio Club (DARC), and G0FOS is the club station call. Often active in the DX tests, the station also participates in a number of special event activities, usually with special callsigns.

This July 4th they will again sign GB4JUL to mark the holiday, having done this for a number of years. During the Boy Scout Jamboree-on-the-Air the club station will be signing GB2BSA. In November and December the club holds open house, and GB2TEN is the callsign used during this time. Some of the calls held by the members of the Darley Club include G0FWG, G0FHP, G0CLY, and G4YGN. Former member G0CQW is now signing NA5E back in the states, and is an editor at *73* magazine.

Jerry, G0CLY, is a member of the Northern California DX Club and signs the K6SMH when home at Saratoga in the Silicon Valley area.

Aruba

With many poised to submit an Aruba QSL for DXCC credit the first of April, there are a couple of requirements other than just the Aruba card itself.

If you already have DXCC credit for Netherland Antilles, you will have to resubmit a Netherland Antilles card. Thus, you should have a creditable Aruba QSL and a card confirming contact with Curacao or Bonaire, or maybe even a card from Aruba showing a contact dated December 31, 1985 or earlier. Therefore, your Aruba contact should be January 1, 1986 or later. If you have that and a card from Curacao or Bonaire, you are in there with the biggies. Remember, they will not be accepted until April 1, 1988.

As long as we are looking in that direction, don't forget that John Thompson, W1BIH, has currently been active from Curacao signing /PJ2 and will be there until April. Once you get this one out of the way you can stop worrying about the additional requirements. Back to DXing!

An Awful Lot of DX Notes

Some may wonder if DX was always like this, intrepid DXers heading in most every direction and a lot of exotic stuff on the air. Some will claim that it was, telling you, "... why, back then you could work the world around the clock on 10 meters." And if you believe that, you will believe anything.

However, there is a lot of good DX developing, and while you might not work it all on 10 meters, the other bands will supply the action, all or almost all you will need.

What do the DXers on Signey Island in the South Orkneys look like? Take a look. Here are enough VP8s to fill any DXer's log. From the left, front row, are Ali, VP8AOG, and Alan, VP8AOF. Second row shows Steve, VP8AOC, and Steve again, VP8AOB. Back row shows Nick, VP8AOD, Roland, VP8AOH, John, VP8AOE, and Dennis, VP8ZR. The photo was taken in winter, the island isolated in the Antarctic ice pack. KØJW has the logs for all these stations and would like to hear from any needing QSLs. (KØJW photo)

The Colvins were in Nepal in January signing 9N5QL. By now they will have been heard from other stops in Asia. YASME is the QSL route. Their DX plans are announced with short notice; as they finish one operation they will announce the next. This is good for DX bulletins, but a bit difficult for we long-range finger-pointers. If you need something to keep you posted, don't forget W6TI DX announcements, 14001 kHz at 0200Z Mondays. They are close to YASME, the Northern California DX Club, and are good for updates on the Colvins.

VE3CPU is making plans for Palmyra this year. Joe has a large sailing vessel lined up and the dates are not final. Early in the year Joe was looking for some additional operators. This may also include Kingman. The Canadian *Long Skip* reports that if this one does not jell, Joe will head for 8Q7—the Maldives.

What's a "large sailing vessel"? Some will say that it is anything over 30 feet in overall length. Then there was the DXer who was a retired Chevron tanker captain who said he would not go out the Golden Gate in any ship less than 300 feet in length. It's like DX—relative.

With DX a relative thing, some even consider XF3, Revilla Gigedo rare DX, this being relative to whether or not you are a European DXer. OH2BH is polling the Deserving there to see if they still thirst for this one and if a major effort would be justified.

Jim Smith, VK9NS, does have a letter of Permission and Agreement from the U.S. Department of the Interior, this necessary to the planning for a trip to Baker and Howland Islands. This will be a joint trip with the Fish and Wildlife Service of the Interior. The time was aimed at this March, but it could slip a bit. But be prepared!

The logistics for such efforts where there are little or no local support facilities can be very complex. Everything for the Baker/Howland effort will have to be carried to the island; every contingency will have to be planned for.

Inevitably, this runs up the costs. Jim notes that the costs will be impressive, and any positive help will be acknowledged. As much of the expenditures will have to be "up front," one can realize the extent of the planning that has to be covered. Sometime in March. The time is at hand.

If you go to the meetings of the Southeast Michigan DX Association, you will meet Wayne Wiltse, K8BHP, who comes prepared with operating largesse to hand out. Included in Wayne's DX package will be a beam-heading chart based on southeast Michigan and showing the *CQ* Zones for WAZ, a great-circle beam-heading chart based on the area, DXCC countries by *CQ* Zone, DXCC 5-Band DXCC tally sheet, and his own K8BTH Russian oblasts by prefix, number, zone, and beam heading. There is also a list of *CQ* magazine's DX Awards; a list of known Zone 2, Zone 23, and Zone 24 stations; and applications for the *CQ* awards, the Golden Jubilee Award, and the 200-WAS Award. What else would one need? That Golden Jubilee Award ended at the end of last year, but Wayne had it when needed.

Ken Boyd, WA4UNZ, is the new president of the Carolina DX Association, he being the only new face among the officers. Holding on for another term are Skip Richardson as vice-president, Bill Jennings, W4UNP, as treasurer, and Rober Burt, N4ZC, as net manager. The club is considering setting up a 2 meter packet system to collect and disseminate DX information. There is even talk of establishing a connection with a similar node in the Charlotte area and hooking in with Atlanta.

HI500UD was a special callsign celebrating the 495th anniversary of the discovery of the island of Santa Domingo. The Worked All VK1-Ø Award is available from the Heard island DX Association. You will need one Heard Island contact, two confirmed with VK1 to VK8, and two confirmed contacts with the VK9s, Cocos-Keeling, Melish, Lord Howe, Norfolk, Christmas, or Mellis. Some might remember that VK9NS is at 14220 kHz at 0600Z just about every evening. But that one won't count. You will also need a VKØ contact with an Australian Antarctic or MacQuarie Island. Heard Island can be any contact. All the others must be HIDXA members. If you need a list, send $2.00 to HIDXA, Box 90, Norfolk Island, Australia 2899. You might also listen at 14220 kHz/0600Z, as there often is a lot of Pacific DX there, and the Baker/Howland effort definitely will be on that frequency at times.

There you are out on the desert and you meet a herd of camels and camel drivers. What do you say? "Seen any DXers lately?" Right? You would find a couple in this crew. Take a look at the big fellow second from the left. Doesn't that look like Marty, OH2BH? And the two in white T-shirts covering the flanks, they look like Arseli Etxeguren, EA2JG, and EA2ANC from the Lynx DX Club. The second from the right is Naama Zeine-Eddine, who signs SØRASD even yet at 14183/2000Z. Just ask. You will find DXers everywhere!

Recently there has been ongoing speculation about some possible Marion Island activity. A month or two back, George Collins, VE3FXT, was saying that he was going probably in March. Some ZS's doubt a permission to land there can be obtained. Will he or won't he? By this time you should know. Work every Marion Island station you hear. One of these days there will be a good one, maybe this March.

The W5YI reports on an item in the Zimbabwae newspaper, the Harare *Herald*. Seems that during drought periods the cattle ate some forage that was heavy in aluminum salts. Some cow parts ended up at the local leather works.

The salts in the leather set up static discharges when the leather was flexed, causing interference on TV and FM broadcasts, this being especially noted in dry and carpeted rooms. One of the executives of a local shoe company discovered the problem while tripping the light fantastic. The interference kept time with his dancing feet. How about that for some insight into the problems of DXers—and dancers? Always go barefoot! Less interference.

EI1000 will be heard during the first half of the year to celebrate Dublin's millenium. It was due on March 17th (St. Patrick's Day) and will be on again on July 10th. SØRASD is being heard on a number of bands, 14183 or 14197 from 1800Z, 3790 kHz or thereabouts from 0400Z, this one often a contact with EA2JG, his QSL Manager. JH4RHF gives a report on the effort in the *CQ* WW DX Test last October, noting that the group made 4000 QSOs in the test and 1000 outside the contest period. This included 11 QSOs on 160 and 211 QSOs on 6 meters, the group catching an opening to Japan on October 27th. Others on the trip were JR3KEG, JG3WDN, and Jun, JH4RHF. Any contact with these stations /FK can go to JH4RHF.

CQ DX Awards Program

SSB

1585	HB9DDW	1587	WL7K
1586	W6TUI		

CW

716	EA8UH

SSB Endorsements

310	K2FL/318	300	K2JLA/307
310	K6WR/317	300	VE7DX/305
310	W4NKI/317	275	WA2FKF/293
310	N6AW/314	275	N2CIC/284
310	OE2EGL/313	200	WL7K/200
310	SM4CTT/312	150	W6TUI/179
310	KU9I/310	3.5/7 MHz	KE4VU

CW Endorsements

300	IT9QDS/301	275	W6YQ/283
275	WØHZ/293		

Total number of active countries is 318. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

Charles Keil, AA4CK, is the new president of the Virginia DX Century Club. Art Westmont, W4EEU, is the vice-president. Carol Shrader, WI4K, is the secretary-treasurer. Secretary-treasurers are the workhorses of most DX clubs. Most times they do everything except receive credit.

VP9AD arranged that the Callbook show his QSL manager. The PTT office updated the file, and Alan's address was again shown. The natural result—three cartons of incoming cards. If it is no problem, he would just as soon they go to his QSL manager, W3HNK.

It is reported that the FCC is mulling over the possibility of issuing instant Novice licenses. Pass the test and here's your license. Also rising again from the dead is a petition to eliminate code requirements from the examinations. The argument is that the CW requirement does not discourage potential or actual troublemakers, but it does deter many potentially great and good operators from obtaining a license.

Billy Williams, N4UF, is the new president of the North Florida Amateur Radio Society. That call should be familiar. N4UF handles the *CQ* DX Awards Program. Also in for another tour in office are Pete Nissen, W4PTT, as the club vice-president, and Bob Bryner, WD4PFN, as the club secretary.

Florida is also booming in other statistics. It is now the second highest state in total amateur licenses, moving ahead of New York. Florida at the last count had 26,242 licensees, while New York is listed at 26,001. Others in the top category are Texas with 25,495 amateurs, and Ohio in fifth spot with 20,783. Then come Illinois, Pennsylvania, Michigan, Washington, and New Jersey to round out the top ten. At the other end, Wyoming has the least with 971 licenses out. Delaware has 1014, North Dakota 1104, South Dakota 1111, and Vermont has 1138. Considering the size of some of those states with few amateurs, you might understand how sparse they are and why the Dakotas are often the hardest for overseas stations to work for WAS. California leads the list of amateur licenses with 59,944 amateurs.

There will be a lot of DX activity in the Pacific in the first half of the year. 4X6TT is aiming for VK9 Norfolk, 3D2 Fiji, FW Wallis, A3 Tonga, T2 Tuvalu, ZK Cooks, T3 Kiribatis, 5W West Samoa, KH8 American Samoa, and VR6 Pitcairn. This one is in progress, and you might have already heard some of it.

DL1VU is also working the Pacific side of the DX street, and his plans call for activity from KH2 Guam, KH0 Marianas, KX6 Marshalls, 3D2 Fiji, T2 Tuvalu, H4 Solomons, FO French Polynesia, and both KC6s Eastern and Western Carolines. Karl might even find a couple more places to stop. 4X6TT QSLs go to Box 36411, Tel Aviv, Israel, but you might find a different QSL manager named at various spots on Karl's operations.

73, Cass, WA6AUD

DX Ten Years Back

In mid-April 1978 the long wait for Iraq ended with YI1BGD showing. And who was there to get things going? Marty Laine, OH2BH. The mystery new country in the Caribbean was identified as Desecheo, and KP4AM was ready to put it on the air as soon as country status was clarified. N0TG was planning for a Navassa operation, and CE9AT was on from the South Shetlands. Another look was being taken at Southern Sudan, and the signs were favorable that the operations of WB7ABK and DL7FT would be approved for DXCC. Bill Rindone, WB7ABK, was the first to put this one on the air. 4U1UN was being considered for country status, but the African homelands were not given much hope. The Desecheo decision was held up when the question was asked, "If Desecheo, why not Water Island?" Everyone remembers Water Island, right?

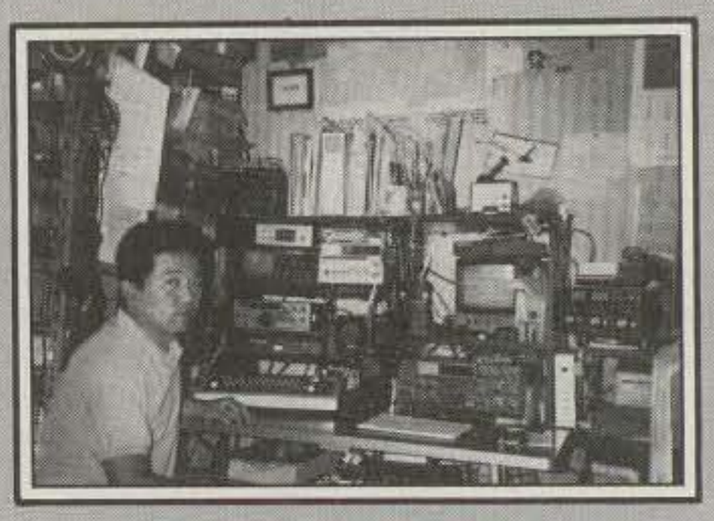
Spanish Sahara was expected shortly to be deleted from the country list. It returned recently as Arab Saharaui Democratic Republic signing S0RASD. At the International DX Convention the general feeling was against list operations, though it was hardly unanimous. P29JS was aiming for Cocos-Keeling, and 4Z4TT was headed for Niue. ZL4LR/A was on from the Campbell Islands on a list operation, and Doug Woolley was signing EP2VW from downtown Teheran and claiming a franchise at 025 kHz—14025 and 21025 kHz nightly. Doug currently is signing N4PW/CE3 in Santiago, moving there recently after five years in Paraguay as ZP5XDW. The big Clipperton operation in 1978 quickly took care of a lot of needs, over 29K QSOs being made in the operation the last week in March. They were at the International DX Convention to tell all. And all hailed F5II, HB9AHL. N6IC, WA9INK, F9JS, W6QKI, W6SO, F6AOI, W6HVN, F6BBJ, F6ARC, F6AQO, WA4WME, F6BFH, F9IE, F6BFH, and HB9AEE, proving again that every DXer cheers the one who brings him a new country. W6YO was home after circumnavigating the world in a square rigger.

QSL Information

There are a few DXpeditions currently active which are specific with their QSL information. What might be remembered longest is their discussion of the monetary market and the decline of the U.S. currency against a number of others. There is even mention that the pro forma dollar bill is something to be sniffed at these days. Do what you think best. There might be a standard established; $2.00 is being mentioned by some as a minimum (acceptable). Use your own discretion. Fortunately, a good many of the planned stops are not excessively rare, just mildly. Some DXers at times feel that their need for such QSLs is likewise mild.

CT3EU to G3PFS
EL2MS to KD8IW
FO0QK to W6TM or KI6DF
N2PC/KX6 to K2CL
OH0MB/OJ0 to N2AU
W1BIH/PJ2 to W1AZ
P40GD to N2SS
TJ1DK to DL4FBC
VP8BFZ to GW8VHI
VP8TPG to G4RFV
VP9AD to W3HNK
VK9YA to W5ODD
VK9YD/VK9X to OH5VD
V31TP to WB0DLT
V31MZ to KD2EU
YB3ASQ to W7YF
ZF2FK to K9QVB
4S7WP to DJ9ZB
9N5QL to YASME
9M2ZR to WA2HZR
A92EM to Box 5486, Manama, Bahrein
FR5DX to 67 rue des Palmiers, 6 Tampon, Reunion Island via France
FR0EL to Box 386, Pierre Fonds, F97411, Reunion Island via France
J50AS to Salvatore Alescio, Via G. la Masa 67, I-90019 Trabia, Sicily
S92LB to Luiz Soares Beirao, Box 14, Sao Tome
TJ1BM to Box 5622, Yaounde, Cameroons
TZ6BKY to (Jose opr.) to EA5TCP
V31TP to John Patterson, 4803 Westport, Jefferson City, MO 65101
W7PHO to KA6V has taken over any W7PHO QSL chores
XF4CIS to Jose Levy, XE1J, Clavel 333, Esq. Libertad, Colima, Col. Mexico
ZK1WL to Warrick Latham, Box 127, Rarotonga, Cook Islands
5L8BS to LAMCO, Box 69, Monrovia, Liberia
9Q5NW to AL7EL (1988 C.B. only)
JH4RHF to Junichi Tanaka, 1-4-6 Kotobuki, Hattori, Toyonaka, Osaka 561, Japan

RTTY WAZ #1



This is Mikio Kuwayama, JR2CFD, winner of the first RTTY WAZ award. All zones were worked on 20 meters, Mikio looking hard for Zone 23 to complete the 40 zones. He now says that was easier than finding Arkansas for WAS on RTTY.

There was a stampede to be the first to win the RTTY WAZ Award, and Mikio Kuwayama, JR2CFD, led the pack, doing it on 20 meters.

First licensed in 1973, he holds the First Class JA license. He works with a TS930S and an IC-720A final. The antenna is a 4-element Yagi about 50 feet above the rooftop at his QTH. He is 29 years old and an architect.

Besides RTTY, Mikio's other main mode is SSB. Zone 23 was the last and most difficult one to work for the RTTY WAZ. He is also looking to complete an RTTY WAS, but Arkansas eludes him. He asks, "Certainly there must be an RTTY DXer in Arkansas who needs Japan. Tell him to call me!" On RTTY, of course.

CIRCLE 28 ON READER SERVICE CARD

CIRCLE 29 ON READER SERVICE CARD

Awards

a monthly feature by
DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for April is:

Arnie Bachmann, K9DCJ
USA-CA All Counties #86, 11-1-72

"In November 1969 I had a grand total of 1879 counties confirmed. In the same month I installed a Swan 350C in the car, mounted a Webster mobile mast, and attached a 20 meter resonator.

"Of course, my first goal was to finish all counties and get the USA-CA All Counties Award. This goal was reached on November 1, 1972, when USA-CA All Counties #86 was issued to me.

"Having made many friends on the air and at the national and district conventions, I couldn't see dropping out of county hunting. I had in mind a number of projects or goals to pursue.

"One goal was to give each of the 72 Wisconsin counties as a last county. This goal was realized, and I've even given my home county, Iowa, Wisconsin, as a last county four times. I've given 31 DX stations a last county, and have given 37 last counties to those working all counties a second time, as well as three last counties to those working them the third time. A last county was given to 22 for both their first and second times, and one person received a last county from me for his first, second, and third times.

"As of July 20, 1987, I had given 502 last counties. Of the 545 that have completed the USA-CA program as of this writing, 277 have received a last county from me, and seven of those were the 'last' last county—the last for the whole country as well as the last for the state.

"Another personal project is to give out all Wisconsin counties each year, and I have done that for 18 consecutive years.

"Since November 1969, when I started mobile operations, I have gone through eight vehicles and am now on the ninth. Total mileage to date is 613,000, with 85% of that total devoted to giving out counties. Six county hunters worked me in all Wisconsin counties two times, and W5LXG worked me in all Wisconsin counties three times. W8WT worked me in all Wisconsin counties on 20, 40, and 75 meters, SSB. Other counts include 177 in 50 Wisconsin counties, 120 in 61, and 100 in 72.

"There seems to be no limit to the ways of working counties. I have completed all counties seven times, with seven different stations in each county. I also have 1900-plus mobile to mobile, 2300-plus on 75 meters, and 2100-plus YLs mobile. A goal yet to be reached is to give a last county to a county hunter in Hawaii; that will complete all 50 states.

"After receiving USA-CA All Counties #86, I was asked many times, 'How many contacts did you guess on the 2 × 2 report, etc.?' This was a challenger to accept, to work and confirm all counties with a 5 × 9 report both ways. Only one more is needed, the Island of Hawaii. I have it 5 × 7, but will keep trying for the 5 × 9. Contest reports will not count because they are all 5 × 9.

"My XYL, Lorraine, USA-CA All Counties #494 (SWL), and I have attended all the county hunter conventions. I wonder if any other husband and wife can make that claim. 73, and good hunting, Arnie."

(Editor's note: As well as being a dedicated county hunter, Arnie is a serious student of the amateur radio hobby. He has complete collections of CQ *from January 1945;* QST *from 1920; all issues of* Ham Radio, Ham Radio Horizons, *and* 73 Magazine; *as well as 25 years of* Radio Electronics, Radio TV, *and miscellaneous periodicals and books. His library, along with an extensive personal collection of vintage amateur gear, is neatly arranged and displayed in a school house from days of yore on their property in Wisconsin. Arnie's story first appeared in* CQ *in March 1974.)*

Arnie, K9DCJ (USA-CA All Counties #86) and Lorraine (SWL, USA-CA All Counties #494) with their FB mobile station No. 9.

Arnie's "pride-and-joy" wall, rewards of dedicated county hunting. Note W9GGN QSL, first county confirmation, 3-3-62.

A glimpse into station K9DCJ, with a few more of Arnie's many trophies.

333 South Lincoln Ave., Mundelein, IL 60060

Awards Issued

Elliott "Skip" Gee, N4FSZ, claimed his award with a full complement of gold seals and received USA-CA All Counties #555, Mixed; USA-CA 3000 #585, All SSB Mobile; USA-CA 2500 #660, USA-CA 2000 #727, USA-CA 1500 #814, USA-CA 1000 #997, and USA-CA 500 #2213, All 20M/SSB/Mobile; all dated 12-1-87. Skip also qualified for an All CW endorsement for 500 and 1000, also dated 12-1-87.

Richard L. Zysk, K0GSV, collected all his confirmations and claimed USA-CA All Counties #556, USA-CA 3000 #586, USA-CA 2500 #661, USA-CA 2000 #728, USA-CA 1500 #815, and USA-CA 1000 #998, Mixed, dated 12-5-87.

John R. "Sparky" Spark, W4LHP, rang out the old year with a clean sweep of USA-CA All Counties #557, USA-CA 3000 #587, USA-CA 2500 #662, USA-CA 2000 #729, USA-CA 1500 #816, USA-CA 1000 #999, and USA-CA 500 #2214, Mixed, dated 12-7-87.

Mike Bragassa, NS7Z, updated his good record by claiming USA-CA 2000, #730, All 20M Mobile-to-Mobile SSB, dated 12-28-87.

USA-CA Special Honor Roll

Elliott R. "Skip" Gee, N4FSZ
All Counties #555, Mixed, 12-1-87

Richard L. Zysk, KØGSV
All Counties #556, Mixed, 12-5-87

John R. Spark, W4LHP
All Counties #557, Mixed, 12-7-87

USA-CA Honor Roll

3000

N4FSZ	585	KØGSV	815
KØGSV	586	W4LHP	816
W4LHP	587	KJ4ON	817

2500

N4FSZ	660	N4FSZ	997
KØGSV	661	KØGSV	998
W4LHP	662	W4LHP	999
		KJ4ON	1000

2000

N4FSZ	727		
KØGSV	728	WB3IHQ	2212
W4LHP	729	N4FSZ	2213
NS7Z	730	W4LHP	2214
		W3DYA	2215

1500

		KJ4ON	2216
N4FSZ	814	NV8W	2217

1000

500

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is $4.00. For non-subscribers, it is $10.00. Initial application must be submitted in the USA-CA record book which may be obtained from CQ Publishing Company, 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 a SASE to the USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060, U.S.A. DX stations must include extra postage for air mail reply.

Frank E. Wallace, KJ4ON, filed his application and received USA-CA 1500 #817, and USA-CA 1000 #1000, Mixed, dated 12-11-87.

USA-CA 500 certificates went to:

Eric R. Wolfe, WB3IHQ, USA-CA 500 #2212, Mixed, dated 12-1-87.

Elliott R. Gee, N4FSZ, USA-CA 500 #2213, All 20M/SSB/Mobile, and All CW, dated 12-1-87.

John R. Spark, W4LHP, USA-CA 500 #2214, Mixed, dated 12-7-87.

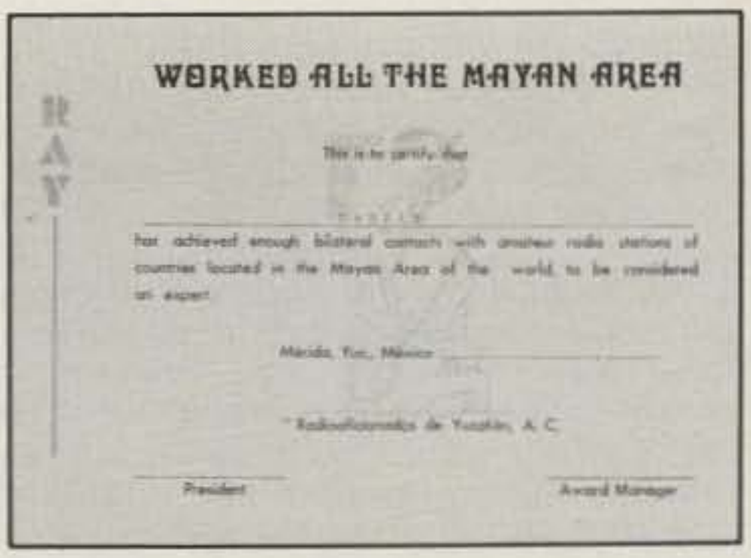
Norm Beavers, W3DYA, USA-CA 500 #2215, All CW, dated 12-11-87.

Frank E. Wallace, KJ4ON, USA-CA 500 #2216, Mixed, dated 12-11-87.

Rose Ann Mears, NV8W, USA-CA 500 #2217, All CW, dated 12-16-87.

Awards Available:

Worked All The Mayan Area (WAMA). This is one of two new awards announced by the Radioaficionados de Yucatan A.C. WAMA is a handsome, two-color certificate available to licensed amateurs and SWLs worldwide. To qualify, submit proof of having had (heard) a QSO with three XE3 stations, one V3 station, two TG stations, two YS stations, and two HR stations. SSB, CW, and mixed contacts are permitted. There are no time or date limitations.



Worked All The Mayan Area Award available to amateurs and SWLs from Radioaficianados de Yucatan A.C.

Send GCR list, certified by a radio club officer or by two licensed amateurs, along with 10 IRCs or the equivalent in U.S. funds to the Awards Manager, David Perez-Loria, XE3DPL, P.O. Box 4-108, 97101 Merida, Yucatan, Mexico.

100% QSL Award. This is the second of two new awards announced by the Radioaficionados de Yucatan A.C. The 100% QSL Award is issued to any radio amateur anywhere in the world who has 100 QSL cards which clearly show **QSL TNX.** This is taken to mean that the sender of such a QSL has previously received a QSL from the applicant for this diploma. *One hundred* QSL cards are required. There is no restriction or requirement as to the number of countries represented, or the number of cards from amateurs in the applicant's own country. There are no date limitations.

Send GCR list or certification by two licensed amateurs, along with 10 IRCs or the equivalent in U.S. funds, to the awards manager, David Perez-Loria, address as above.

R.A.A.G. Award. The R.A.A.G. Award is offered by the Radio Amateur Association of Greece. The award is available to all licensed radio amateurs and short-

The 100% QSL Award offered by Radioaficianados de Yucatan A.C., Mexico.

wave listeners. Contacts after January 1, 1975 are valid.

Applicants must submit verified evidence of contacts with at least seven Greek stations from the following nine call areas: SV1, SV2, SV3, SV4, SV5, SV6, SV7, SV8, SV9. There are no band or mode limitations.

Send certified log extract only, no QSL cards, along with $2.00 U.S. or 8 IRCs to R.A.A.G. Awards Manager, P.O. Box 3564, Athens 10210, Greece.

Amateur-Radio-Telegrafie High Speed Club. We have secured a pamphlet entitled "Introduction of a Club" from HB9ANE, Jurgen H. Timcke, Club Secretary. The information is in five languages. A condensation of the English language section follows. For complete information and club rules, write to the secretary at Friedaustrasse 7, CH-8355 Aadorf, Switzerland.

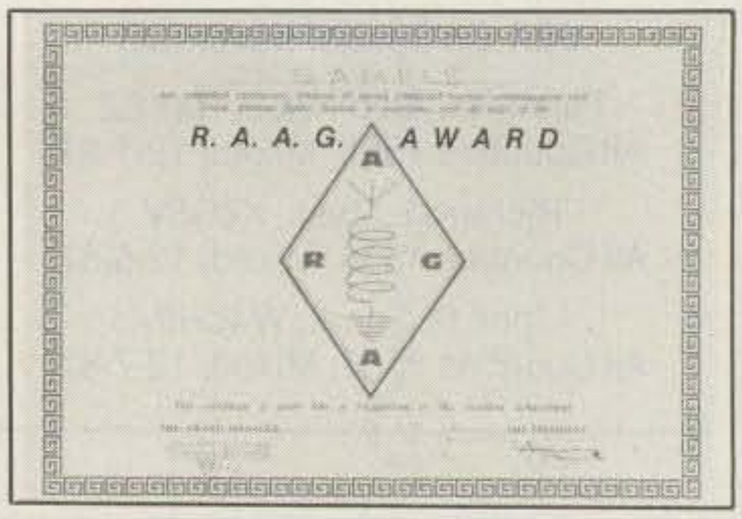
Why Do We Introduce Ourselves?

The HSC-Schweiz was founded in 1980 and has seen very positive developments since then. We feel it is appropriate to introduce ourselves worldwide, hence this information leaflet.

Our intent is to promote cooperation among all people interested in amateur radio telegraphy. Those who want to know more about us and are interested in our club rules, which are written in German, French, Italian, Spanish, and English, may address a request to the secretary at his address given above. We would be particularly pleased if this information leaflet were accepted as a gesture to help promote friendly relationships with other clubs, worldwide, that are devoted to amateur radio telegraphy. Clubs may reprint the leaflet, unchanged, in their own club news, provided that "Radio-Telegrafie High Speed Club HSC-Schweiz" together with our signet is stated.

Who Are We?

The Amateur-Radio-Telegrafie High Speed Club HSC-Schweiz is an independent association of Swiss shortwave amateurs. We are neither associated with, or dependent upon, another shortwave amateur club. The HSC-Schweiz is a collective member of the "Union Schweizerischer Kurzwellen-Amateure" (USKA).



R.A.A.G. Award sponsored by the Radio Amateur Association of Greece.

The HSC-Schweiz radio club certificate, Switzerland.

What Do We Want?

Mainly, we want to contribute to the cultivation and encouragement of amateur radio telegraphy, which we consider to be one of the mainstays of amateur radio. In this connection, we have transmitted Morse code practice from club station HB9HC for several years. We also endeavor to support home construction of equipment, participation in radio telegraphy competitions, exchange of information, and promotion of the traditional Ham Spirit through our own exemplary conduct.

Note

In this part of the world we look forward now to springtime and summer holidays again. We hope all is well at your QTH.

73, Dorothy, WB9RCY

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Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

April, 1988

The new sunspot cycle continues to increase, but at a very slow pace. The Royal Observatory of Belgium reports a monthly mean sunspot number of 26.5 for December, 1987. This results in a 12-month running smoothed sunspot number of 28 centered on June, 1987. This is an increase of only one point from the previous month's level. A smoothed sunspot number of approximately 60 is forecast for April, 1988, as the new cycle is expected to rise somewhat faster during the next several months. The *Algonquin Radio Observatory* at Ottawa, Canada reports a mean level of 10.7 cm solar flux for December, 1987 at 94.4.

Sunspot Number and Solar Flux

Both the smoothed sunspot number and the 10.7 cm level of solar flux are indicators of solar activity. An unbroken daily record of telescopic counting of sunspots goes back to the mid-1700's. In 1848, the Swiss astronomer Johann Rudolph Wolf introduced a systematic method for counting sunspots and for determining a sunspot number. This method is still in use today at solar observatories throughout the world. It takes into account the total number of individual spots visible on the face of the sun, the number of groups into which they cluster, and a calibration factor which varies with each telescope used. An observer multiplies the number of groups seen by ten and adds this to the number of individual spots seen. This result is then multiplied by the calibration factor to arrive at a daily sunspot count for that particular observatory.

The official international daily sunspot number is determined by Dr. Andre Koeckelenbergh of the Royal Observatory of Belgium by computing the weighted average of the daily numbers recorded at a network of cooperating observatories. The monthly mean number is derived from the daily values, and the 12-month running smoothed sunspot number, upon which the sunspot cycle is based, is determined by averaging 12 consecutive monthly mean values.

As precise as Dr. Wolf's method is for counting sunspots it is a subjective method, and there is some degree of variation in the results of different observers. Radar research conducted during World War II detected electromagnetic radiations from the sun, which were found to be associated with sunspots and solar flares. Termed *solar flux* or *solar noise*, it occurs at frequencies between approximately 20 and 5,000 MHz. Solar noise can be observed best by aiming a high gain directional antenna at the sun.

Since the end of World War II, daily observations of solar noise have been made at several observatories throughout the world, but chiefly at the Algonquin Radio Observatory at Ottawa. There, the solar noise level at approximately 2,800 MHz (10.7 cm.) is measured precisely at local noon every day. These values of daily solar flux levels are broadcast by voice on WWV at 18 minutes after each hour. Solar flux is also tabulated for monthly means and for 12- month running smoothed values. A very close correlation has been found to exist between solar flux values and sunspots numbers. This is shown in fig. 1.

Determining solar activity based on solar flux values has some advantage over telescopically determing the sunspot count. Measuring the signal strength of solar noise is more sensitive and precise and less subjective than counting sunspots. Solar flux measurements can be made when the sun is obscured by clouds, and in any type of weather, although solar flares can influence readings.

The measurement of radio frequency radiation from the surface of the sun on 10.7 cm has proven to be a very sensitive indicator of solar activity, particularly on a day-to-day basis. On the other hand, telescopic observations of the sun have been made daily for nearly 250 years. While they are not as an objective indicator of solar activity as solar flux measurements, they do represent a long historical chain of solar data. Determining solar activity by both methods is expected to continue to provide valuable information for radio amateurs and for all users of the high frequency spectrum.

April Propagation

Fewer DX openings are forecast for the *10* and *15* meter bands during April, but conditions are expected to *improve* on *20* meters during the day and *40* meters at night. Seasonably favorable conditions for long DX openings between the northern and southern hemispheres, associated with the equinoctial period, should continue through the month. An increased number of short-skip openings due to sporadic-E propagation is expected during April, and a major meteor shower is also expected to take place.

Twenty meters should be the optimum band for DX propagation during April. The band should open to most parts of the world shortly after sunrise, and remain open for DX throughout the daylight hours and well into the evening. Exceptionally strong signals should often be noticeable during the late afternoon and early evening hours.

Expect fewer openings on *15* meters this month, but some fairly good DX still should be possible to many areas of the world during the daylight hours. Peak conditions are expected during the afternoon and early evening hours on this band.

Not many DX openings expected on *10* meters this month, but some should be possible towards Central and South

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for April 1988

Propagation Index	*Expected Signal Quality* (4)	(3)	(2)	(1)
Above Normal: 8, 11, 13, 20 27	A	A	B	C
High Normal: 3, 7, 9-10, 12, 15, 21, 26	A	B	C	C-D
Low Normal: 1-2, 6, 14, 16, 18-19, 23-25, 28-29	B	C	D	D-E
Below Normal: 4, 17, 22, 30	C	C-D	D-E	E
Disturbed: 5	C-D	D	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9 +, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between 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.
3 dB 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 (C) on April 1 and 2, good (B) on the erd, fair-to-poor (C-D) on the 4th, poor (D) on the 5th, etc.**

11307 Clara Street, Silver Spring, MD 20902

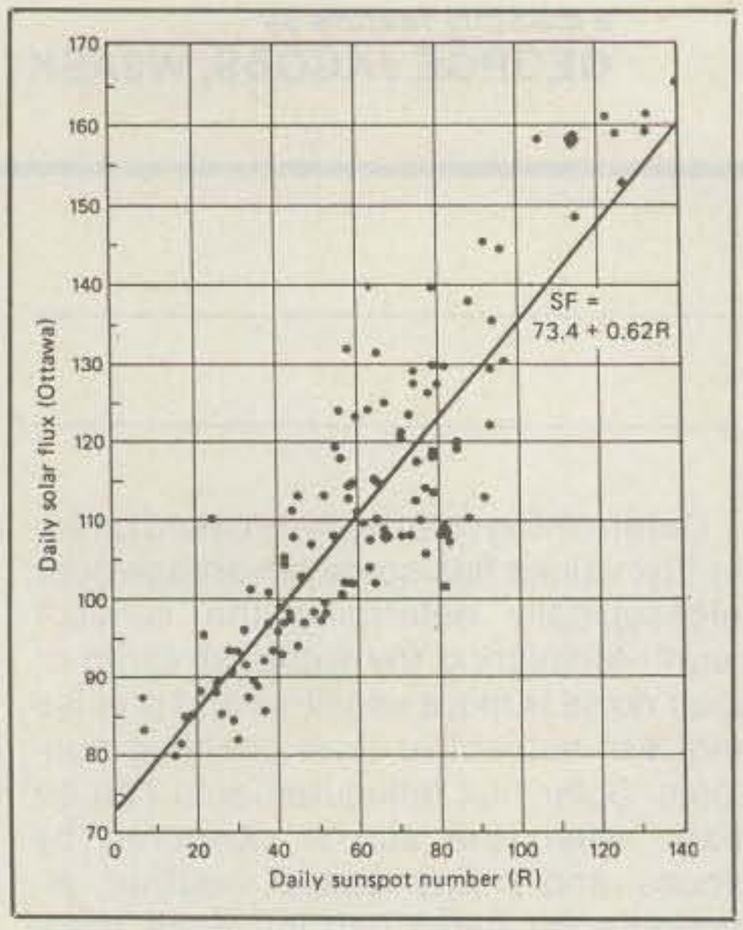


Fig. 1– Comparison of daily values of Solar Flux vs. daily Sunspot Numbers.

America, the Caribbean area, and to the South Pacific during the afternoon hours, particularly during periods of HIGH or ABOVE NORMAL conditions.

Improved DX propagation conditions are expected on *40* meters during April. The band should open toward Europe and the east an hour or so before sundown; toward the south an hour or so after sundown, and towards the west and South Pacific after Midnight. Expect good DX openings throughout the hours of darkness, but signals should peak around Midnight from an easterly direction and an hour or so before sunrise from all other directions.

Fairly good DX openings to many areas of the world should also be possible on *80* meters during the hours of darkness and at sunrise. There is also a chance for a few *160* meter DX openings during this same time period.

Seasonably favorable equinoctial propagation conditions should continue during April for openings between the northern and southern hemispheres. Be sure to check during the sunrise and sunset twilight periods for some exceptionally good openngs on *20* meters from the USA to such areas in the southern hemisphere as Australasia, South America, southern Africa, etc. These inter-hemispheric openings can take place at other times and on other bands as well, as shown in the DX PROPAGATION CHARTS.

Ionospheric absorption should continue to increase in the northern hemisphere during April, as the sun rises higher in the northern sky. This should result in somewhat weaker DX signal levels during daytime openings, compared to the winter months. Static levels are also expected to increase noticeably during April, as thunderstorms become more numerous. This should result in higher noise

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

3. The *propagation Index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *daylight* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10 db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

April 15 - June 15, 1988
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40-80 Meters*
Western & Central Europe & North Africa	*Nil*	09-14 (1) 14-18 (2) 18-19 (1)	05-06 (1) 06-10 (2) 10-12 (1) 12-14 (2) 14-17 (3) 17-20 (4) 20-21 (3) 21-22 (2) 22-01 (1)	19-20 (1) 20-21 (2) 21-00 (3) 00-02 (2) 02-03 (1) 20-21 (1)* 21-22 (2)* 22-00 (3)* 00-01 (2)* 01-02 (1)*
Northern Europe & European USSR	*Nil*	10-13 (1) 13-15 (2) 15-17 (1)	06-09 (2) 09-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-23 (1) 23-01 (2) 01-06 (1)	19-20 (1) 20-23 (2) 23-01 (1) 20-00 (1)*
Eastern Mediterranean & Middle East	*Nil*	11-15 (1) 15-17 (2) 17-19 (1)	06-08 (1) 13-16 (1) 16-19 (2) 19-23 (3) 23-00 (2) 00-02 (1)	19-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Western Africa	14-18 (1)	08-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	08-14 (1) 14-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-01 (2) 01-06 (1)	20-22 (1) 22-02 (2) 02-03 (1) 00-02 (1)*
Eastern & Central Africa	16-18 (1)	09-11 (1) 11-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	05-06 (1) 06-08 (2) 08-09 (1) 14-16 (1) 16-18 (2) 18-21 (3) 21-23 (2) 23-01 (1)	21-01 (1) 22-00 (1)*
Southern Africa	*Nil*	08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	14-16 (1) 16-17 (2) 17-18 (3) 18-19 (1) 23-01 (1)	21-22 (1) 22-00 (2) 00-02 (1) 22-01 (1)*
Central & South Asia	*Nil*	10-12 (1) 18-20 (1)	07-10 (1) 14-16 (1) 19-22 (1)	05-07 (1) 19-21 (1)
South-east Asia	*Nil*	10-12 (1) 18-20 (1)	07-08 (1) 08-09 (2) 09-11 (1) 19-22 (1)	*Nil*
Far East	*Nil*	18-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 22-00 (1) 00-02 (2) 02-04 (1)	04-06 (1)
South Pacific & New Zealand	17-20 (1)	08-09 (1) 09-11 (2) 11-16 (1) 16-18 (2) 18-19 (3) 19-20 (2) 20-22 (1)	04-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-16 (1) 16-18 (2) 18-20 (1) 20-22 (2) 22-00 (3) 00-04 (2)	02-03 (1) 03-04 (2) 04-06 (3) 06-07 (1) 02-03 (1)* 03-05 (2)* 05-06 (1)*
Austral-asia	18-20 (1)	17-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 15-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (3) 01-03 (2) 03-04 (1)	03-05 (1) 05-07 (2) 07-08 (1) 04-07 (1)*
Caribbean, Central America & Northern Countries of South America	10-14 (1) 14-17 (2) 17-19 (1)	08-10 (1) 10-11 (2) 11-14 (3) 14-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	04-06 (1) 06-07 (2) 07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-22 (4) 22-00 (3) 00-04 (2)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-07 (1) 21-02 (1)* 02-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	10-14 (1) 14-16 (2) 16-17 (3) 17-19 (1)	07-08 (1) 08-11 (2) 11-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (2) 19-21 (1)	04-06 (1) 06-09 (2) 09-15 (1) 15-17 (2) 17-19 (3) 19-22 (4) 22-01 (3) 01-04 (2)	20-21 (1) 21-04 (2) 04-06 (1) 23-03 (1)* 03-04 (2)* 04-06 (1)*
McMurdo Sound, Antarctica	*Nil*	14-15 (1) 15-17 (2) 17-19 (1)	07-08 (1) 08-09 (2) 09-10 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	01-05 (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	*Nil*	14-18 (1)	06-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (3) 17-18 (4) 18-19 (3) 19-21 (2) 21-22 (1) 22-00 (2) 00-02 (1)	19-21 (1) 21-23 (2) 23-01 (1) 21-00 (1)
Northern & Central Europe & European USSR	*Nil*	13-15 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-17 (2) 17-19 (1) 22-00 (2)	20-00 (1)
Eastern Mediterranean & Middle East	*Nil*	15-17 (1)	07-09 (1) 13-16 (1) 16-22 (2) 22-00 (1)	20-00 (1)
Western Africa	13-17 (1)	12-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	05-06 (1) 06-08 (2) 08-09 (1) 12-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	20-01 (1)
Eastern & Central Africa	14-17 (1)	10-14 (1) 14-16 (2) 16-18 (1)	06-08 (1) 13-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	21-00 (1)

Southern Africa	*Nil*	08-10 (1) 10-12 (2) 12-13 (3) 13-14 (2) 14-15 (1)	14-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 22-23 (1) 23-01 (2) 01-02 (1)	20-22 (1) 22-00 (2) 00-01 (1) 23-01 (1)*
Central & South Asia	*Nil*	09-11 (1) 18-21 (1)	07-10 (1) 18-20 (1) 20-22 (2) 22-23 (1)	05-07 (1) 19-21 (1)
South-east Asia	*Nil*	08-10 (1) 19-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 19-22 (1)	05-07 (1)
Far East	*Nil*	18-21 (1)	20-00 (1) 00-04 (2) 04-06 (1) 06-07 (2) 07-08 (3) 08-09 (2) 09-11 (1) 15-18 (1)	03-05 (1) 05-06 (2) 06-07 (1) 05-06 (1)*
South Pacific & New Zealand	14-16 (1) 16-18 (2) 18-20 (1)	07-09 (1) 11-14 (1) 14-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	16-19 (1) 19-21 (2) 21-23 (3) 23-01 (4) 01-03 (3) 03-07 (2) 07-10 (3) 10-11 (2) 11-12 (1)	00-02 (1) 02-04 (2) 04-05 (3) 05-06 (2) 06-07 (1) 02-04 (1)* 04-05 (2)* 05-06 (1)*
Austral-asia	17-20 (1)	09-11 (1) 16-18 (1) 18-21 (2) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-15 (1) 15-18 (2) 18-21 (1) 21-23 (2) 23-01 (3) 01-03 (2) 03-06 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Carib-bean, Central America & Northern Countries of South America	10-14 (1) 14-17 (2) 17-19 (1)	07-09 (1) 09-11 (2) 11-14 (3) 14-17 (4) 17-19 (3) 19-20 (2) 20-22 (1)	00-04 (2) 04-06 (1) 06-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-22 (4) 22-00 (3)	19-21 (1) 21-22 (2) 22-03-(3) 03-05 (2) 05-07 (1) 21-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	10-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	07-08 (1) 08-12 (2) 12-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	05-06 (1) 06-10 (2) 10-16 (1) 16-18 (2) 18-19 (3) 19-23 (4) 23-01 (3) 01-02 (3) 02-04 (2) 04-05 (1)	21-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-06 (1) 00-04 (1)*
McMurdo Sound, Antarc-tica	*Nil*	13-15 (1) 15-18 (2) 18-19 (1)	06-09 (1) 17-18 (1) 18-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	00-06 (1)

Time Zone: PDT
(24-Hour Time)
WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40-80 Meters*
Western & Souththern Europe & North Africa	*Nil*	12-16 (1)	06-08 (1) 08-11 (2) 11-13 (1) 13-17 (2) 17-19 (1) 20-22 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Central & Northern Europe & European USSR	*Nil*	*Nil*	07-08 (1) 08-10 (2) 10-12 (1) 12-15 (2) 15-17 (1) 20-22 (1)	20-23 (1) 21-22 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	13-15 (1)	07-10 (1) 10-12 (2) 12-13 (1) 13-15 (2) 15-17 (1) 20-22 (1)	20-23 (1)
Western Africa	13-15 (1)	09-12 (1) 12-15 (2) 15-17 (1)	05-06 (1) 06-08 (2) 08-15 (1) 15-18 (3) 18-20 (2) 20-22 (1)	20-23 (1)
Eastern & Central Africa	*Nil*	10-14 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (1)	20-22 (1)
Southern Africa	*Nil*	10-12 (1) 12-14 (2) 14-15 (1)	07-09 (1) 13-14 (1) 14-17 (2) 17-18 (1) 21-22 (1) 22-00 (2) 00-02 (1)	19-21 (1) 21-22 (2) 22-23 (1) 20-22 (1)*
Central & South Asia	*Nil*	09-11 (1) 19-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-19 (1) 19-21 (2) 21-23 (1)	04-07 (1)
South-east Asia	*Nil*	09-11 (1) 16-19 (1) 19-21 (2) 21-22 (1)	04-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 22-00 (1) 00-04 (2)	04-07 (1) 05-06 (1)*
Far East	*Nil*	14-17 (1) 17-20 (2) 20-22 (1)	04-07 (1) 07-08 (2) 08-09 (3) 09-10 (2) 10-12 (1) 12-14 (2) 14-21 (1) 21-23 (2) 23-00 (3) 00-02 (4) 02-03 (3) 03-04 (2)	02-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
South Pacific & New Zealand	13-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	10-12 (1) 12-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-23 (1)	05-08 (1) 08-12 (2) 12-17 (1) 17-19 (2) 19-21 (3) 21-23 (4) 23-01 (3) 01-05 (2)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 01-02 (1)* 02-05 (2)* 05-06 (1)
Austral-asia	15-17 (1) 17-19 (2) 19-20 (1)	13-16 (1) 16-18 (2) 18-20 (3) 20-22 (2) 22-23 (1)	05-08 (1) 08-10 (3) 10-12 (1) 18-20 (1) 20-22 (2) 22-00 (3) 00-02 (4) 02-03 (3) 03-05 (2)	01-02 (1) 02-04 (2) 04-06 (3) 06-07 (2) 07-08 (1) 02-03 (1)* 03-05 (2)* 05-06 (1)*
Carib-bean, Central America & Northern Countries of South America	10-14 (1) 14-17 (2) 17-18 (1)	07-09 (1) 09-11 (2) 11-14 (3) 14-17 (4) 17-19 (3) 19-20 (2) 20-22 (1)	00-03 (2) 03-05 (1) 05-06 (2) 06-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-20 (4) 20-00 (3)	19-20 (1) 20-21 (2) 21-02 (3) 02-04 (2) 04-06 (1) 21-00 (1)* 00-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	13-15 (1) 15-17 (2) 17-18 (1)	07-08 (1) 08-12 (2) 12-14 (1) 14-15 (2) 15-16 (3) 16-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	00-02 (2) 02-06 (1) 06-10 (2) 10-15 (1) 15-17 (2) 17-18 (3) 18-23 (4) 23-00 (3)	20-22 (1) 22-02 (2) 02-04 (1) 21-03 (1)*
McMurdo Sound, Antarctica	15-17 (1)	15-16 (1) 16-18 (2) 18-19 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-01 (1) 04-06 (1) 07-09 (1)	23-03 (1) 03-06 (2) 06-07 (1)

*Predicted times 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.

levels, particularly on *40*, *80* and *160* meters.

VHF Ionospheric Openings

April looks like it should be a good month for VHF ionospheric openings.

Lyrids, a major meteor shower should take place between April 22-23, with a peak expected during the late afternoon of April 22. During the shower's peak, at least 15 good-sized meteors should enter the earth's atmosphere hourly, permitting fairly good meteor-scatter type openings on the VHF bands.

Trans-equatorial propagation (TE), which produced some new *2* and *6* meter DX records late last year, should reach a seasonal peak during April. TE openings are most likely to occur between 8 and 11 p.m. local time, on long north-south paths which cross the *geomagnetic* equator at approximately a right angle. TE openings toward South America from the USA favor locations in the southern states, but some openings may also be possible to more northerly states.

A seasonal increase in sporadic-E ionization usually begins during April, and continues through the spring and summer months. This should result in an increased number of short-skip openings on both *15* and *10* meters during April, as well as occasional openings on *6* meters. Openings on *10* and *15* meters will range between approximately 400 and 1,300 miles, while those on *6* meters will usually be between 750 and 1,300 miles. While sporadic-E ionization can occur at just about any time, there is a tendency for it to peak between 8 a.m. and Noon and again between 5 and 9 p.m. local time.

Unusual ionospheric openings on the VHF bands can also occur during April from widespread auroral activity. The best times to check for such openings are during periods of radio storminess on the HF bands. Check the *Last Minute Forecast* at the beginning of this column for those days during April that are expected to be BELOW NORMAL or DISTURBED.

Short-Skip Propagation

For openings between 50 and 250 miles, best band should be *80* meters during the day and *160* meters at night. Between 250 and 750 miles, *40* meters should be best during the day, *80* meters for an hour or two after sunrise and again from sunset to Midnight, and *160* meters from Midnight to sunrise. For openings between 750 miles and the one-hop, short-skip limit of 2,300 miles, use 20 meters during the day, *40* meters for an hour or so at sunrise and again from sunset to Midnight, and *80* meters from Midnight to sunrise. Look for *15* meter short-skip openings from about 10 a.m. to sundown, ranging between approximately 1,300 and 2,300 miles, although at times openings may be as short as 500 miles. There is also the possibility for some *10* meter short-skip openings during the daylight hours, over similar distances.

The DX PROPAGATION CHARTS in this month's column contain DX propagation predictions for each amateur band between *10* and *160* meters for the period *April 15 through June 15*, 1988. Beginning this month and continuing through the summer and fall, the times shown in the CHARTS will be local *daylight* time (EDT, CDT, MDT and PDT).

For more detailed predictions of short-skip openings between distances of 50 and 2,300 miles, refer to the SHORT-SKIP CHARTS, which appeared in last month's column.

Ticket Talk

a monthly feature by
FREDERICK O. MAIA, W5YI

INFO ON AMATEUR RADIO LICENSING

Amateur Radio Examinations - How They Work

We have had several inquiries regarding taking or administering amateur radio examinations under the relatively new VE program. This month we will cover the two volunteer examining programs. Yes, there are two. Taking increasingly harder amateur radio operator examinations is a way of life for hams! Under our incentive system of licensing, more operating privileges and better frequencies come with the higher class tickets. The Novice testing program is completely separate from the Technician through Extra Class VE/VEC System.

Novice Testing

Novice (entry) level testing has always been handled by volunteer examiners (VE's). Five years ago the FCC further deregulated Novice examining to allow a single General Class level VE to not only design and administer the Morse Code requirements, but the *written examination as well*.

By law (as of January 1, 1987), the Morse code examination must consist of a five word-per-minute transmission for exactly five minutes containing all alphabet letters, numerals 0-9, plus certain punctuation marks (period, question mark, comma and slant bar) and operating pro-signs (AR, SK and BT.) You may be asked to copy all characters transmitted correctly for one minute out of the five . . . or to answer seven out of ten questions correctly about the code text. Code sending tests are usually not required - although they can be if the VE team so wishes.

It used to be that VE's examining Novices could administer the code test (Element 1A), but had to write to the FCC in Gettysburg, Pennsylvania, to obtain the written (Element 2) theory examination. It had to be given and returned within a 30 day period.

In 1983, the FCC allowed volunteer examiners to simply select a specified number of questions from each subtopic in a 250 question bank. The questions were all known and published—as were the answers. The ARRL's multiple choices became the defacto answer standard. Applicants simply studied the questions and answers and passed the test.

Last year, as a result of Novice Enhancement, the FCC increased the Novice question pool from 250 to 300 questions to include questions on the new voice and digital privileges at 10 meters, 222.1-223.91 MHz and 1270-1295 MHz. It also now takes two General (or higher class) VE's to conduct Novice examinations.

The Novice question pool and testing instructions are widely published. If you need a copy, we have a *Novice Voice Class* test book available with all questions, multiple choices and answers for $4.95 (plus $1.25 postage). Order from: P.O. Box #10101, Dallas, Texas 75207. The manual can be used as study material by the entry level applicant—or as a guide for designing and administering a Novice test by the examiner.

Almost any General, Advanced or Extra Class amateur can serve as a Novice level examiner. They must be 18 years of age, not related to the candidate, never have had their amateur radio operator license suspended or revoked and not in the amateur radio equipment or publishing business. At the option of the examiner, if the applicant fails either the written or Morse code examination, the applicant can be *immediately* retested as long as different examinations are administered.

There is *no cost* to the applicant to take a Novice examination. The VE team certifies in Section II-A on the reverse side of Form 610 that the applicant has passed the required examinations. The VE keeps the answer sheets in his records. In about a month the applicant will receive their new Novice license. Successful applicants must wait until they actually have their license in-hand before operating their equipment on the Novice ham bands.

The Form 610, *Application for Amateur Radio Station and/or Operator License* is available without charge from the: F.C.C., P.O. Box #1020, Gettysburg, PA 17326 or by telephoning: (717) 337-1212. Only the Form 610 with an expiration date of 12/31/89 is suitable for applicants that take tests. Previous editions, which are fine for routine renewals and modifications, do not provide for two VE's to certify Novice examinations - nor for the separation of Element 3 into the Technician Element 3(A) and General Element 3(B).

Technician and Higher Class Testing

It used to be that all Technician, General, Advanced and Extra Class examinations were administered by FCC examiners at regional testing points. But no more. Now the amateur community administers them. The FCC is completely out of the testing business. Extra Class VE's (and in some cases, Advanced class) are now authorized to administer all amateur radio operator examinations. The VE/VEC System, as it is known, got under way in 1984.

The system works like this. Advanced and Extra Class Amateurs are accredited by VE Coordinators (VEC's) to act as volunteer examiners for the Technician, General, Advanced and Extra Class examinations. The requirements to be a VE/VEC System examiner are basically the same as for the Novice level. VEC's are under no obligation to accredit anyone. Advanced Class VE's can only give the Technician Class (Element 3A) requirements, whereas Extra Class VE's can administer all written and Morse code examinations.

A VEC is more or less an amateur radio testing supervisor who manages volunteer examiners. VEC's are appointed by the FCC and operate on a regional basis. That is, VEC's apply to coordinate examinations in one or more call sign areas. There are thirteen geographical areas . . . call sign areas: 1 through 0, plus Pacific, Alaska and the Caribbean. VEC's coordinate examinations in areas where they have been previously approved by the government. Any VEC can also coordinate examinations outside of the 13 designated areas . . . such as in Japan for example. There still must be three accredited VE's to conduct the tests, however.

Teams of three accredited VE's are supplied with testing materials, forms and instructions by their VEC. The testing materials must conform to agreed upon test construction formulas. That is, a certain number of questions must be used from each test subtopic. Every VEC uses exactly the same word-for-word questions and answers.

VE teams are authorized to make up their own Morse code and written examinations from test formulas supplied them by their VEC. Most VE teams, however, use the written test materials supplied to them by the VEC. Many make up their own code tests since they can easily be generated by microcomputers. Applicants that hold or have held a commer-

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

cial radiotelegraph license within the past five years are automatically given credit for the 20 wpm examination. It is even legal for amateur radio examinations—both code and written—to be given at the keyboard of a personal computer. The PC can even score the result and issue you a Certificate.

The collective VEC's—and there are about two dozen of them—decide on test standards and questions. It used to be that the FCC provided the questions and testing guidelines. Now the VEC's agree on appropriate test questions and procedures among themselves. The VEC's hold an annual conference where the future of testing is discussed. The next one is scheduled for June here in Dallas, Texas. Your author, Fred Maia W5YI, is a VEC. The W5YI-VEC organization—some 4,000 volunteer examiners strong—examined nearly 11,000 applicants at over 1,200 test sessions last year.

There is no longer a waiting period to retake failed examinations. This also applies to Technician and higher class testing. It used to be 30 days. At the option of the VE team, applicants can retake them immediately—even at the same testing session if they pay another test fee. The fee, at present, is $4.55 for most VE sessions. Some VEC organizations charge less. You only have to pay another fee when you must retake failed examinations. Applicants that successfully pass increasingly harder examinations are not charged more than the initial $4.55 fee.

Test papers are immediately graded by your examiner and you are advised of your result. Form 610 applications of applicants that upgraded, answer sheets and attachments are sent to the VEC office who check and approve them. The application is then forwarded to the FCC for license issuance. The answer sheets and reports are retained in the VEC Office.

Applicants that either upgrade, or pass test elements that do not result in an upgrade, are issued Certificates of Successful Completion of Examination (CSCE) which serve as test completion evidence. The CSCE serve a twofold purpose. They allow the applicant to use their new privileges immediately (with an identifier) until their actual license arrives. Or they can be used during a period of one year as proof of passing a test at a future test session where the applicant will take additional examinations needed to upgrade.

The interim identifiers are: KT for Technician, AG for General, AA for Advanced and AE for Extra Class. They must be used every time you give your call sign until you actually receive the hard copy of your new license from the FCC. The identifier advises airwave enforcement personnel that you are operating under an interim permit, the CSCE.

So You Want to be a VE

Becoming a volunteer examiner is amateur radio's highest calling. Most General or higher class amateurs can administer the Novice requirements—Element 2, Elementary theory and Element 1(A), the 5 words-per-minute code test.

You must be accredited by a VEC and be part of a three man testing team, however, to administer Technician and higher examinations. Every VEC has an VE application form available to apply to become an accredited examiner. Some VEC's have slightly different prerequisites. Our VEC program only accepts Extra Class level applicants as VE's since only they can administer all of the written examinations—and any Morse code examination above the Novice 5-wpm level.

The two largest VEC operations, by far, are the ARRL and W5YI programs. Together they account for over 75% of all amateur testing. Both have VE application forms available: ARRL; VEC Dept.; 225 Main St.; Newington, CT 06111 or W5YI-VEC Program; P.O. Box #10101; Dallas, Texas 75207. Many volunteer examiners are VE's for both programs.

Basically, this is how the two volunteer examining programs work. Why don't you get involved and participate?

From the Mailbag . . .

Do you think we will ever have a no-code amateur radio class?

Yes, I do—in some form. It is only a matter of time. Morse code is more than 150 years old. It was created by Samuel F.B. Morse and his assistant Alfred Vail in 1835 for overland telegraph. Its greatest use, however, has been for ships at sea. The "code" has really stood the test of time.

The code is slowly being replaced. The March 1988 issue of *Science* magazine states that Morse code use is decreasing at the rate of 10 percent a year. For the Maritime Services, the death knell will ring in the 1990's, they say, when the International Maritime Organization requires all ships to have one of three digital selective calling systems: VHF (Very High Frequency), SITOR (Simplex Telex Over Radio) or a satellite-based system on board. While Morse code sometimes can't get through due to propagation characteristics, digital selective calling uses "hand shaking" computers to automatically correct poor message receipt.

A recent Mobile World Administrative Radio Conference yielded to the Maritime Unions that, in the interest of preserving jobs, wanted to continue the practice of mandating a full time radio operator on board. The United States refused to go along with the majority, however, and is not bound by the agreement. There are advantages to the code. It can easily translate into other languages and has a lower initial cost. But the fact remains that there are far more computer buffs than Morse code fanatics out there and at some point, the code will be de-emphasized more than it is today - or completely eliminated for VHF and higher amateur operation. Many countries already have a code-free VHF ham class - and Canada is planning to join them.

I am a Canadian citizen. In Canada there is no 5 word-per-minute code exam or Novice class. Can I pass the American Technician license requirements in the U.S. and then operate in Canada?

An interesting question - and one that you will probably have to consult with the Canadian DOC. On the surface it appears you may be able to, since due to a treaty agreement, Canada automatically recognizes U.S. FCC amateur licenses without further testing or application for a reciprocal license. U.S. amateurs can freely use their American call signs in Canada without any paperwork or notification whatsoever. On the other hand, it is possible that the rules may preclude Canadians operating in Canada with American ham licenses. Any readers in Canada have the answer to this one?

VHF

a monthly feature by
STEVE KATZ, WB2WIK

PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

Mailbag

The fun part of writing a monthly column is receiving so much mail. This month I'll try to catch up a bit on newsy items and correspondence.

KA3B is taking orders for his new *1988 North American 50 MHz SSB Directory and Beacon List* and his *1988 North American 6 Meter Repeater Directory*. I've seen the beacon list and it is far more than a list, featuring lots of interesting tidbits about the history, people and hardware behind several of the long-running beacons; it even includes photographs (well, photocopies of photographs) and is very well done. I've not seen the repeater directory as yet, but Harry says it is 24 pages long and is the most accurate listing of six meter repeaters available. Either publication is available for $8.00, or both for $15.00, to help defray the cost of reproduction. Send orders directly to Harry Schools, KA3B, 1606 So. Newkirk St., Philadelphia, PA 19145.

I'm on KA3B's mailing list and can assure you that nobody has more apparent love for the six meter band than Harry. He must keep every shred of information ever published about six meters in a very big file box that grows bigger each year. Just for you, Harry, I'll run this photograph of a multioperator contest operation with which I was involved in September, 1967. That's me on the left, looking like a little kid. (I was, way back then.) The other operators are WA2BAT (center) and WB2UQT (right, partly hidden), and the rig shown is an Amplidyne 6 and 2 meter AM/CW transmitter with an NC303 receiver and converter. The converter was a Tecraft "Criterion," I recall, which used Nuvistors in a real "state of the art" design. Ha!

NCJ, the National Contest Journal, a long-time periodical dedicated to the sport of radio contesting, is now published by the ARRL. The League has turned this into a really professional publication which now features a "VHF-UHF Contesting!" section written by W9IP, W3EP and K9AKS. Always glad to see folks generating some enthusiasm for VHF/UHF work on any level. Subscriptions to NCJ are via ARRL.

Looking for hard-to-find VHF/UHF/Microwave components? If you haven't tried Microwave Components of Michigan, you haven't looked hard enough. MCM offers a broad range of components, plus custom-built GaAsFET preamplifiers and a preamp measuring service for "bull-free measurements and tweaking on our HP897OA/346A" (automatic noise figure meter). Interested? Call them at (313) 941-8469 or write 11216 Cape Cod, Taylor, MI 48180.

Twenty years later . . . . A nostalgic shot of the world famous (and now defunct) Interstate VHF Society setup during the September, 1967 VHF contest. Left to right, WB2WIK, WA2BAT, WB2UQT manning the rock-crushing 60 W AM station! Setup was atop a local 520′ hill. Were we ever that young?

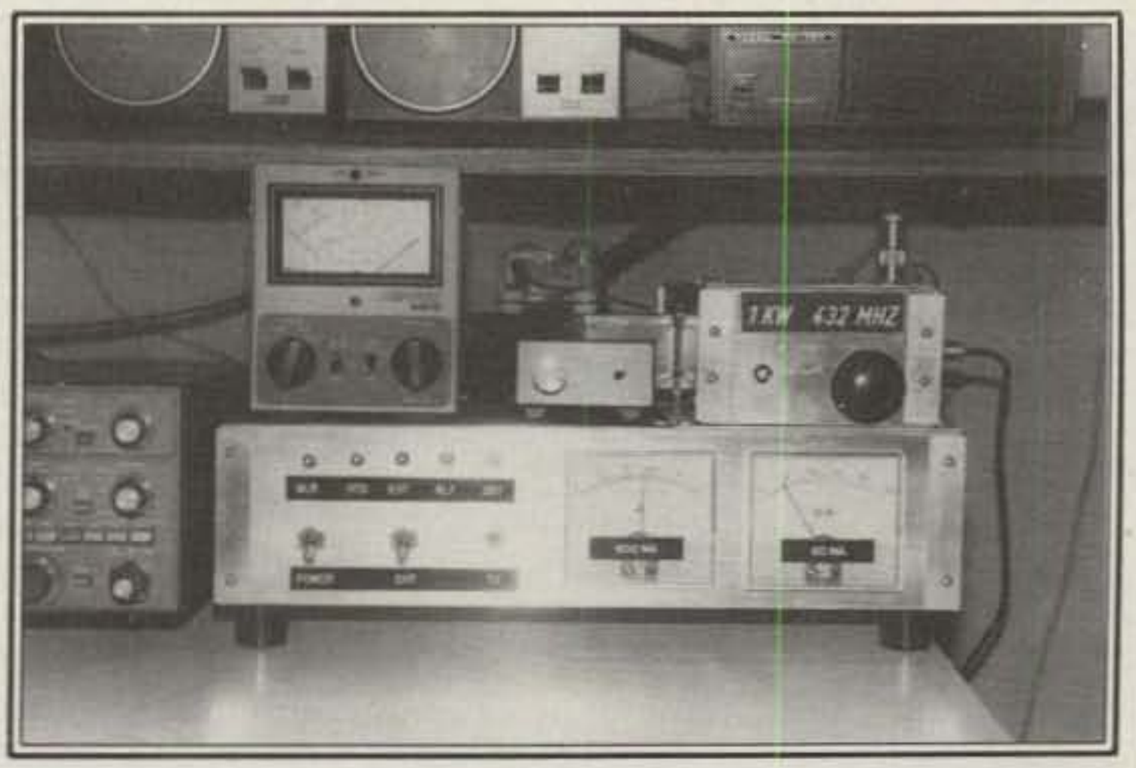
How did you do in the January VHF Sweepstakes? Conditions here in the Northeast were "flat"—not good, not bad, maybe improved from last year. Competition was fierce, as always in this event that keeps most of us at home, doors locked against neighbors complaining of interference. Actually, due to brilliant scheduling, there were no pro football games contest weekend and my neighbors didn't flinch a bit. I worked hard to make 860 QSO's in 135 grids on six bands, but I suspect this isn't good enough to win. WAØTKJ's six meter scatter signal was outstanding but he wasn't hearing a lot of eastern callers. Caught a brief burst from N4EJW for my only FL contact. No E-skip or Au. Disappointing, until one considers how the Denver Broncos must've felt just a week later.

WA1TRE wrote to inquire about stacking six meter beams. Dick wrote, "I thought power dividers used 52 Ohm coax of equal lenght, but not according to your F9FT system." Well, yes and no. Commercial hardware is available for dividing signals to even numbers of antennas at 144 MHz and higher, but nobody I know of markets a six meter divider; this is why I homebrew mine of two equal (odd quarter-wave) lengths of 75 Ohm cable which step up the impedance of each antenna to 100 Ohms, then combines the two lines in parallel to result in a system feedpoint Z of 50 Ohms. If you were to simply parallel random but equal lengths of 50 Ohm cable to the two antennas, you could find yourself with a 2:1 mismatch between the main transmission line and the divider.

Dick also asked, "Is it possible to build a power divider and use two 100′ lengths of 9913 to the shack" (to parallel two pairs of antennas for a 2 × 2 switched 4-bay array)? Anything is possible, but this is a tough job because you'd be relying heavily on the velocity factor of the 9913 being constant and predictable for six wavelengths of cable. Instead, I'd do

153 Rodman Court, Eatontown, NJ 07724

GJ4ICD's neat layout includes 3CX800A7 kilowatt amplifiers for 144 and 432 MHz, FT-726R and assorted accessories. Geoff says the amplifiers have built-in power supplies using toroidal transformers. Are these switched-mode units, Geoff?



GJ4ICD's 70 cm KW amplifier looks like a nice, clean job. The Mirage MP2 power meter appears to be "pegged" at 500 Watts. Are you trying to tell us something, Geoff?

all the splitting and phasing at the top of the tower to assure getting it all right, install a remote coaxial relay to switch in either or both pairs of antennas, and run a single feedline to the shack. This requires a weatherproof housing for the relay, of course, but it does save the expense of another 100' of coax.

Speaking of power dividers, WA6MGZ offers a family of two meter units for 2, 4 or 6 way splitting at legal-limit power levels. His 6-way unit uniquely meets the need of operators planning to install 3 × 2 arrays that are becoming quite popular: Model Z144X6NF sells for $70.00 postpaid and saves a lot of work. For further information contact Chuck Smallhouse, 803 Mora Dr., Los Altos, CA 94022.

A new supplier of F9FT Tonna antennas has emerged on the west coast: Kitchens' Communications, P.O. Box 939, Camarillo, CA 93011 lists all the popular Tonna models in their latest brochure. I've used about every antenna Tonna makes, and they are well made, lightweight and offer excellent performance. By the time this is published, I should have a 4-bay array of the new Tonna 2304 MHz Yagi which features a horn (cavity) feed.

Seen the ads for the new Yaesu FT-736R but don't know anybody who's tried one yet? Well, I have. I was pleased to receive FT-736R serial number 7M020480, one of the very first units to arrive in the U.S., and plan a full product review for the June "VHF Special" issue. Watch for it!

Chris Burger, ZS6BCR/ZS3Z/H5AYB *et al.*, wrote to tell us a bit about VHF DX'ing in South Africa. Chris says, "As the longest distance that is workable in this country, i.e., the spacing between the furthest two stations, is only 1200 km, that particular path has a fairly slim chance of opening and the chances of those two stations being on the air at the same time is slim. If you consider that a more typical path (from ZS1 to ZS6) is only 1100 km, it is even worse." I see your point, Chris. This is only 683 miles, short for six meters and *really* short for two meter E-skip.

"As the biggest gun in ZS1 runs 100 W to four elements, tropo is even worse. The only mode that is really usable here is meteor scatter. At least, through the efforts of Hal Lund, ZS6WB, this mode is coming into its own. ZS1EK, ZH1L, ZS2NR, ZS4AAB, ZS4TX, ZS4NS, ZS5AV, ZS6CE, ZS6LW and ZS6WB are all now regularly active on this mode." Good deal, Chris! Now, how can we arrange an m.s. sked between ZS and W2?

"You probably heard about the excitement when Dave Saul A22KZ worked into the U.K. Once again, the equipment to get him on six was supplied by ZS6WB. Also, Hal was the prime mover behind the

visit that ZS4TX and myself paid Dave to show him the ropes on operating and setting up the equipment. This doubled as an attempt to give out grid squares and also to run prefixes for the CQ WW VHF WPX." Chris, at least you have someplace to go to activate a new grid, new country and new prefix all at once! Around here the only way to do this is to work from 4U1UN, which has now been done during a major contest. Sigh.

Chris went on to tell about the VHF WPX contest effort last July, which we'll report a bit more on in the contest writeup this June. A highlight of his letter is about working W5UN via EME from A25/ZS6BCR while using a battery operated rig and a single Yagi tied to a tree and directed manually into an overcast sky! "At times during the contact, the batteries became so flat that the PLL on the exciter unlocked—we had to change batteries about six times during the contact!" Just goes to show what can be done with a strong will and unfaltering faith.

ZS6BCR ended his letter with, "Hope you enjoyed reading about it, like I enjoyed reading about the incredible amount of activity in your VHF contests (our country leaders on 50 MHz have about 35 squares confirmed, which is pretty good if you consider there are only about 12 squares with resident activity)!" It's always enlightening to read about experiences on the other side. Thanks for writing, Chris.

Another reader from across the pond, GJ4ICD of Jersey, Channel Islands (U.K.), wrote to say, "I trust you are well and still alive after seeing your "6 Meter BIG PSU" in *CQ*, hi hi." (He must mean the 8877 amp article run last June.) "Six meters is going well, I now have a good station on six and will be QRV 24 hours a day through June for the 'Es' to the States." Great going, Geoff! I'm not sure my XYL would like the sounds of the six meter rig running through the house all day and night. Where did you find your wife, or aren't you married? Sure hope to work you this coming E season. Listen for me, and about a thousand others who are anxious to work GJ!

Expeditions

An expedition to Saba Island (PJ6, grid FK87) is planned by WB2CZB, N3AHI, W1EXC and W3IWU for July 7 through 14 (come on, guys, extend it three more days to take in the VHF WPX Contest!) with operation on 80 through 6 meters, with particular emphasis on 6. Saba counts the same as Dutch St. Maartin (PJ7) for DXCC, but offers superior northerly paths. Particular attention will be paid to exploring six meter multi-hop paths to the U.K. and Europe as well as to the Americas. A special call has been applied for, but was not received as of this writing. QSL's will be handled by K2MUB (SASE's, please!). Thanks to Bud Weisberg, K2YOF for this information.

WA4VCC, KB4CSE, WW4T and N4ORP plan a grid expedition to EL79, with operations from St. George Island off the Florida panhandle beginning April 18 PM and ending April 23 AM. This operation will include 50, 144, 220 and 432 MHz and emphasis will be placed on the ARRL 135 cm "Sprint" April 19 PM. The group is available for meteor schedules during the Lyrids shower which is expected to peak April 21.

WA4VCC and KB4CSE are also planning a mini-expedition to rare grid EM61, April 12 PM on 432 MHz only. Plans are also underway for operations from EM52, EM53 and EM54 during the summer E season, according to WA4VCC. For skeds or further information, contact Ted Goldthorpe, WA4VCC, 209 Swamp Fox Drive, Fort Mill, SC 29715 (803) 547-6980.

Speaking of expeditions, WB9MSV would like to share an entertaining story of his operations from EN56 on Michigan's upper peninsula. The story is a bit lengthy but bears repeating, so we'll try to squeeze it in next month.

Look for you in the Sprints! Till then.

73, Steve, WB2WIK

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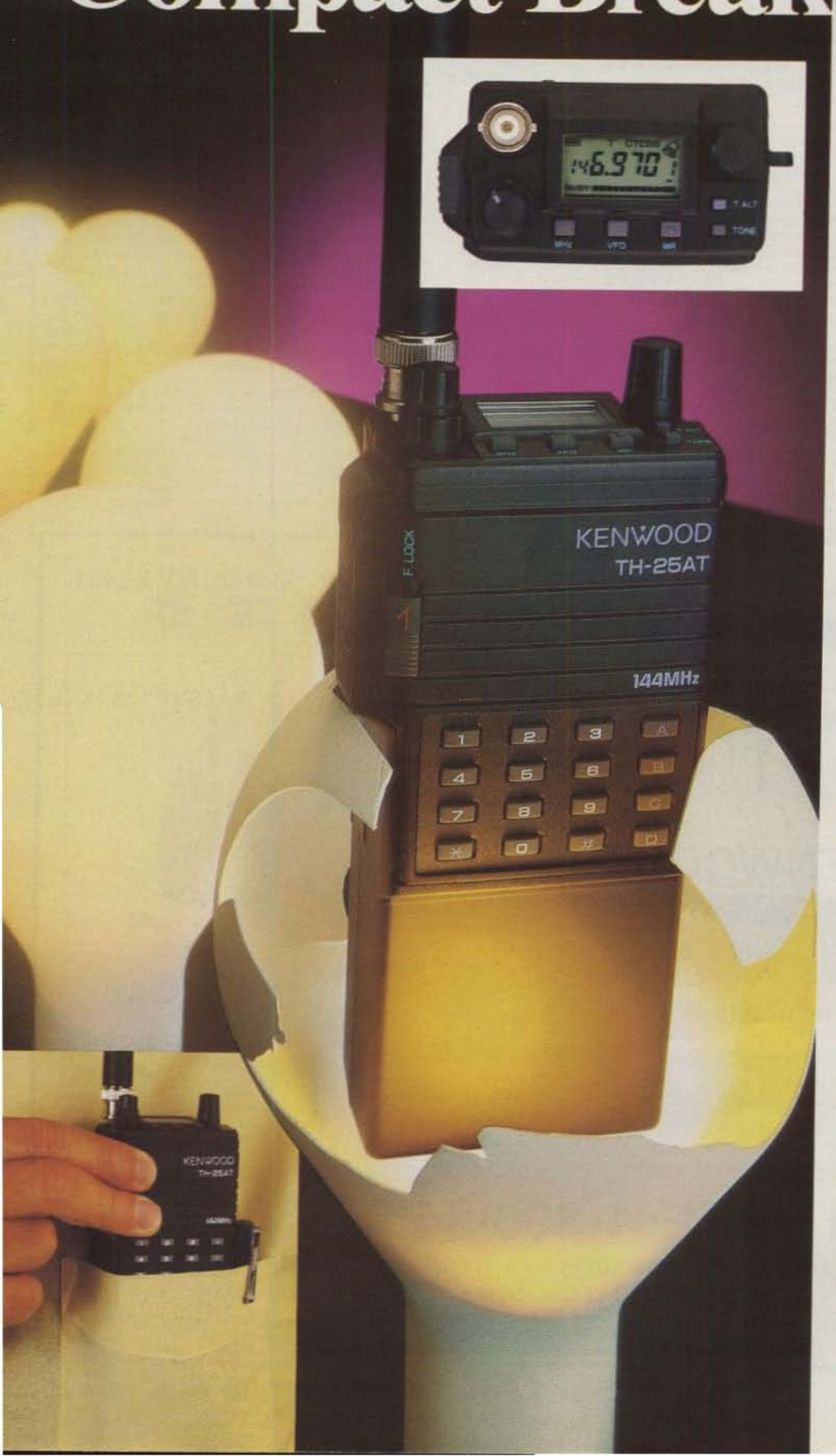

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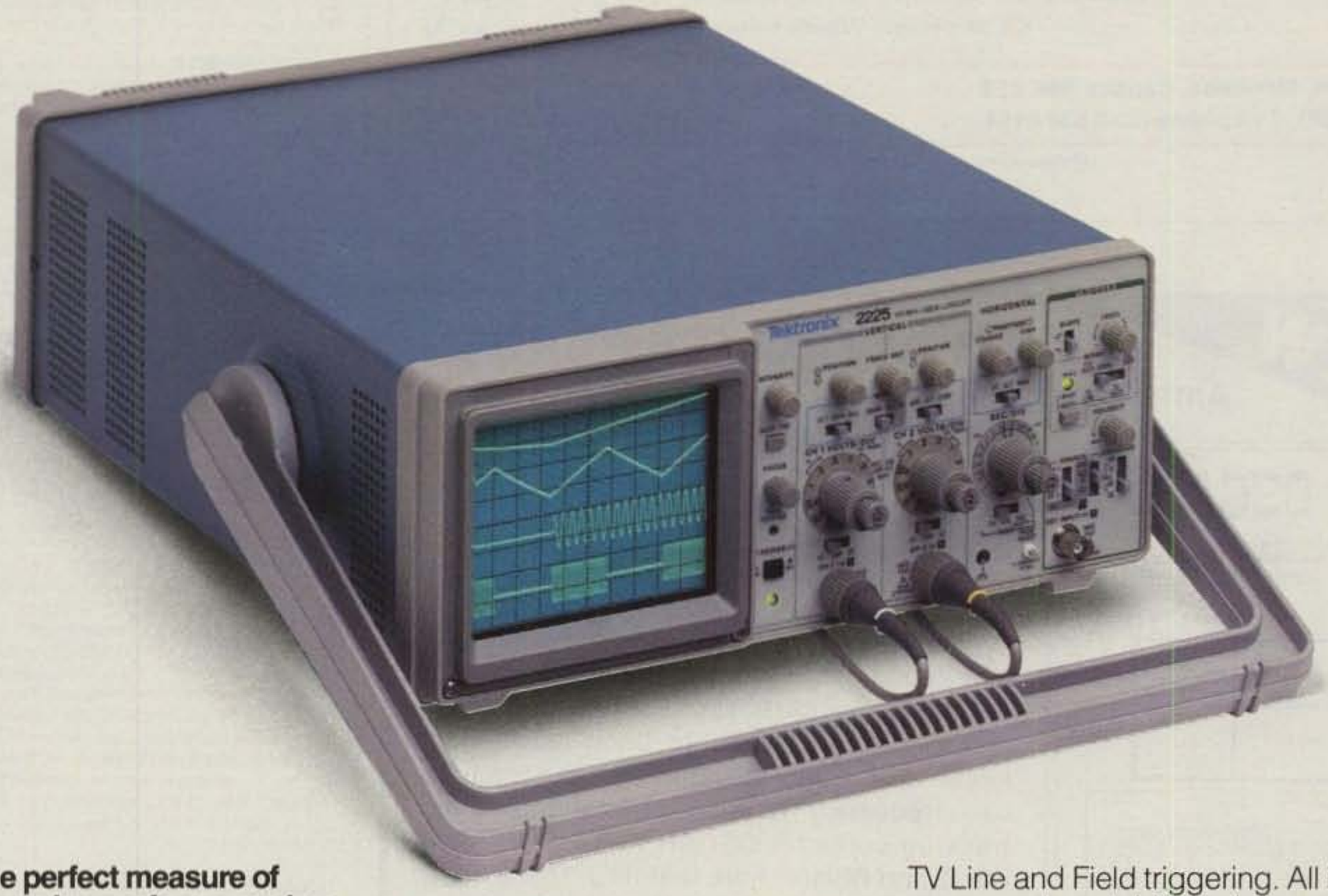

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R-390A RECEIVER: $115, electronically complete, repairable, (Government-removed meters, operation unaffected). R-390A parts: Info SASE. CPRC-26 Manpack Radio, 6 meter FM, with antenna, crystal, handset: $22.50, $42.50/pair, $97.50/six. H-251 Military Communications Headphones: $7.50. Add $4.50/piece shipping, $9 maximum, except R-390A shipped collect. Baytronics, Box 591, Sandusky, OH 44870.

DEAD BATTERY PACK??? NiCds/Inserts/Rebuilding. Replacement inserts, less wires/plugs: ICOM BP2 $17.95, BP3 (Std.) $16.95, BP5 $23.95; Kenwood PB24 $19.95, PB25/25H/26 $24.95; Tempo S1 (270mah) $21.95, S1,2,4,5,15 (450 mah) $22.95, Azden 300 $19.95; Ten-Tec 2991 $24.95; Santec 144 w/plug $21.95; Yaesu 207/208R (w/case) $23.95. For rebuilding, add $3.00 to install in ICOM, Kenwood, Motorola, GE, phone packs, others SASE quotes/info. In PA add 6%. Add $2.00 S&H/order. CUNARD ASSOCIATES, R.D. #6, Box 104, Bedford, PA 15522.

WRITTEN EXAMS SUPEREASY. Memory aids from psychologist/engineer cut study time 50%. Novice, Tech, Gen: $5 each. Advanced, Extra: $10 each. Moneyback guarantee. Bahr, 2549-D3 Temple, Palmbay, FL 32905.

FREQUENCY RE-CALLER PROGRAM for IBM pc's and compatibles. Store and recall up to 1500 frequencies. Ideal for scanner users. Simple to operate. $12.95. Infinite Horizons, Box 104, Granby, MA 01033.

WANTED: Radio station bumper stickers to decorate my shack. NØGSA, 1214 S.E. 4th Street, Minneapolis, MN 55414-2027.

FOR SALE: 10 ch. crystal scanner w/crystals and antenna base/mobile $60. Heathkit GR-84 receiver 500 kHz to 30 MHz w/antenna $40. Will trade for BP-8 or ? George KA9ZZJ (414) 257-1743.

WANTED: Equipment and related items. The Radio Club of Junior High School 22 NYC, Inc. is a non-profit organization, granted 501(c) (3) status by the IRS, incorporated under the laws of the State of New York with the goal of using the theme of Ham Radio to further and enhance the education of young people. Your property donation would be greatly appreciated and acknowledged with a receipt for your tax deductible contribution. Please contact WB2JKJ using the callbook or telephone (516) 674-4072 24 hours, seven days a week. Thank you!

SUPERFAST MORSE CODE SUPEREASY. Subliminal cassette. $10. LEARN MORSE CODE IN 1 HOUR. Amazing new supereasy technique. $10. Both $17. Moneyback guarantee. Free catalog: SASE. Bahr, 2549-D3 Temple, Palmbay, FL 32905.

ROSS'$$$$ NEW SPECIALS: KENWOOD TS-440S/WAT $1009.90, TM-751A $???.90, TM-221A $354.90, TS-140 $764.90, TM-2530A $379.90 TR-851A $604.90. AEA PK-64HFM $169.90, ICOM IC-38A $349.90, IC-O4AT $374.50, IC-290H $496.90, IC-781A $5939.90, MICRO 2AT $274.90. YAESU FT-73RTT $275.90, FT-726R $789.90. ALL L.T.O. Phone or send SASE for pricing on popular items. Over 8772 ham-related items in stock for immediate shipment. *Mention ad.* Prices cash, F.O.B. Preston. We close at 2:00 Saturdays & Mondays. ROSS DISTRIBUTING COMPANY, P.O. Box 234, 78 South State, Preston, Idaho 83263 (208-852-0830).

WANTED: Unmodified National NC57 amateur receiver in very good or better condition. Please call Dick Leatherman collect at 804-320-2415, or write P.O. Box 35613, Richmond, VA 23235.

ROSS'$$$$ USED April SPECIALS: KENWOOD TS-820S/WCWFL $549.90, AT-200 $119.90, AT-130 $119.90, MC-85 $94.50. YAESU DC-200 $59.40, FP-707 $109.90, FC-901 $169.90, FT-221 $229.90, FR-101SD $349.90. SWAN 102BX $459.90. Phone or send SASE for USED ITEMS LIST. OVER 8,777 NEW ham items in stock. MENTION AD. Prices Cash, FOB Preston. We close at 2:00 Saturdays & Mondays. ROSS DISTRIBUTING COMPANY, P.O. Box 234, 78 South State, Preston, Idaho 83263 (208) 852-0830.

NEED: Schematic for Knight R-100-A receiver and T-150 xmitter. HELP! Bill Schmidt, R2 Box 211, Lincoln, AR 72744.

WANTED: Old Radio Shack catalogs, 1979 and older. Will return postage. Jeff Crawford, 601 S.E. Karrigan Terr., Port St. Lucie, FL 34983.

ANTENNAS: Half size 80 meter dipole $25; 2 meter ¼-wave cowl mount disguise antenna $10; 2 meter/audio radio antenna splitter $10. Charles Bright, 4115 Buckley Ridge Court, St. Louis, MO 63125.

WANTED: Manual or copy for Johnson Viking Courier. K9GHD, Rt #5, Box 438-A, Centralia, IL 62801 (618-532-6267).

WANTED: Basketcase SB-200. Also want ARR MML-144VDG preamp. C. Hays, 3675 Estates Dr., St. Louis, MO 63033.

SELL: 48 foot HD aluminum tower, $350. Delivery possible. T.N. Colbert, WA8MLV, Burton, OH 44021.

FOR SALE: Collins 51J receiver with manual, $60. Ward Becht, 625 Tufts Ave., Burbank, CA 91504 (818-842-3444).

WANTED: Data Tech 600 Demodulator for Model 28 teletype. K5IKB, 1303 Rogers Dr., Amory, MS 38821.

KENWOOD

...pacesetter in Amateur Radio

NEW!

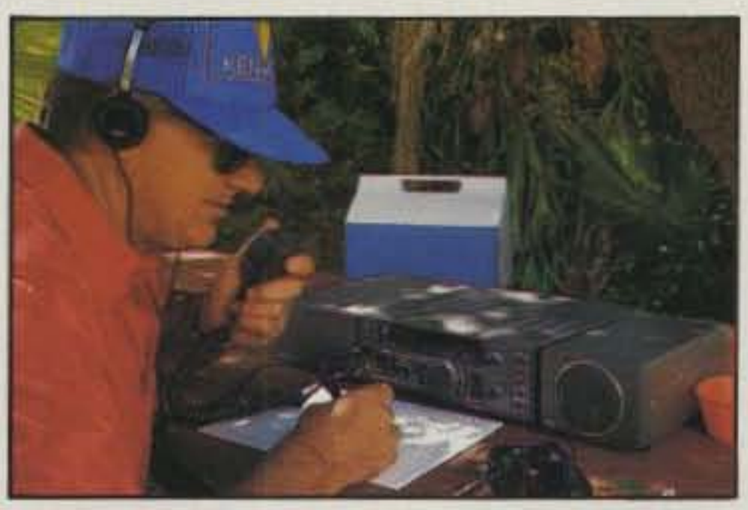
Affordable DX-ing!

TS-140S

HF transceiver with general coverage receiver.

Compact, easy-to-use, full of operating enhancements, and feature packed. These words describe the new TS-140S HF transceiver. Setting the pace once again, Kenwood introduces new innovations in the world of "look-alike" transceivers!

- **Covers all HF Amateur bands with 100 W output.** General coverage receiver tunes from 50 kHz to 35 MHz. *(Receiver specifications guaranteed from 500 kHz to 30 MHz.)* Modifiable for HF MARS operation. *(Permit required).*
- **All modes built-in.** LSB, USB, CW, FM and AM.
- **Superior receiver dynamic range** Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range.



- **New Feature! Programmable band marker.** Useful for staying within the limits of your ham license. For contesters, program in the suggested frequencies to prevent QRM to non-participants.
- **Famous Kenwood interference reducing circuits.** IF shift, dual noise blankers, RIT, RF attenuator, selectable AGC, and FM squelch.

- **M. CH/VFO CH sub-dial.** 10 kHz step tuning for quick QSY at VFO mode, and UP/DOWN memory channel for easy operation.
- **Selectable full (QSK) or semi break-in CW.**
- **31 memory channels.** Store frequency, mode and CW wide/narrow selection. Split frequencies may be stored in 10 channels for repeater operation.
- **RF power output control.**
- **AMTOR/PACKET compatible!**
- **Built-in VOX circuit.**
- **MC-43S UP/DOWN mic. included.**

Optional Accessories:

• **AT-130** compact antenna tuner • **AT-250** automatic antenna tuner • **HS-5/HS-6/HS-7** headphones • **IF-232C/IF-10C** computer interface • **MA-5/VP-1** HF mobile antenna (5 bands) • **MB-430** mobile bracket • **MC-43S** extra UP/DOWN hand mic. • **MC-55** (8-pin) goose neck mobile mic. • **MC-60A/MC-80/MC-85** desk mics. • **PG-2S** extra DC cable • **PS-430** power supply • **SP-40/SP-50B** mobile speakers • **SP-430** external speaker • **SW-100A/SW-200A/SW-2000** SWR/power meters • **TL-922A** 2 kW PEP linear amplifier (not for CW QSK) • **TU-8** CTCSS tone unit • **YG-455C-1** 500 Hz deluxe CW filter, **YK-455C-1** New 500 Hz CW filter.

TS-680S

All-mode multi-bander

- 6m (50-54 MHz) 10 W output plus all HF Amateur bands (100 W output).
- Extended 6m receiver frequency range 45 MHz to 60 MHz. Specs. guaranteed from 50 to 54 MHz.
- Same functions of the TS-140S except optional VOX (VOX-4 required for VOX operation).
- Preamplifier for 6 and 10 meter band.

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

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KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

DRAKE R4C, T4XC, AC4, MS4, Mic. 1.5 kHz CW, AM filters. Thirteen extra RX xtals, inc. 160m with cables. $550. Include SASE. AA1K, Jon Zaimes, 145 Farm House Ln, Bear, DE 19701.

SELL: Heath SB-303 receiver $85; HDP 0242 desk mike $35; HM 2140A dual SWR/wattmeter $75; MFJ 901B Versa Tuner $45; Microlog SWL $50. Bob (804) 467-8605 after 6 PM EST.

FOR SALE: Heath HW-9, 8 bands, P/S, wattmeter, $159. Hamtronics TX converter 10 to 2, $40; 10 meters to 432, $60. UHF wattmeter, $25. Call (605) 336-8097 or callbook. WB7DRU.

LMB CO-1 Cabinet (like S-Line) $29 plus shipping. Teller CK or MO only. Erickson, W2CVW, 343 Catherine St., S. Amboy, NJ 08879.

RIDER'S MANUALS WANTED: Volumes 6-15-16, also 18 thru 23. Loretta Hausmann, KA3QBT, 6256 Montague Street, Phila., PA 19135.

WANTED: Manuals and cable for US Navy Type RBM-3 RCVR, June 1942 and CCT-20086 Power Unit. D. Palmer, W6PHF, 638 Benvenue Ave., Los Altos, CA 94022.

OSCILLOSCOPE—Heath Model 10-12 with manual and probes, like new, $125. Sencore TC 130 Tube Tester $65. Marsh, P.O. Box 354, Colonia, NJ 07067 (201-381-3873).

WANTED: Operational AC Power Supply for Gonset G-76 Transceiver. K8HVG, 3520 Campbell, Dearborn, MI 48124.

NEED SERVICE INFO for the following. I will purchase or copy cost. Unicom Electronics Power Supply Model PS-11R, Tandy 64K Color Computer II Model 26-3127, EMP/GTS Manual Mini Modem Model MM-101 (manufactured by Elec and Eltec Co. Hong Kong), Heathkit O'scope Calibrator Model IG-4505, Leader RF Signal Generator Model LSG-11, Garrard Turntable Model Lab 95B, Johnson Messenger CB Model 323, Apple IIe Pro System Duo-Disk Imagewriter Printer Monitor II, and ICOM Model 735 Ham Transceiver. Mike Adams, Haney Vo-Tech Center, 3016 Hwy 77, Panama City, FL 32405 (904-769-2191).

HEATH HR-1680/HX-1681/PS-30 Supply, CW rig, 10–80 meters. Good condition. $230 and will ship. Mark, N0EPF, 3803 Dixon Way, Colorado Springs, CO 80909.

INSTRUCTOGRAPH: With 10 tapes and instruction manual. $25.00 plus shipping. Ted Long, Rt. 2, Box 166, Nevada, MO 64772.

FOR SALE: TS-520 with CW filt., excel. condx., $325 plus shipping. KA1SJ, Box 86, N. Granby, CT 06060 (tel. 203-653-6887).

CLEGG WANTED: Venus six meter transceiver, SS Speech booster, Apollo amplifier. Contact: G. Hawrysko, K2AWA, P.O. Box 568, Boro Hall, Jamaica, NY 11424.

ICOM 260A w/TT mic, extra pwr cable, PA. Cushcraft 214B. PK64A, C64, monitor. Swan 2XA. Best offer. Ken, N5CND, 108 E. Centre St., Fredericksburg, TX 78624 (512-997-3820).

HELP! Need schematics/manuals for DX-150 (cat #20-150) and DX-100 (cat #20-206). Will pay for copying and postage. KB8BMN, Andy Duplay, 1785 Spencer Apt. A, Toledo, OH 43609.

SELL: ARRL Handbook, hardcover, 1980, $10; Foreign and U.S. call books, 1984, each $10; Radio Handbook by Editors & Engineers, hardcover, 1942, $15; Radio Physics Course by Ghirardi, hardcover, 1932, $20; Elements of Radio by Marcus & Horton, hardcover, 1952, $5; U.S. Callbook, 1986, $12. Joseph Schwartz, 11 Windham Loop, Staten Island, NY 10314 (718-698-8069).

WANTED: ALPHA 77DX or SX. Sam, N9FUT, 317-342-7777 days.

NEED SERVICE MANUAL for National Radio NC98. Elfriede Schulz, 2196 NE Vista Ave., Gresham, OR 97030.

WANTED: Ham Radio program for Commodore 64/128. Send disk(s) and I'll return what I have. Don, WB4CVH, 38 Elmwood Place, Goose Creek, SC 29445-3802.

TS-820 $450, FT-101ZD digital $550, FV-700 DM VFO $110, M-6000 Decoder $650. SASE for cleanout. KA8UWR (216) 376-2402. Wanted: TS-440/S.

FOUR bedroom split-level east of Poughkeepsie, NY (NYC less than 1½ hr.). Top of 500 foot hill, friendly neighbors. Two, 15, 20, and 75 M. Best NY school district, ½ acre, 2½ baths playroom, 2 car garage, $220K. W2VGI, 914-452-5136.

WANTED: ICOM IC-275H, IC-560. Kenwood TS-430S, SP-930, SP-940, HC-10 World Clock. Sony ICF 2002. Kauppi, 690 Vermillion Tr., Gilbert, MN 55741.

RTTY, CW, ASCII on VIC-20. Plug-in software and interface AEA MP-20, $25. D-104 microphone $15. I ship. KV5F, Callbook address.

WANTED: Heath Pwr. Sup. HP23 Series. W6PZX, P.O. Box 183, Cool, CA 95614.

WANTED: Kenwood Remote VFO-820 with connecting cable and manual. Erwin Donadt, WF4V, 6445 Juniper Rd., Port Richey, FL 34668 (813-847-0658).

FREE "Magnolia Blooson" QSL. Send SASE to K4NBN "No Bad News," 1945 Sweetbriar Lane, Jacksonville, FL 32217.

WANTED: Old Radio Shack catalogs 1979 and older. Will return postage. Send to Jeffrey Crawford, 601 S.E. Karrigan Terrace, Port St. Lucie, FL 34983.

FOR SALE: VFO 230 mint $175. KF5AL, P.O. Box 287, Alvord, TX 76225.

NEED INFO on Alliance model HD-73 rotor and Hy-Gain TH3JRS Tribander. Send info to: Terry Brown, KA4ZER, 409 RL Honeycutt Dr., Wilmington, NC 28403.

WANTED: Ribbon or high velocity microphones in working condition with extra ribbons. Marvin Rosen, N3BQA, 20 W. Madison St., Baltimore, MD 21201 (301-685-6308).

NEED C64, C128 PD Ham software? Send $10 for 2 SS disks or SASE for info. Send to: Terry Brown, KA4ZER, P.O. Box 236, Wilmington, NC 28402.

WANTED: DS-1 Power Supply for Kenwood 520S, and VIC-20 Packet, RTTY, CW interface. WB2CUZ, Marc Roffman, 255-21 E. Williston Ave., Floral Park, NY 11001 (718-347-5988).

REMOTE 2 meter base/repeater station in outside cabinet, trade for mobile unit. K6KZT, 2255 Alexander, Los Osos, CA 93402.

WANTED: Boonton, GenRad, H-P test equipment. Need manual for Boonton 63H "L" Bridge. Call 715-453-5616. W0WTE, 127 Voerman St., Tomahawk, WI 54487.

FOR SALE: IC-740 w/FM, $800. Int. PS + $150. FT-102 w/FM, $800. Mint w/manuals. George Konya, 383 Coulee Rd., Pasco, WA 99301.

DE K3UKW: Drake TR7/PS7 station with NB7, SL500, SL1800, SL6000. Gone over by factory. Excellent condx., $750. Collins "S-Line"—75S3B, 32S3, 516F2 . . . R/E . . . $750. Tony Musero, 215-271-8898.

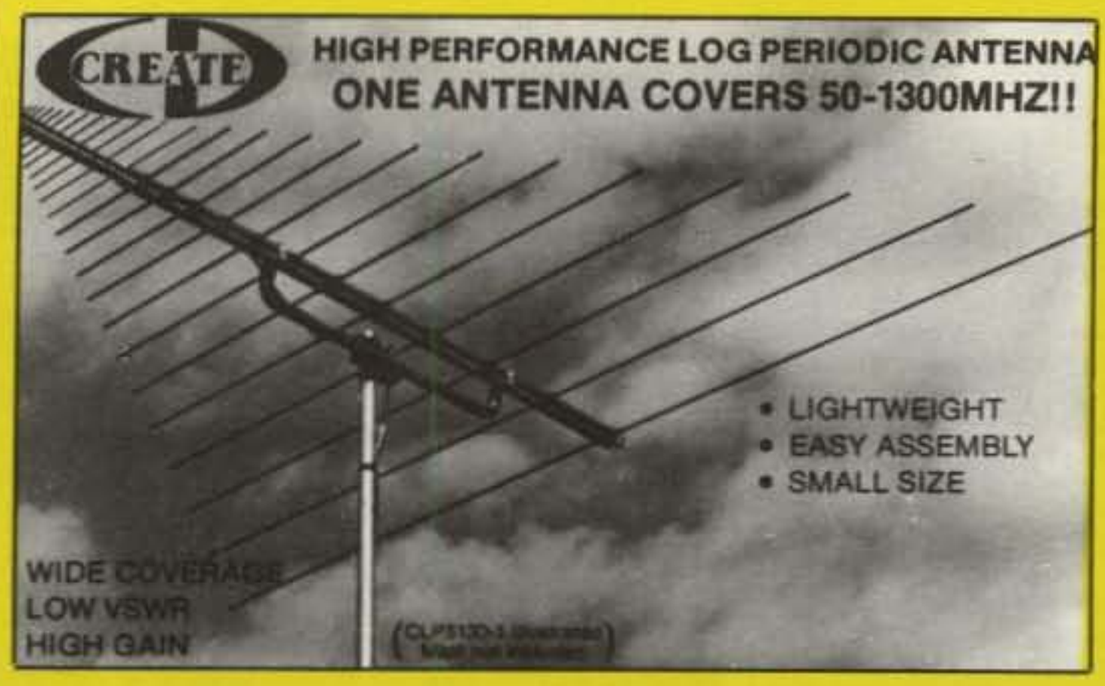
CLEANING HOUSE: Transmitting and receiving variable condensers, plate & filament transformers, tubes, coils and many other parts. R.W. Parkinson, W3QJ, 1415 Main St., #77, Dunedin, FL 34698 (813-734-4626).

KENWOOD TS-820 with remote VFO, CW filter, RF processor, A-1 in and out, $475 via UPS. R. Scott, W8FDN, 371 Claymore, Cleveland, OH 44143 (216-531-9160).

KLM KT-34A triband beam for sale. Pick-up only, $250. Gerry Skloot, KE2N, 2923 Mandalay Beach Road, Wantagh, NY 11793 (516-221-3535).

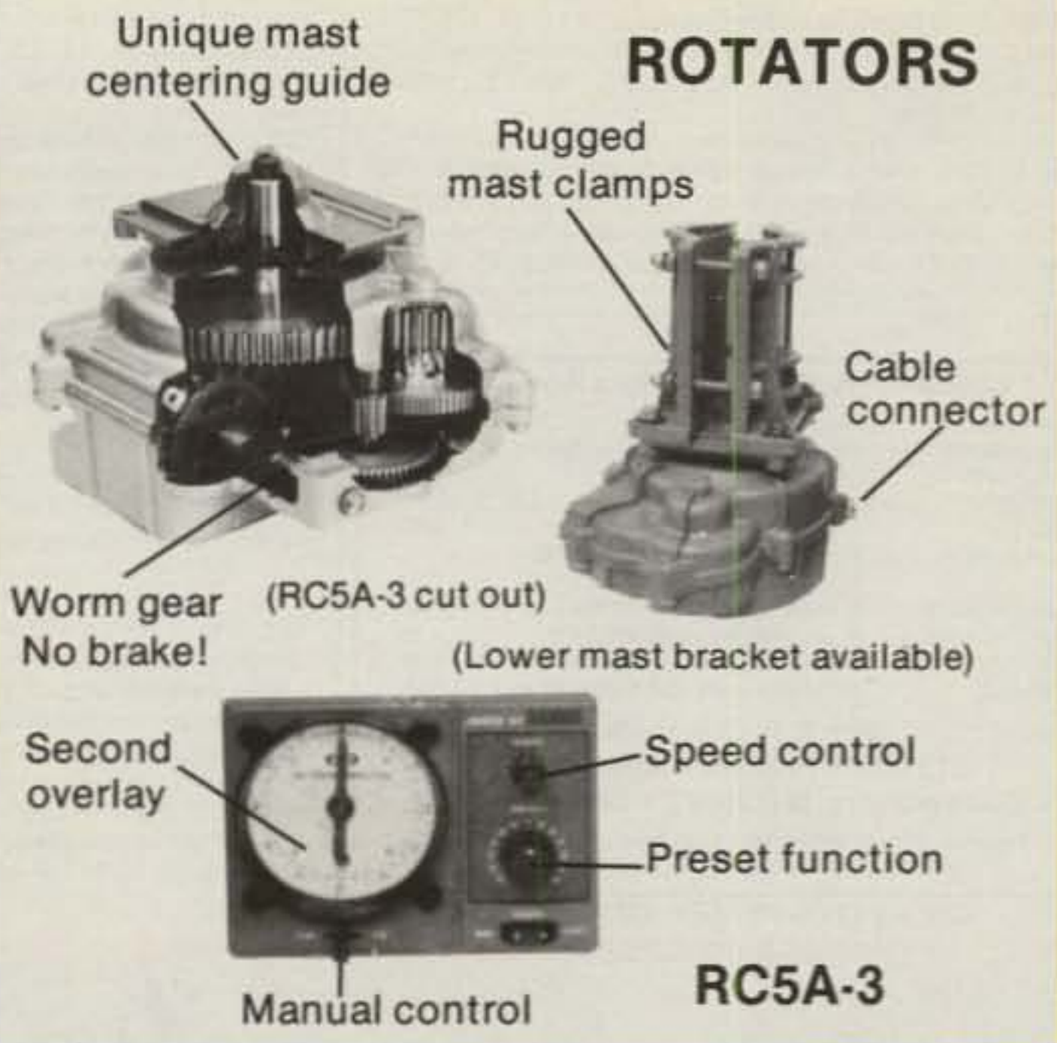
YAESU FT-7 H.F. solid-state xcvr., real good cond., $200, or trade. WB6TOW, (916-527-5930 eve.

TELESCOPE: Celestron Super C8 Plus, black, case, heavy-duty tripod, wedge, eyepieces, right-angle finder, Starbright coatings, diagonal, manuals. Like new, $1295. Gerry Skloot, KE2N, 2923 Mandalay Beach Road, Wantagh, NY 11793 (516-221-3535).



CLP5130-1 50-1300 MHz 25 el. 500W 6′ Boom $239
CLP5130-2 105-1300 MHz 20 el. 500W 4′6″ Boom $139

Operate on 6m, 2m, 1¼m, 70cm, 900 MHz and 1.2 GHz using only one antenna and one feedline. No tuning is required and the VSWR is 2:1 or less across the entire frequency range with excellent forward gain. The boom is made of high quality aluminum and the elements are precut for easy assembly. Each model can be mounted for either vertical or horizontal polarization. Create VHF/UHF log periodics are great for the amateur bands, scanners and numerous other applications.



RC5-1	10 sq. ft.	**$251**
RC5-3	10 sq. ft. preset	**$328**
RC5A-2	25 sq. ft.	**$399**
RC5A-3	25 sq. ft. preset	**$459**
RC5B-3	35 sq. ft. preset	**$736**

(All rotators are UPS shippable)

See Lew McCoy's Review In August 1987 Issue Of CQ.

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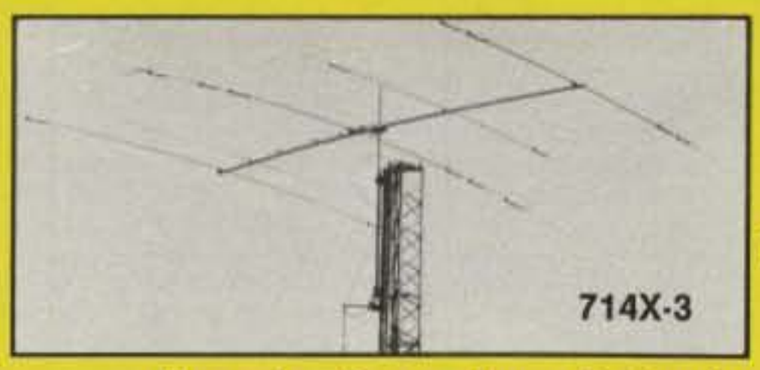
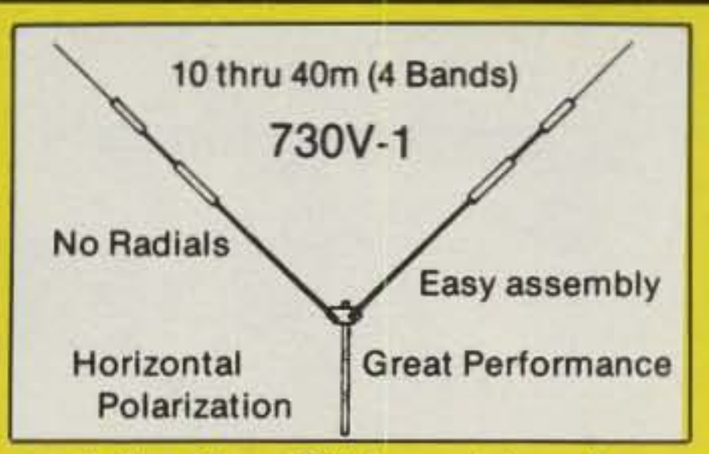
Creative Design Co., LTD.



714 Series Tribanders
15-20-40 Meters

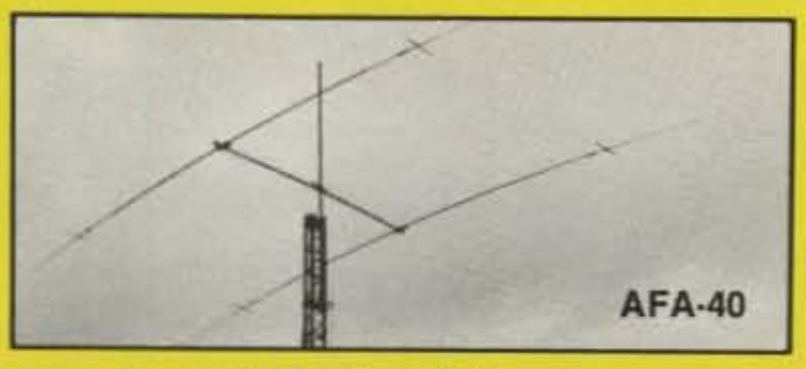
Model	Elements 40-20-15	Boom Length	Longest Element	Turning Radius	Wgt. Lbs.	Power PEP	Price
714T	2/4/4	28′6″	43′	25′3″	71	2 kw	$574.
714X	3/4/4	32′5″	44′	26′2″	75	2 kw	$762.
714T-3	2/4/4	28′6″	43′	25′3″	75	3 kw	$707.
714X-3	3/4/4	32′5″	44′	26′2″	80	3 kw	$928.

(Prices include balun)



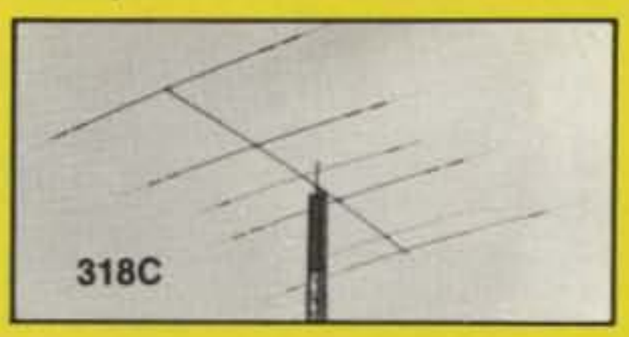
The 730V-1 is a V-dipole consisting of two 19 ft. heavy duty, self-supporting elements and bracket with an efficient balun that is ready for mounting on a standard TV mast. Rotation is not necessary. The V-dipole is superior to standard vertical antennas in gain, noise and efficiency. **$159**

2 Element Phased Arrays



Model	Freq Mhz	Boom Length	Longest Element	Turning Radius	Wgt. (Lbs)	Power PEP	Price
AFA-30	10	12′11″	32′1″	18′	29	1.5 kw	$258.
AFA-40	7	16′ 8″	47′10″	25′7″	42	3 kw	$388.
AFA-75-1	3.8	29′6″	80′	42′7″	148	4 kw	$1,940.

(Prices include balun. All UPS Shippable except AFA-75-1)



318 Series Tribanders
10-15-20 Meters
Available Soon
318B +7 (10-40 Meters)!

Model	Elements 20-15-10	Boom Length	Longest Element	Turning Radius	Wgt. (Lbs.)	Power PEP	Price
318JR	3/3/3	13′1″	31′1″	15′9″	28	1.2 kw	$289.
318	3/3/3	16′4″	31′1″	17′4″	40	2 kw	$345.
318B	3/4/4	20′11″	31′1″	18′4″	49	2 kw	$434.
318C	5/5/5	29′10″	31′1″	21′	58	2 kw	$643.

(Prices include balun. All UPS shippable except 318-C)

Prices do not include shipping.

ALSO AVAILABLE: ROOF TOWERS • MONOBANDERS • TRIBANDERS • TOWERS • DUALBANDERS • COMMERCIAL

All Create Antennas Are Manufactured With High Quality, Heavy Duty, Precision Aluminum Tubing For Easy Assembly And Long Life.

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See Us at Dayton Booths 222, 223, 224

1-800-255-7020, or in CA 818-888-4927

(Specifications and prices subject to change without notice or obligation) FAX 818-888-5112 TELEX 697-4899

Orion HI-Tech

ORION HI-TECH
P.O. Box 8771
Calabasas, CA 91302

CIRCLE 137 ON READER SERVICE CARD

FOR SALE: Midland Mobile 2 meter rig 144–148, $85. R/S printer DMP 100, $100. R/S Programmable Scanner covers air freq., $150. More info send SASE to P.O. Box 518, Whitehouse, FL 32220.

HEWLETT-PACKARD Model 606A Signal Generator, 50 kHz–65 MHz, for communication equip. servicing. $125 or trade for linear amplifier parts, vacuum capacitors/relays. A. Emerald, 8956 Swallow, Fountain Valley, CA 92708.

WANTED: Astron RS/VS-35M, Bencher ZA-1A, Drake RCS-4, Kenwood DM-81, HC-10, MC-85, SP-930/940, Millen 90652 Dip Meter. K0MK 218-865-6541.

COLLINS 75-S-3B ham band receiver $375. Central Electronics 100V linear transmitter $225. Hallicrafters HT-33A 1KW linear ampl. $225. HS-33 low impedance headphone $4. S-11-A Waterman 3 inch Packetcope $15. TM-40 stereo power level meter $5. 16 ohm stereo crossover network $5. One pair Sears 3 channel CB walkie-talkie $15. Riders Troubleshooting Handbook 30th edition $5. Learn code the easy way with Code Master tape and instructions $10. Portable 12 V generator with B & S 4 cycle gas motor $35. Most items with instruction manual. U pay shipping. T.K. Brown, RD 1 Box 225, Forksville, PA 18616.

NEED: Manual for DX-20. Parts for SX-28. Matching speaker for SX-28. Q.R. Galbraith, K5TVC, 4303 Kingsway, Farmington, NM 87401.

SELL: Heath SB102 with AC supply, new tubes only $150. M.C. Jones power meter 1KW with coupler $20. Five volt 20 amp filament transformer $15. 115–120 volt 20 amp G.R. Variac new boxed $50. Plus shipping. M. Levy, W5QJT, 2833 Junction Hwy. #15, Kerrville, TX 78028.

WANTED: BC-1016 Undulator Unit, Yaesu FT-225RD w/memories, and Yaesu memory option for FT-625RD. C.T. Huth, 229 Melmore St., Tiffin, OH 44883.

QSL CARDS: Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSLs, Dept. C, 310 Commercial, Emporia, KS 66801.

OUTGOING DX QSL SERVICE serving Amateur Radio and SWLs since 1983. SASE to WD8AWS, 31439 42nd Avenue, Paw Paw, Michigan 49079.

FOR SALE: Swan 500CX DC converter, $35. MFJ 1229 (VIC-20, 64, TRS-80, Apple IIe) RTTY, CW Interface, less software, used once!—$120. KA7NKS (406-857-3817).

I need a HALLICRAFTERS Model SX-117 for parts. Need not be repairable. Joe Karr, N9FAU, 3800 Cheyenne Ct., Racine, WI 53404.

SCHEMATICS: Radio receivers 1919/70s. Send Brand name, Model Number, SASE. Scaramella, P.O. Box One, Woonsocket, RI, 02895-0001.

VIBROPLEX WANTED: Blue Racer (narrow base) or Lightning Bug. John White, 212 Marcin Lane, Burnsville, MN 55337.

UNLOCK THE POWER OF YOUR HEATH COUNTER. IM-2400 owners, easy one-evening kit yields two decades greater resolution. Measure things you thought you'd have to buy another counter for. You won't believe the difference. $12.95 for kit #1052 to L&R Distributing, P.O. Box 4643, Northbrook, IL 60065-4643.

WANTED: Two 8874 tubes and Swan WM3000 wattmeter. K4NBN "No Bad News," 1946 Sweetbriar Ln., Jacksonville, FL 32217.

NEEDED: Schematic for Lafayette BCR-101 six-band receiver. Harry Dunning, N2DZI, 26B Rye Colony, Rye, NY 10580 (914-967-2764).

SCOTT BAKER, WD6DLL, and his wife, Margie, send their sincere thanks to all who sent them congratulatory cards and letters for their 50th wedding anniversary.

ATTENTION: Preserve your call card in "The 20th Century Time Vault." Put your card in an envelope, 25¢ donation per card requested. Mail to PROJECT UNITY 2000, P.O. Box 964, Silverdale, WA 98383.

WANTED: Blind handicapped amateur needs donation of shortwave radio (Kenwood 2000 preferred). Richard, 5909 West 6th Street, Los Angeles, CA 90036 (213-938-5347).

FOR SALE: Issues of *CQ* magazine from December 1952 through June 1977. Also publications such as *CQ The Antenna Roundup* by Art Seidman (#119-1963) and *CQ Command Sets* (#106-1957), and more. Best offer. Contact Mrs. Miller Jernigan, 1103 Royal Trail, Manchester, TN 37355 (615-728-2964).

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FOR SALE: Three cartons of antique wireless books and printed paper material (no sets). Large SASE for list. Alley, 48 Judson St., Raynham, MA 02767.

WANTED: Hallicrafter HT-6. Howard 430. Stancor 10P. Grebe CR18. K4UJZ, 608 W. Thompson Ln., Murfreesboro, TN 37130 (615-893-5344).

HEATHKITS: SB300, SB400 (set of new tubes (spares)), speaker and mike (2 meter and 6 meter converters). Make offer to W3PHV, 600 Southmore Road, Baltimore, MD 21228.

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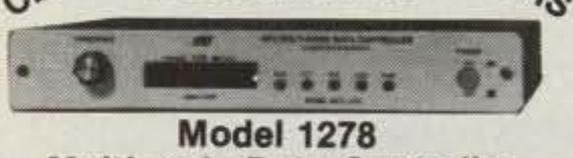

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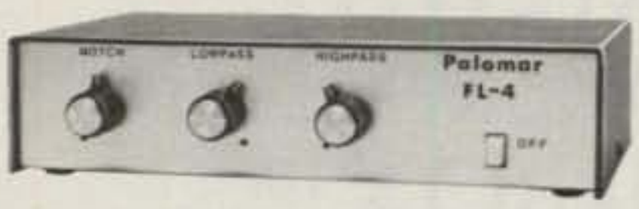

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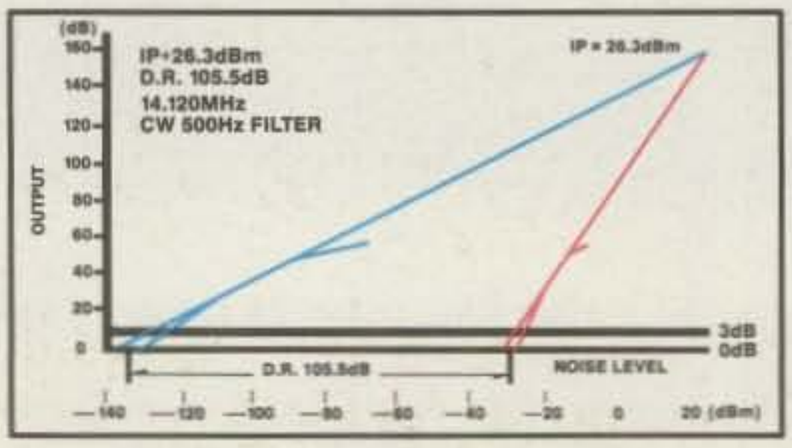

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