Amateur Radio

CQ

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An Extra Measure of Packet Radio Articles in This Issue!

Cover Photo:
KH6IJ, Katashi Nose,
Hawaii's Most Famous Amateur

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

...pacesetter in Amateur Radio

#1 Rated HF

"DX-cellence!"

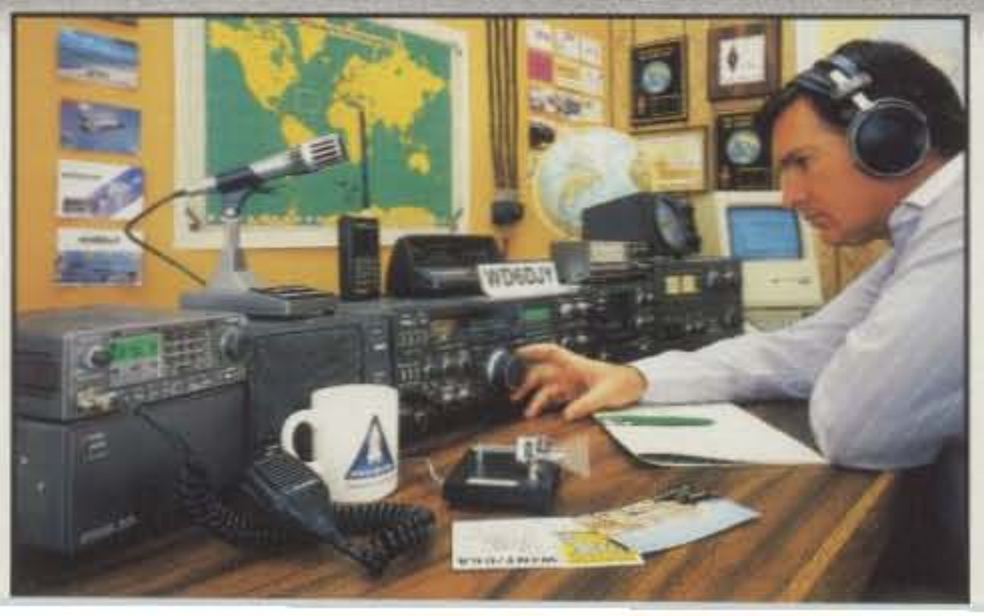
TS-940S

The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel."
- **Graphic display of operating features.** Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT- 940 antenna tuner status.
- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top "quality Kenwood" sound.
- **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
- **QRM-fighting features.** Remove "rotten QRM" with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.
- **Built-in FM, plus SSB, CW, AM, FSK.**
- **Semi or full break-in (QSK) CW.**
- **40 memory channels.** Mode and frequency may be stored in 4 groups of 10 channels each.
- **Programmable scanning.**
- **General coverage receiver.** Tunes from 150 kHz to 30 MHz.
- **1 yr. limited warranty.** Another Kenwood First!


Interface IF-232C/IF-10B

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.



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

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

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2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

KENWOOD

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NEW!

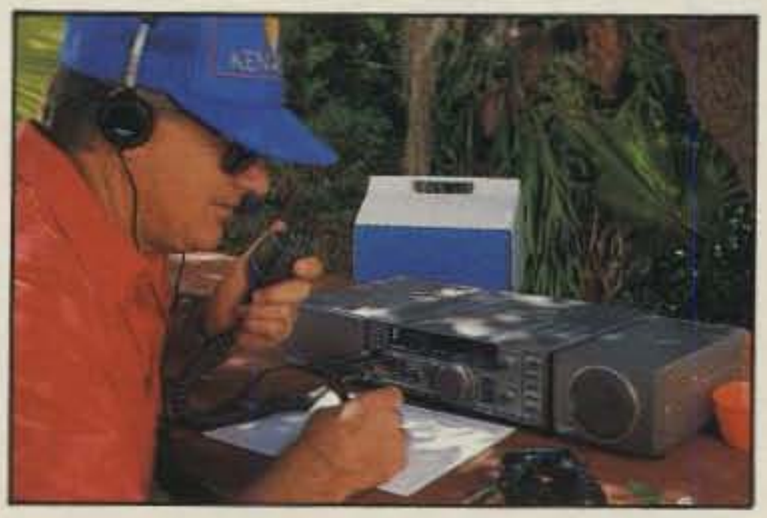
Affordable DX-ing!

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** disk 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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220 MHz TM-321A Coming Soon!

Here's One for You!

TM-221A/321A/421A

2 m and 70 cm FM compact mobile transceivers

The all-new TM-221A, TM-321A and TM-421A FM transceivers represent the "New Generation" in Amateur radio equipment. The superior Kenwood GaAs FET front end receiver; reliable and clean RF amplifier circuits, and new features all add up to an outstanding value for mobile FM stations! The optional RC-10 handset/control unit is an exciting new accessory that will increase your mobile operating enjoyment!

- **TM-221A provides 45 W, TM-321A, 25 W. The TM-421A is the first 35 W 70 cm mobile!** All three models have adjustable 5 W low power.
- **Selectable frequency steps** for quick and easy QSY.
- **TM-221A receives from 138-173.995 MHz. This includes the weather channels!** Transmit range is 144-148 MHz. Modifiable for MARS and CAP operation. (MARS or CAP permit required.) *(Specifications guaranteed for Amateur band use only.)*
- **TM-321A covers 220-224.995 MHz. The TM-421A covers 438-449.995 MHz.**
- **Built-in front panel selection of 38 CTCSS tones.** TSU-5 programmable decoder optional.
- **Simplified front panel controls**— makes operating a snap!
- **16 key DTMF hand mic., mic. hook, mounting bracket, and DC power cable included.**
- **Kenwood non-volatile operating system.** All functions remain intact even when lithium battery back-up fails. (Lithium cell memory back-up— est. life 5 yrs.)
- **Packet radio compatible!**
- **14 full-function memory** channels store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2 m is automatically selected.** There are **two channels** for "odd split" operation.
- **Programmable band scanning.**
- **Memory scan with memory channel lock-out.**
- **Super compact:** approx. 1-1/2"Hx5-1/2"Wx7"D.
- **New amber LCD display.**
- **Microphone test function on low power.**
- **High quality, top-mounted speaker.**
- **Rugged die-cast chassis and heat sink.**

RC-10 Remote Controller

For TM-221A/321A/421A. Optional telephone-style handset remote controller RC-10 is specially designed for mobile convenience and safety. All front panel controls (except DC power and RF output selection) are controllable from the RC-10. One RC-10 can be attached to two transceivers with the optional PG-4G cable. When both transceivers are connected to the RC-10, **cross band, full duplex repeater** operation is possible. (A control operator is needed for repeater operation.)

Optional Accessories:

• **RC-10** Multi-function handset remote controller • **PG-4G** Extra control cable, allows TM-221A/TM-421A full duplex operation • **PS-50/PS-430** DC power supplies • **TSU-5** Programmable CTCSS decoder • **SW-100A** Compact SWR/power/volt meter (1.8-150 MHz) • **SW-100B** Compact SWR/power/volt meter (140-450 MHz) • **SW-200A** SWR/power meter (1.8-150 MHz) • **SW-200B** SWR/power meter (140-450 MHz) • **SWT-1** Compact 2 m antenna tuner (200 W PEP) • **SWT-2** Compact 70 cm antenna tuner (200 W PEP) • **SP-40** Compact mobile speaker • **SP-50B** Mobile speaker • **PG-2N** Extra DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MC-55** (8-pin) Mobile mic. with gooseneck and time-out timer • **MA-4000** Dual band antenna with duplexer (mount not supplied) • **MB-201** Extra mobile mount

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

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CQ The Radio Amateur's Journal

ON THE COVER: One of the big guns in amateur radio contesting, Katashi Nose, KH6IJ. This past April KH6IJ was inducted in the CQ Contest Hall Of Fame at the Visalia DX Convention. Photo by Larry Mulvehill, WB2ZPI.

NOVEMBER 1987 **VOL. 43, NO. 11**

FEATURES

DEPARTMENTS

Zero Bias AN EDITORIAL

It's catalog time. Not only within the pages of *CQ*, but in almost every days mail as well. It's "wish list" making time again when we all like to dream and plan on wonderful additions to the shack. It's also the time that folks start to prepare lists of potential gifts for friends and relatives. Of course the few curmudgeons among us will insist it is a nefarious plot by unscrupulous purveyers to part an amateur from his money. These same curmudgeons of course, with righteous halos shined brightly, would naturally turn down all offers of holiday gifts with the exception of socks and hair shirts (preferably monogrammed with their call letters).

This month we celebrate Thanksgiving and next month Hanukkah and Christmas. These celebrations all share a common element of joy and excitement. While I don't equate the import of amateur radio to these National and religious holidays, I do feel that a sense of joy, wonder and excitement is equally important to being an amateur. Amateur radio is an avocation, something we elect to do, not a sentence to be served or an enlistment obligation to be lived out. Sure there are serious components to amateur radio activity, but for the most part we are involved with something that is enjoyable and fun to do. And, we do this activity in our leisure time, time not taken up by work, family and civic responsibility.

Getting back to the holiday season, just mention Thanksgiving and most people can conjure up images of a family seated around the dinner table with dad carving up the turkey. You can almost anticipate and feel the warmth, love and sense of well-being generated by that scene even though you may never have experienced it. It's the same sort of thing if you look at a stack of wood and visualize a house or see a sail boat and fantasize for a moment on the possibility of entering the Bermuda Cup races. Well, amateur radio, as hard as it may seem, is right up there in imagination and fantasy. We can all see ourselves doing wondrous things, winning contests, achieving awards, building elaborate gear or operating the most marvelously equipped station, and doing them well. It's all future oriented, it's all going to happen someday, and you know what . . . for some of us it does.

Well, amateur radio is fun, and part of the fun are the things we haven't done yet. It may even be that we'll never get to do all of those things, but the planning, dreaming and fantasizing are a very important part of that fun. These are the things that motivate us to try new and different approaches to situations at work and at home. It's that spark, that promise of an exciting accomplishment or of satisfying some goal that heads us towards enjoyment.

Now I know that for some amateurs, the concept of enjoyment is counterproductive to an amateur's duty to be grave, somber and solemn. I also know that for some there exist a set of unwritten rules as to what an amateur is and anybody new automatically trangresses these rules. In addition, I'm aware of what archaeologists would call several traditions within the site of amateur radio. But I'm not aware of any mandate to have a flashing neon sign by any shack that displays in big bold letters, "Only Serious Things Take Place Within."

If we are looking for things to be Thankful for this season, one thing might be that an amateur radio license is like a key to opportunity. You can open the door and enter as far as you wish and partake of it as much as you wish. You can wish, dream and enjoy as much as you want, and conversely you can be as unhappy and dogmatic as you want too. You can elect to have fun with amateur radio, checking out every product and service available to help you have fun, or ruminate about how you're being ripped off and in effect humbug the whole thing. Personally I enjoy looking at everything connected with amateur radio, even the things I don't understand. Maybe I just like toys and gadgets.

Everyone, including the biggest grouch, was sold on the dream of amateur radio long before we sat for any exam. We were told or saw the countless possibilities of talking to distant lands, having our own operating station and amassing thousands of those little cards with the funny letters and numbers on them. That's quite a package to take in. Somewhere along the line license requirements may have been mentioned but by that time we were hooked on the dream. The recent concern over Novice Enhancement proves that point. There were and probably still are amateurs out there who predicted the demise of 220 MHz with the influx of thousands of Novices clambering onboard with their new 220 MHz rigs. While some may have, it's really evident that most new Novices get hooked on "Tune In The World" type of material and opted for 10 meters. Even if the DX consists of the next state, it's still more exciting than the next block. They seem to be dreaming the same dream.

So with winter ahead, and the holiday season only a few weeks off, settle back in your favorite easy-chair and check out some of the new gear that's around. Picture yourself behind the controls, think of the possibilities, imagine what it would be like to add whatever it is to your station. Look at the picutes of other amateurs and what they're using to accomplish what they did, and think of what you might have been able to do with that station. Materialistic? Maybe, but most of what everyone considers as DX was done years ago with that ever popular 6L6. Everything that's come along since then could be considered as frills. All these new fangled gadgets and transceivers haven't changed the geographic distances one iota, they did change, however, the concept of reliability and fun. They did make it more fun for more people.

If you want to waste time and worry about what kind of element this brings in, then reflect back to what people were saying about you when you got your ticket. it's probably a good thing you didn't hear everything that was said. Maybe what they were saying was true? Most of us still can't design our own rig, let alone build it. And, to be perfectly truthful, the only reason today that we send our gear back to the factory for repair is that we honestly don't want to void the warranty and have them get mad at us.

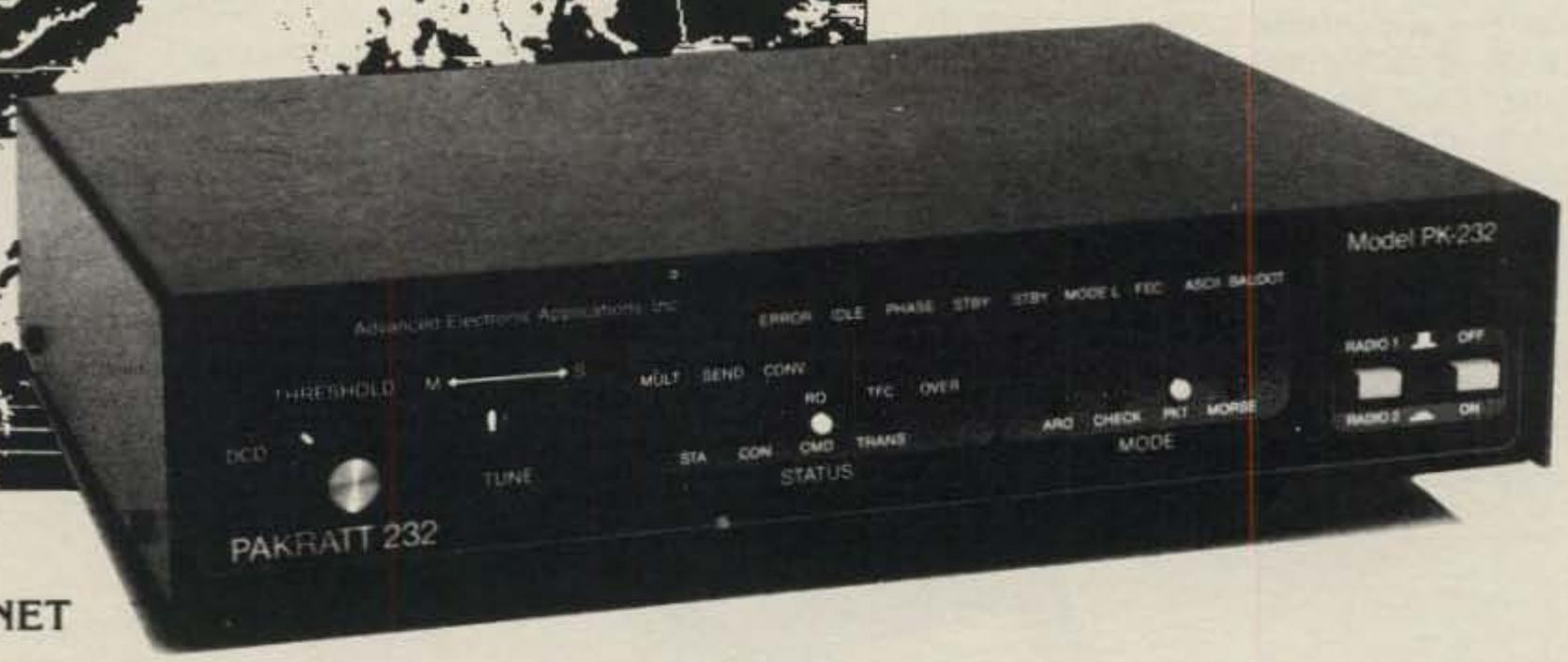
There still is a rational grounding factor in all of this. Even if you check out the Sears catalog for example and see a really good buy on a set of auto mechanics tools, put that set on your wish list and perhaps even get it, it still won't help you fix your car unless you know something about engines. On the other hand you just might like to collect tools. Amateur gear is the same way. You can want it, buy it, use it or collect it and still have fun. It's really up to you. So, given the choice of a new (or newer) "toy" over a monogrammed hair-shirt, I'll take the "toy" anyday.

Travels With CQ

Our traveling activities slowed down a bit since last month, but we will be winding up the year in a flurry. The big one here on Long Island (actually the second of two), the LIMARC fleamarket took place in late September with its usual good fortune in weather. In typical fashion it was cold and rainy, a perfect day for the several thousand people who came out. To the regulars it was just a bit of heavy humidity and not something to worry about. I saw a lot of familiar faces trodding up and down the aisles checking out the bargains. If you've been to a number of these, you know to expect either rain or snow. I don't think that they would postpone the event in case of good weather though. Next month we'll have a few other hamfests to report on. We hope to see you there. 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

Announcing

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

Nov. 1 **RF Hill ARC Hamfest,** PA National Guard Armory, Rt 152, Sellersville, PA. Contact Hamfest Chairman, 523 Vine St., Perkasie, PA 18944.

Nov. 7-8, **West Texas ARC Odessa Hamfest,** Holiday Inn Convention Center, Odessa, TX. Contact Otis Brasfield, KA5REM, 3103 N. Hancock Ave., Odessa, TX 79762.

Nov. 8 **Fort Wayne Hamfest,** Allen County memorial Coliseum, Coliseum Blvd, Fort Wayne, Indiana. Contact AC-ARTS Hamfest, PO Box 10342, Fort Wayne, IN 46851 (219-485-0164, 6-10 p.m.).

Nov. 15 **Illinois State ARRL Convention and Rockford Hamfest/Computer Fair,** Forest Hills Lodge, 9900 forest Hills Road, Rockford, IL. Contact Roger Sawvell, KD9MQ, 6514 Swansdown Dr., Rockford, IL 61111 (815-282-1283).

Nov. 14 **Milwaukee RC '6.91 Friendly Fest,** Serb Hall, 51st and Oklahoma Ave., Milwaukee, WI. Contact the Milwaukee Repeater Club, PO Box 2123, Milwaukee, WI 53201.

Nov. 21, **MARK IV RC Greensboro Hamfest,** National Guard Armory, Franklin Blvd., Greensboro, NC. Contact Fred Redmon, N4GGD, 3109 Goodall Dr., Greensboro, NC 27407 (919-852-9244, 0100Z-0300Z).

Nov. 21-22 **South Florida ARRL Suncoast Convention,** Hilton & Towers, 333 1st St., St. Petersburg, FL. Contact FGCARC, 1556 56th Ave. North, St. Petersburg, FL 33703.

Nov. 21-22 **Palm Beach Hamfest,** South Florida Fair Grounds, Southern Blvd., West Palm Beach, FL. Contact Hamfest, PO Box 461, Lake Worth, FL 33460.

Nov. 22, **Auctionfest 87,** Massillon K of C Hall, Rt. 21, Massillon, OH. Contact MARC, PO Box 73, Massillon, OH 44646 (SASE).

Nov. 29, **Denver Radio Club Hamfest,** Jefferson County Fairgrounds, Golden, CO. contact Dean Haworth, AC0S, 14368 West Bayaud Ave., Golden, CO 80401 (303-279-4956).

• **International Police Association Contest** - sponsored by the IPARC German Section from 0600Z to 1000Z and from 1400Z to 1800Z each day Nov. 7 - 8. CW Nov. 7 and phone Nov. 8. Non-IPA stations work IPA members only. Exchange signal report and serial number. U.S. stations also send state. IPA members send IPA with exchange. Phone and CW contests are separate. Work stations once per band one each mode. Count 1 point per QSO with non-IPA members and 5 points per QSO with IPA members. Multiply by sum of IPA countries/states worked per band. Suggested frequencies: Phone - 3.650, 3.775, 7.075, 14.295, 21.295, 28.575 MHz; CW - 3.575, 7.025, 14.075, 21.075 28.075 MHz. Mail entries by Dec. 31 to Anton Kohten, DK5JA, PO Box 40 01 63, D-4152 Kempen 1, Fed. Rep. of Germany. For more information, contact WA8VDC, 4824 Elm, Newport, MI 48166.

• **Ormond Beach, FL** - The daytona Beach Amateur Radio Association will operate K4BV from 1300Z to 2000Z Nov. 21-22 in celebration of the Birth of Speed Commemoration and Gaslight Parade. Look for them in the lower 25 kHz of the General phone bands and on 147.15 FM. After contact, send QSL and SASE for special certificate to DBARA, PO Box 9852, Daytona Beach, FL 32015.

• **Newport, RI** - The Newport County Radio Club will operate W1SYE Nov. 7 and 8, all bands, all modes, celebrating the Constitution Bicentennial. For souvenir QSL card, send QSL and SASE to NCRC, c/o Fred Evens W1JFF, 74 Bedlow St., Newport, RI 02840.

• **Logan, WV** - The Logan County ARC will conduct its 7th annual Mountain State Award Expedition from 1600 UTC Nov. 7 to 0200 UTC Nov. 8 operating NU8K. Look for them 25 kHz up from bottoms of General Class phone bands. Contacts submitting QSL and legal-size SASE to NU8K, Roy Elkins, PO Box 202, Monaville, WV 25636, will receive a handsome 8- x 10-inch certificate.

It's A Girl

CQ's Associate Editor, Gail Scheiber, gave birth to a new junior-op on Sept. 6. Weighing in at 7 lbs. 2 oz., Megan Anne joins her brother Brian (see CQ Aug. 1985, p. 108) in enlivening the Scheiber household. Mom and Dad, plus the grandparents along with Gail's six cats are busy welcoming Megan home and introducing her to her new surroundings.

HF performance you can have a real field day with.

With Yaesu's FT-757GX/II, you can enjoy full-featured HF performance just about anywhere.

On vacation. During field day. On the road. Or in your shack.

Because the FT-757GX/II packs all its HF performance into one highly compact, action-ready case. A case so small, it even fits under airplane seats.

Of course, you've probably noticed a similarity to its predecessor, the FT-757GX. That's purely intentional. And now its performance is even better.

With new features like memory storage of operating mode. Slow/fast tuning selection. Automatic step-change according to mode. IF notch filter. 10 memories. And VFO to VFO scan.

Plus you get an iambic electronic keyer. Woodpecker noise blanker. 600-Hz CW filter. AM and FM modes. AF speech processor. And 25-kHz marker generator. All at no extra charge.

Three microprocessors. Dual VFOs. Single-button VFO/memory swap. Receive coverage from 500 kHz to 30 MHz. Transmit coverage from 10 to 160 meters, including WARC bands. All-mode coverage (LSB, USB, CW, AM and FM). 100-watt RF output.

QSK operation. Massive heatsink and duct-flow cooling system for continuous RTTY operation for up to 30 minutes.

Computer Aided Transceiver (CAT) System for computer control via optional interface (software is available from your Yaesu dealer).

Of course, the FT-757GX/II offers the kinds of options you'd expect from Yaesu, too. Including standard and heavy-duty power supplies, automatic antenna tuner, and more.

So no matter where you work the DX, take along Yaesu's FT-757GX/II. The full-featured HF rig you'll have a real field day with.

YAESU

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847.
Yaesu Cincinnati Service Center 9070 Gold Park Drive, Hamilton, OH 45011 (513) 874-3100.

Prices and specifications subject to change without notice.

CIRCLE 58 ON READER SERVICE CARD

Our Readers Say

Error

Editor, *CQ*

There is an error in the schematic diagram of my SWR bridge in the Sept. issue (*How To Build A Simple SWR Bridge*, pp. 36-37). The lead coming from the center pin of J1 is shown connected to D1/M1. This connection is in error. The lead from J1 should only connect with L2.

John J. Gray, VE3AEH
Burlington, Ontario

Scholarships?

Editor, *CQ*

I am an Advanced Ham-Radio Operator and am currently a senior at Cotter High School, Cotter, Arkansas. I am interested in learning more about scholarships offered by the Ham-Radio Association. If you have any information I would greatly appreciate you sending it to me.

Elana Mayfield, KA5THI
Gassville, AR

More On Classic Keys

Editor, *CQ*:

The discussion and pictures of "Classic Keys" by Dave Ingram in June 1987 *CQ* was very interesting. The Vibroplex Original model was not mentioned. I noticed that probably because I have been using that "original bug" since the mid 1920s.

The Sideswiper or Cootie key, fig. 12, while I never used one, has always fascinated me. They were probably made to be used on a land line, but to my knowledge I never heard one on a land line. On wireless radio I have heard several, some unbelievably bad and some unbelievably good code.

However, I must disagree with the author about International and Continental Morse. I think International Morse is a system of flags used by mariners. Before radio or wireless telegraph the land lines in this country, Western Union, postal telegraph, the railroads, etc., used American Morse. In Europe the land-line telegraph systems used Continental Morse. It was probably Marconi who picked Continental Morse for his wireless—a natural choice and wise, too, as the spaced letters of American Morse like C, R, O could have been a problem, especially with spark signals in QRN.

The old Dodge Telegraph school originally taught American Morse. When they added wireless or radio, they taught American Morse in one building and Continental Morse in a second building. Dodge was located in Valpariso, Indiana.

There were also other codes. The Japanese had one and the U.S. Navy had one.

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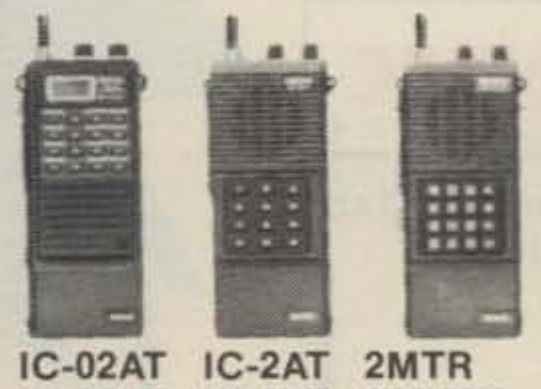

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Still undecided about packet radio? Well, KR3T takes a bit more of the mystery out of it while opening some exciting doors for your amateur radio enjoyment.

Amateur Packet Radio Who Needs it? You Do!

BY JOHNATHAN L. MAYO*, KR3T

Packet radio is a relatively new mode of digital communications in amateur radio. It provides many advantages over other forms of digital communications, yet some amateurs are not easily convinced that packet radio is so great. Many amateurs have walked up to me at hamfests, club meetings, and conventions and said something like, "Sure all that technical stuff is great for computer whizzes, but what good is packet to me? I already have an RTTY station and am happy with it." Well, hopefully this article will put to rest any confusing concepts that you might have regarding packet's place in the different methods of digital communications.

CW, Baudot, RTTY, ASCII RTTY, AMTOR, and packet are the common modes of digital communication in use by amateurs today. Packet is by far the most advanced and the most technologically complicated. Packet also provides the most features to assure your message arrives at its destination error free.

Amateur packet radio is a complex digital communication system that utilizes a high degree of computer technology to obtain a reliable, versatile means of communicating information. Despite the high degree of technology involved in packet radio, it is an easy mode to operate. Packet radio is being routinely used for error-free ragchewing, program and message transfers, satellite, and computer communications.

But we're getting ahead of ourselves. What exactly is packet radio and what does it have to offer? This article differentiates packet from the other modes of digital communications.

Packet Versus Other Digital Modes

This section discusses the capabilities of each of the common digital communication systems and then details the capabilities of packet radio. After the discussion you should have a good understanding of what packet radio has to offer above and beyond the other modes.

Flag	Address	Control	PID	Info	FCS	Flag

Fig. 1 – AX.25 information frame construction.

CW

CW is the oldest form of digital communications. It uses an uneven form of coding, usually Morse code. In an uneven code the number of elements that make up each character are not equal; thus some characters have more elements than others. Morse code contains most characters needed for communications and requires very simple equipment for transmission and reception. With the advent of computerized keyboards and decoders, CW can be sent very quickly. However, the slightest bit of interference or imperfect sending can reduce the decoder's ability to accurately copy the code. Compared to other forms of digital communications, CW has a lot to be desired. On the plus side, CW is the only form of digital coding which can be easily copied without the aid of decoding equipment.

Baudot RTTY

Baudot RTTY uses an even form of coding known as the Baudot (or Murray) code. In the Baudot code each character is made up of five "mark" and "space" elements (or bits). However, there are only 32 possible combinations using a 5-level code. Therefore, the Baudot code includes two different character sets, figures and letters; the character sets are alternated as needed.

Baudot RTTY operation usually takes place at speeds of 45, 50, or 75 baud using either solid state equipment or mechanical teleprinters. In most cases the baud rate is roughly equal to the number of elements (or bits) sent per second.

ASCII RTTY

ASCII RTTY was first legalized in 1980 by the FCC for amateur use in the United States in response to the wide proliferation of computer equipment which uses the seven-element ASCII code. Its primary advantages over Baudot RTTY are its speed (usually 110 or 300 baud) and its 128 possible characters. Solid state equipment is usually used for ASCII operation, but mechanical teleprinters can also be used. In operation, ASCII RTTY is very similar to Baudot RTTY except for the coding used.

AMTOR

AMTOR was first legalized for amateur use in 1983. AMTOR uses a special even coding in which there is a constant ratio of mark and space elements. If the received characters do not have the proper ratio, they are presumed erroneous. AMTOR operates at 100 baud, and because of error checking is much more reliable than standard Baudot or ASCII RTTY.

Packet

Finally, we get to packet. Packet is the

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most advanced form of digital communications available to radio amateurs. The primary advantages of packet radio are speed, networking, error checking, and efficient use of frequency space.

Packet radio operates using a standard digital communications networking technique known as Carrier-Sense Multiple Access with Collision Detection (CSMA/CD). Put simply, this means that a packet station will not transmit when the frequency is busy. It will wait until the frequency is clear and then transmit a short burst (frame) of information. Because packet transmissions are very short, many packet stations can be on the same frequency without interfering with each other. A line of text that takes 30 seconds to type can be transmitted in a fraction of a second.

Should two or more packet stations transmit on the same frequency at the same time, their transmissions (frames) may interfere with each other (collide). If a collision occurs, each station will wait a random length of time and try again. Most likely, one station will wait a shorter length of time and thus transmit before the other station(s). Its carrier will prevent the other station(s) from transmitting until it is finished.

Most packet activity today is at 1200 baud on the VHF bands and at 300 baud on HF. Soon packet will be operating at 9600 baud and up on VHF as modem technology advances.

Packet's error checking follows the **HDLC** (**H**igh-level **D**ata **L**ink **C**ontrol) format. The sender's data is grouped together in "bundles" of usually 128 characters. The binary digits (bits) which compose the data and any other information to be transmitted (such as the sending and receiving station's callsigns) are put through an extensive polynomial expression, and a number unique to the specific data being transmitted is generated. This number is known as the **FCS** (**F**rame **C**heck **S**equence). The FCS is sent along with the data. When the receiving station gets the data and the FCS, it recomputes the FCS using the same expression and compares it with the one received with the data.

If the two FCSs match, the data is assumed error free, and an **ack**nowledgement (**ACK**) is sent to the transmitting station. If they do not match, the data was not received exactly as the transmitting station sent it, so the receiving station ignores the transmission. The transmitting station will retransmit the data after a period of time.

For all this time to work, the two stations must be using compatible equipment and the same protocols. The equipment in packet radio consists of three main components in addition to a transceiver; a digital communications terminal, a **TNC** (**T**erminal **N**ode **C**ontroller); and a **modem** (**M**odulator **DEM**odulator). The two modems must observe the same standard—usually Bell 202 on VHF and Bell 103 on HF. The two TNCs may be of different manufacture, but they must use the same protocol. Do not confuse amateur packet radio TNCs with RTTY Terminal Units and modems.

Protocols define the format of the information sent on packet. The protocol organizes the information to be transmitted into "frames." A protocol also defines what steps are to be taken by the TNC under different circumstances. Networking procedures are another area which the protocol defines.

There are two main amateur packet radio protocols in use today: **AX.25** and **VADCG** (or **V-1**). AX.25 was developed by AMRAD (Amateur Radio Research and Development Corp.) and RATS (Radio Amateur Telecommunications Society) and is a modified version of the X.25 commercial protocol. The VADCBG (Vancouver Amateur Digital Communications Group) protocol was written by Doug Lockhart, VE7APU. He wrote it in the late

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1970s as an experimental protocol for use with TNC testing. The VADCG protocol achieved widespread use in the early days of packet radio.

The AX.25 protocol was developed in 1982 to provide some additional needed capabilities not present in the VADCG protocol. Packet had grown enormously since Doug wrote his protocol, and since the VADCG protocol was not designed to support a large number of users and had limited networking capabilities, an extended protocol was needed. AX.25 offers the advanced capabilities needed for an extended packet network. Today AX.25 is the most widely used protocol.

As you may recall, the AX.25 protocol organizes the information to be transmitted into frames. The frame contains flags, control information, a protocol identifier (PID), addresses, the information and the FCS (see fig. 1). Protocols and frames can get somewhat complicated; check the references to locate more detailed information.

Since the sending and receiving stations' IDs (usually their callsigns) are included in the frame, the frame can be routed through different intermediary stations to reach its destination. These intermediary stations can include digipeaters (simplex packet repeaters), satellites, and HF Gateways. There is great potential in using packet's networking capabilities to link large areas of the world together.

It is easy to see how much more versatile packet radio is than the other forms of digital communications. While ordinary RTTY can only be relayed through duplex repeaters, packet allows for multiple controlled relays through simplex repeaters. Packet's controlled transmissions assure error-free reception, and packet's high speed reduces the time a packet station must transmit. Packet radio can be used for simple ragchewing, both local and DX, as with the other digital modes; however, packet offers so much more. Today packet radio is as simple to operate as ordinary RTTY. No special programming or computer knowledge is necessary. In fact, a microcomputer is not required to operate packet; almost any communications terminal will work.

There have been many fine articles written on packet radio over the past few years. Some of them are listed in the references at the end of this article. My book, *The Packet Radio Handbook*, published by TAB Books, Inc., covers the full spectrum of packet radio. It will give you the information you need to better understand packet radio and help you to set up your own amateur packet radio station. It is available from the *CQ* book shop.

Digital Modulation

One area which this article does not cover in depth is the subject of modulation. All the digital modes require some sort of modulation to transmit the data. For CW it is a simple matter of turning a carrier on and off. But for RTTY, AMTOR, and especially packet, it is a little more complicated. THese modes usually use **F**requency **S**hift **K**eying (**FSK**) or **A**udio **F**requency **S**hift **K**eying (**AFSK**). RTTY usually uses a 170 Hz shift between mark and space tones. High-speed ASCII and packet usually use a 1000 Hz shift to accommodate their high baud rate. There are several other forms of modulation under consideration for packet radio which should allow for even higher baud rates while consuming a minimum of bandwidth.

Conclusion

Packet radio is a versatile, efficient mode of communications and has many advantages over the other forms of digital communications. I hope this article has helped you to better understand what all the excitement over packet radio is about. If you enjoy your standard RTTY setup, chances are you'll love packet radio. Packet radio is still growing rapidly and undergoing many changes, and there is no reason why you cannot be a part of the future of packet radio.

If you have any questions or comments, please write to me. Alternately, you can reach me on CompuServe (User ID: 72276,2276).

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In this concluding part W1ICP highlights remaining areas of propagation with which we should be familiar. This overview will also enable you to understand and appreciate some of the operating aides currently on the amateur market.

Getting The Signal From Here To There – Part II

BY LEW McCOY*, W1ICP

Last month we discussed the ground wave, line of sight, and other means of signal travel. Now we go into ionosphere signal propagation.

As we said earlier, the F2 layer sometimes splits during the daylight hours creating the F1 layer at about 120 miles or so. The F1 layer is of little importance in the scheme of things except to add additional absorption to our signals. It disappears at night. In fact, at night we normally have only the F2 layer with occasional sporadic-E activity.

Refraction and Reflection

When we send a signal into the ionosphere many things happen to it. Depending on the amount of ionization, the signal can be reflected and/or refracted. Visualize a large reflector such as a mirror, which is the F2 layer up at 250 miles. Next assume a transmitter and antenna with a narrow signal beam aimed at this mirror. One can quickly get an idea of how the radio waves are propagated for distances.

We said the F1 layer doesn't come into play much, but that isn't entirely true. An interesting aspect of the F1 layer is early evening propagation on 80/75 meters. Customarily, the skip distance on this band is very short just after sundown. The F1 layer is still operating, and it tends to reflect or refract 80 meter signals, thus considerably weakening any signals that get through to hit the F2 layer.

Suppose the station we want to work is on 80 meters and located 100 miles away. We certainly can't work him on ground wave because the signal would be completely absorbed. It is obvious that we would have to use a very high angle of radiation to bounce a signal off the F1 layer and return only 100 miles away. This example is shown in fig. 1. It may seem strange, but that is exactly what happens sometimes when we work 80 meter stations only a short distance away. In this case our signal goes 150 miles up to the F1 layer and then back down 150 miles, making a 300 mile trip to actually go 100 miles.

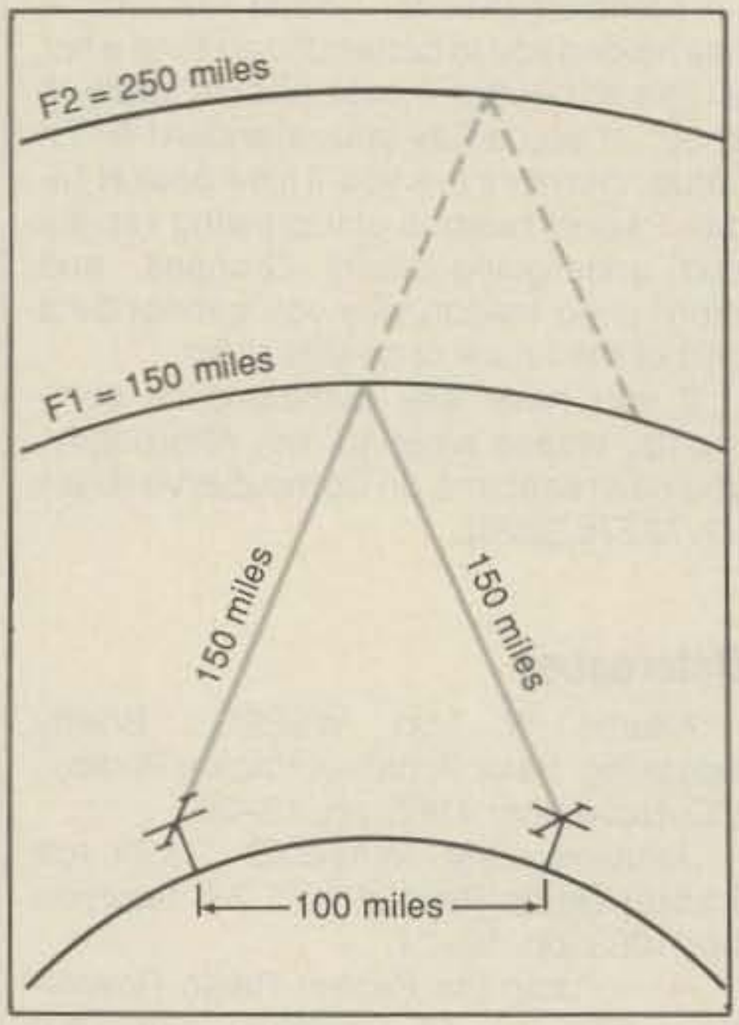

Fig. 1– A graphic illustration of how a signal may travel a distance of 300 miles up and back to traverse 100 miles.

It should quickly be apparent that the angle of radiation from the antenna is all important. Just suppose our 80 meter antenna was a beam that had only low-angle radiation, say below 30 degrees. We couldn't work that station 100 miles away simply because our signal would be returning from the ionosphere at a much greater distance. Also keep in mind that in the above discussion we cannot go higher than the critical angle to make that 100 mile contact, as our signal will not be reflected back. This happens frequently as the condition of the ionosphere changes. Amateurs on 80 refer to the "skip lengthening out." Later in the evening F1 disappears and only the F2 layer operates. Simply, the ionosphere has changed, and in turn has changed the skip distances and the critical angles.

When we start talking about long distances and DX, propagation takes a whole new approach. The maximum one-hop distance from the F layer 250 miles high is on the order of 2500 miles. This would require an extremely low angle of radiation, on the order of one or two degrees. It should also be pointed out that an antenna that could produce such low angles is very hard for the average amateur to come by or even consider, at least, not a very efficient one.

In the real world antennas don't produce a single angle, but a much more complex pattern. For example, the average beam antenna at a height of one-half wavelength could produce strong signals ranging from 10 degrees up to 40 degrees or more with one area being much stronger than the others. So in reality, the skip distance from the transmitting point is much more than just a single distance, but actually a range of coverage. This coverage is called the **skip zone**. The signal strength across this distance will vary according to stronger to weaker angles from the transmitting antenna.

To make the problem even more complex, when the signals are reflected back to earth from the ionosphere, the earth acts as a reflector, and the signals are sent back up to the ionosphere. As mentioned earlier, the earth is far from a perfect reflector, so some of the signal is lost in absorption. Looking at the example of

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the longest one hop of 2500 miles, a two-hop distance could be 5000 miles. This assumes that the ionosphere is at 250 miles at both points of intercept with the signal. One can quickly estimate the number of hops for the longest DX, halfway around the earth. Propagation conditions must be excellent in order for such communications to exist.

Long Path and Short Path

Most handbooks do not treat the subject of what is called "long path" propagation, at least not in any detail. (Some amateurs call it "long pass".) I'll try to touch on the subject here, at least to give the reader some idea of what it is.

One of the things an amateur will encounter is **long path** communications, particularly when working low-frequency DX such as on 20 meters. For example, let's say one is located in midwestern USA and has his 20 meter beam aimed at Europe, aiming from his location to the northeast, which would be the shortest path, and normally the best path because the signal would require the least number of bounces off the ionosphere and earth, hence the least absorption. However, for a myriad of different reasons—time of the sunspot cycle, the MUF, time of day, solar flux, and so on—it is very possible, and quite frequent, that the best path, the one with the least signal absorption, is the "long path." In this case the midwestern station would be better off aiming his antenna southwest. There is a little clinker here that many DXers don't realize. If one studies both the long and short paths for certain locations in the world, it will be found that in many cases the path distances are not that different! Assuming your beam or directional antenna has any respectable front-to-back ratio, the best idea is to turn the antenna and see which path is strongest.

One quickly realizes the value of satellite communications where the vagaries of the ionosphere are eliminated. However, those same vagaries are what provide amateur radio with such enjoyment; it is always the challenge of the unknown. But on the other hand, for those people who wish to maintain regular schedules, knowledge of signal paths and antenna angles can be all important.

One-Way Skip?

I would be remiss if I didn't mention the argument over the existence of **one-way skip**. Let me digress for a moment to explain what is called "one-way skip." Any amateur who has been around through many sunspot cycles and has operated a great deal on 10 meters has observed some rather unusual propagation phenomena. Back in the late 1940s we had unusually good conditions, and during that time I was chasing DX, eventually working well over 100 countries on 10 meters. During that period it was not uncommon to hear a station come really booming in calling CQ. I would call the station (and I might add I ran high power with a very good antenna), but the station would not come back. Rather it would come on again calling CQ. After I had called several times with no return, I began to wonder if I had some kind of RF body odor that was being transmitted! This didn't happen just once, but many times.

It was always a good topic for arguments at the radio clubs in those days. While the subject of radio propagation was not exactly in its infancy in those days, let's just say it was a pretty young child! Nearly all propagation experts argued that it was impossible for one-way skip to exist. The argument is a very simple one—on the surface. The energy or radio wave from the transmitting signal follows definite angles from the transmit to receive location. Assuming, of course, that the receiving point uses the same antenna for both receiving and transmitting, then when that station returns the call, the return signal follows the same path. Making that assumption, there should always be a path at that instant in time between the two stations. In later years (after the 1940s) as I got into discussions with many people I consider experts, they would dismiss the argument by simply stating one-way skip is (or was) impossible. However, when I was preparing this article, I thought I had better go over the subject again. I might add here that many of these same antenna experts with whom I discussed one-way skip had never done extensive 10 meter operation. This, of course, meant they had not encountered much sporadic-E propagation.

Earlier I mentioned sporadic-E. This action can be described as "clouds" of ionized material. When operating on 10 or 15 (or 6 meters), when the sporadic-E occurs conditions can best be described as going crazy. These bands are not normally known for short-skip contacts—say, distances under 1000 miles or so. However, you can throw the book away when they occur, because the skip can be short.

Getting back to one-way skip, in looking over references, I checked the latest *ARRL Antenna Book*, and they mention one possibility of one-way skip via some combined R- and E-layer travel. Let's assume that both locations have exactly the same major angles of radiation from their antennas and have the same power. I would agree that one-way skip could be difficult to explain, because the path should be identical for both stations at any given instant. However, I can see many conditions, such as sporadic-E absorption, existing where the paths are not identical, and if so, it could certainly explain some of the conditions an amateur

will experience. To be perfectly honest, I still don't know *exactly* how and I cannot explain one-way skip, except to say I know darn well it exists. I feel it is something that happens more in amateur radio than in commercial services, and that is probably why there is little written about it. I am sure my discussion of one-way skip will raise some arguments. Have fun!

Backscatter

Backscatter, or sidescatter as it is sometimes called, is another form of signal propagation that usually exists when working near the MUF. This is a complex form of propagation in which some of the transmitted signal is propagated back through the skip zone. Backscatter signals are usually rather weak.

With modern receivers that have such excellent sensitivity and signal-to-noise ratios it is possible to copy very weak signals. On 20 meters, for example, you would not expect to hear signals from your own location clear out to 500 miles or so. However, when tuning the band and hearing DX or a far away station talking to someone who is in that 500 mile range mentioned above, listen carefully when the DX station stands by. By far, a large percent of the time the nearby station will be there, very weak but perfectly readable.

There are other things about the ionosphere which I call vagaries and which are still not completely understood. In some cases you'll find that a signal will come in from a direction entirely different from direct path. Sometimes one encounters a condition where the signal enters the ionosphere and takes some strange paths. During aurora borealis at the North Pole amateurs can aim their antennas to the north and work other distant stations doing the same thing. This condition is not uncommon and sometimes permits VHF long-distance contacts. Therefore, the ionosphere can present some surprises.

Satellite Communications

I haven't touched on satellite communications, which has grown since the first amateur satellite, OSCAR I, was put into orbit. For those readers who don't know, the name OSCAR is an acronym for Orbiting Satellite Carrying Amateur Radio. OSCAR I was launched in 1961, and while the earliest OSCARs enjoyed only short lives, OSCARs #6 through 11 have proven very healthy, with 9, 10, and 11 still working. Briefly, the orbiting satellites serve as a form of repeater using what is called a transponder. (Most repeaters as most amateurs know them will only handle single signals; a transponder will accommodate many signals at the same time.) Simply, the satellites take the received signals from earth and retransmit them back to earth. This work is done on VHF and UHF. There is much, much more to this subject, and I would recommend further reading.

In conclusion, I hope this series has helped give newer amateurs a better understanding of signal propagation. Keep in mind what I said earlier. Those who have come into the hobby in the last five years are in for a real treat as the solar numbers continue to increase. Good hunting!

Editor's Note

W1ICP's two-part series on propagation is designed as a basic primer to familiarize us with the terms and concepts used in amateur radio. For a full discourse on the subject we recommend that you obtain and read a copy of *CQ's The Shortwave Propagation Handbook*. The *Handbook* was written by *CQ*'s Propagation Editor George Jacobs, W3ASK, and Theodore J. Cohen, N4XX. It covers all areas of propagation in full detail and is written in easy-to-read language. The book is available from the *CQ* Book Shop for $8.95 plus $2.00 shipping and handling.

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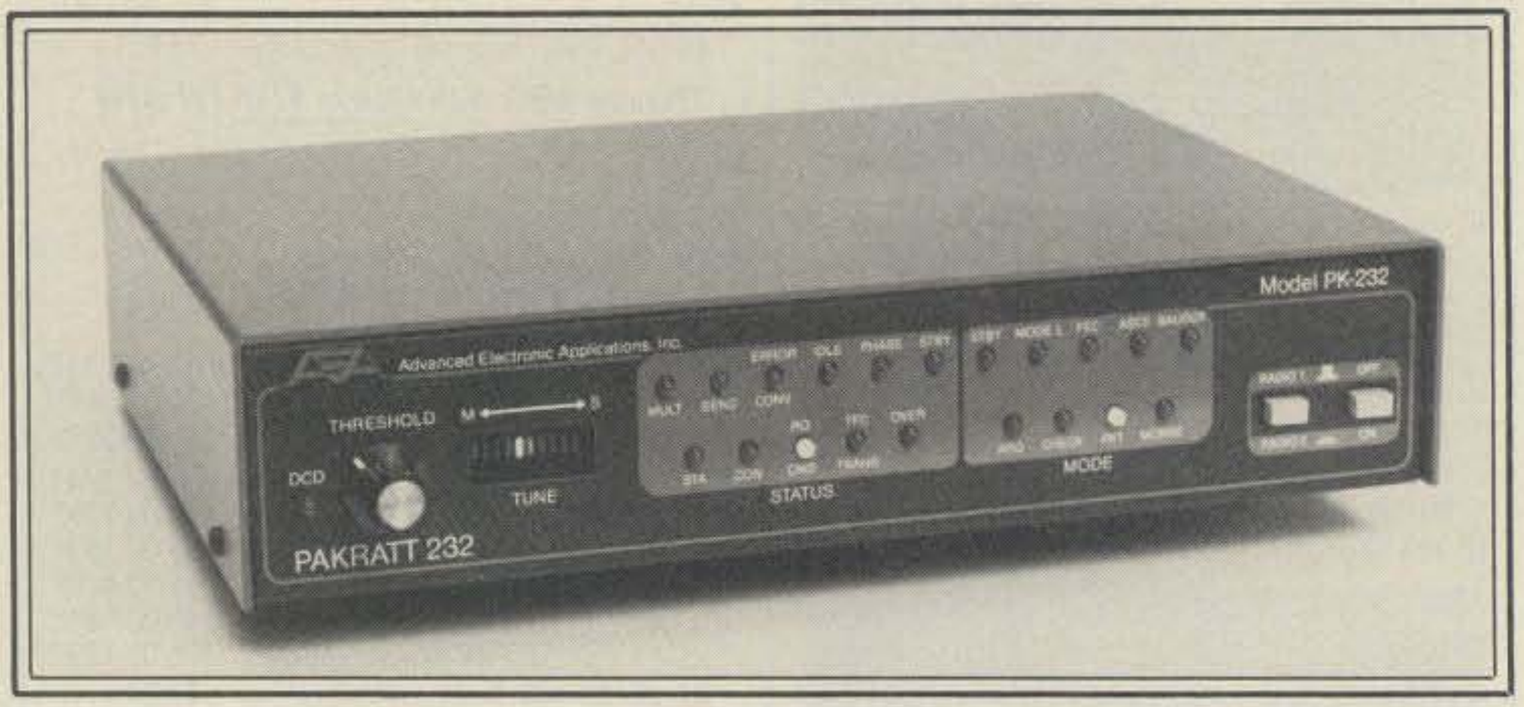
CQ REVIEWS:

The AEA PK-232 Multi-Mode Data Controller

BY JONATHAN L. MAYO*, KR3T

The AEA PAKRATT Model PK-232 Multi-Mode Data Controller, commonly called the PK-232, is a very versatile digital communications device for amateur radio operators. This unit features operation on the following modes: Morse code, Baudot RTTY, ASCII RTTY, AMTOR, packet (both HF and VHF), and fascimile. The PK-232 has the potential to become the central hub around which a station's digital communications are based, replacing separate RTTY, AMTOR, and packet units. Before taking a look at the specifics of the PK-232, let's review the basic modes of amateur digital communication that the PK-232 supports.



The AEA PK-232 Multi-Mode Data Controller. (Photo courtesy of AEA)

Modes of Digital Communications

Morse code is one of the oldest forms of digital communications and contains most characters needed for communications. With the advent of computerized units such as the PK-232, Morse code can automatically be sent and copied. However, the slightest bit of interference or imperfect sending can reduce the decoder's ability to accurately copy the code.

Baudot RTTY (Radio TeleTYpe) uses a form of digital coding known as the Baudot (or Murray) code. In the Baudot code each character is made up of five levels (commonly called the mark and space elements). However, there are only 32 possible combinations using a five-level code. Therefore, the Baudot code includes two different character sets, figures and letters; the character sets are alternated as needed.

ASCII RTTY was first legalized in 1980 by the FCC for amateur use in the United States in response to the proliferation of computer equipment which uses the seven-element ASCII code. ASCII's primary advantages over Baudot RTTY are its speed (ASCII is usually sent much faster than Baudot) and its 128 possible characters. In operation ASCII RTTY is very similar to Baudot RTTY except for the coding used.

AMTOR (AMateur Teletype Over Radio) was first legalized for amateur use in 1983. AMTOR uses a special coding in which there is a constant ratio of mark and space elements. If the received characters do not have the proper ratio, they are presumed erroneous. Because of this error checking AMTOR is much more reliable than standard Baudot or ASCII RTTY.

Packet is the most advanced form of digital communications available to radio amateurs. The primary advantages of packet radio are speed, networking, error checking, and efficient use of frequency space.

Packet radio operates using a standard digital communications networking technique known as Carrier-Sense Multiple Access with Collision Detection (CSMA/CD). Put simply, this means that a packet station will not transmit when the frequency is busy. It will wait until the frequency is clear and then transmit a short burst (frame) of information. Because packet transmissions are very short, many packet stations can be on the same frequency without interfering with each other. A line of text that takes 30 seconds to type can be transmitted in a fraction of a second.

Facsimile

Beginning 01 April 1987 facsimile operation was added to the PK-232. Facsimile, or FAX, is a method of transmitting visual images, such as photographs and weather maps, over radio. The image to be transmitted using FAX is scanned, line by line, and converted to audio frequency signals. FAX is sent using a 800 Hz shift, with the audio signals between 1,500 Hz and 2,300 Hz. A 1,500 Hz signal represents black, and a 2,300 Hz signal represents white. Signals between the two extremes represent varying shades of gray. FAX is used by a variety of news organizations and weather services to transmit photographs and maps. Almost all FAX activity is on HF outside of the amateur bands, so a general-coverage receiver is a necessity.

The PK-232 uses an Epson graphics compatible printer to produce received FAX images. Any signal above 1700 Hz (the center frequency of the PK-232's 1000 Hz filter) causes the printer to print a black dot, and any signal below 1700 Hz causes the printer to leave a blank. Thus, the PK-232 cannot display shades of gray that might be found in photographs. However, Weather FAX, WEFAX, maps are transmitted using only black and white, so excellent reproduction is possible using the PK-232.

The PK-232 is also capable of transmitting FAX. The image must have been converted to digital form, a process known as *digitizing*. A received FAX image may be stored on disk, assuming a microcomput-

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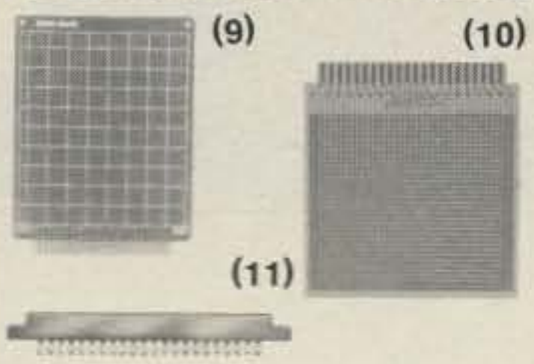

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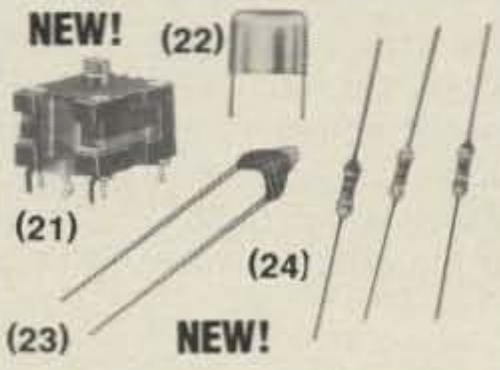

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er is being used as the terminal, and retransmitted. To transmit FAX the PK-232's VHF transmit tones should be recalibrated to the standard 800 Hz FAX shift.

Owners of PK-232s purchased before April 1987 can have facsimile capability added to their units. The upgrade kit consists of two ROM chips, a Y-cable with outputs for the terminal and parallel printer, and addendums to the owner's manual. AEA will provide the FAX upgrade at no charge (except a $5.00 shipping and handling fee) to owners of PK-232s purchased after 01 March 1987. All other PK-232 owners can get the FAX upgrade for $40.00 (plus the $5.00 fee). Contact AEA for specific details.

The PK-232

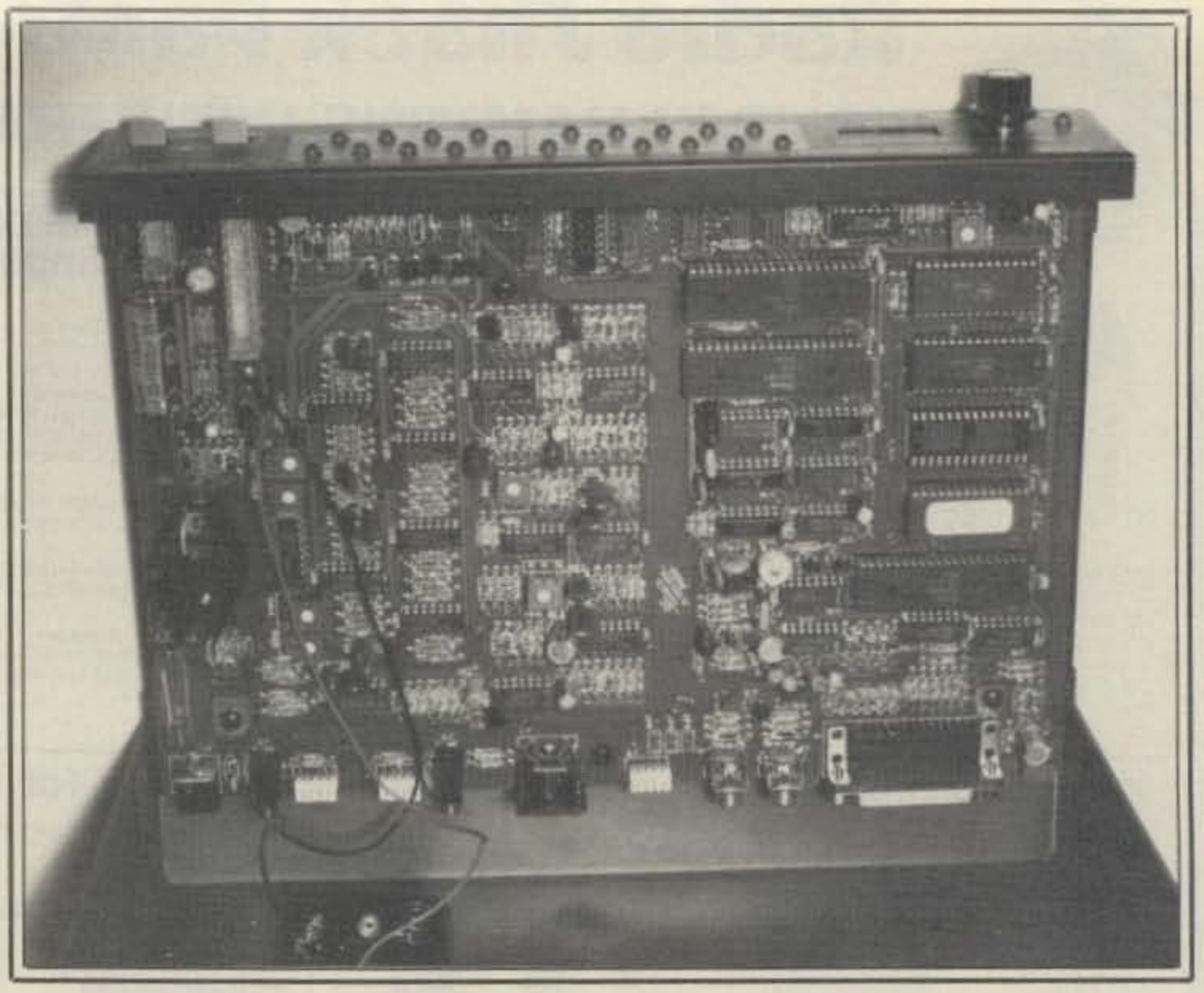
Before the advent of multi-mode units such as the PK-232, separate components were needed to operate each mode. A computerized keyboard might be used to send and receive Morse code. An RTTY TU (Terminal Unit) would be needed for Baudot and ASCII RTTY operation. Another unit would be required to operate AMTOR. And yet another for packet, as well as facsimile equipment. The PK-232 combines the functions of all these units into a single package—not to mention requiring only one communications terminal and one set of radio interfacing cables.

If you are familiar with AEA's original PAKRATT, the PK-64, which was designed for use with the Commodore 64 and 128 microcomputers, you already have a good idea of what the PK-232 is capable. However, unlike the PK-64, the PK-232 will interface with any communications terminal that has a RS-232 serial port, and the PK-232 has many more indicator lights as well as an improved modem (MOdulator/DEModulator) section. Also, because the PK-232 is designed to work with a wide variety of terminal configurations, it does not use the same machine-specific user interface as the PK-64 (the user interface allows the user to communicate with the PK-232 through the terminal).

Physical Description

The AEA PK-232 measures 11½" W × 8½"D × 2½"H. The case is a dark gray and black. The back panel contains a barrel power connector, a pair of radio connector sockets, a scope connector, a CW keyer output, a DB-25 socket for the RS-232 connection, and an ASFK (Audio Frequency Shift Keying) level control. These connectors are discussed later in the section on interfacing.

The front panel contains an impressive number of indicator lights, over 21 in all. The indicator lights are divided into two main groupings—Mode and Status. The Mode indicators tell the user at a glance in what mode the PK-232 is operating. The Status indicators show the current state of the PK-232, such as whether it is waiting for an acknowledgement or if the PTT is triggred.



Inside the PK-232.

The remainder of the front panel is composed of a DCD (Data Carrier Detect) indicator, a threshold adjustment knob, a LED bar tuning indicator, and two switches. One switch selects which radio port is to be used, and the other is the power switch.

Basic Station

The digital communications station must have three basic components: a terminal, a data communications unit (in this case, the PK-232), and a transceiver. The terminal converts characters into digital codes and vice versa. The PK-232 processes the digital codes and converts them to analog tones and vice versa. Finally, the transceiver transmits and receives the analog tones.

When transmitting, characters are typed on the keyboard of the terminal and converted into digital codes which are sent to the PK-232. In the PK-232 the digital codes are processed according to the mode in which the PK-232 is operating. The processed digital codes are then converted into analog signals which are sent to the transceiver. The transmitter then transmits the analog signals.

When receiving, the receiver receives the analog signals and sends them to the PK-232, where they are converted back into digital codes and are processed according to the mode in which the PK-232 is operating. Finally, the digital codes are sent to the terminal, where they are converted back into characters.

Keep in mind that the PK-232 can communicate with units other than PK-232s. For example, when the PK-232 is operating as an RTTY TU, it can communicate with other RTTY TUs. And when the PK-232 is operating as a packet TNC (Terminal Node Controller), it can communicate with other TNCs.

Interfacing

Interfacing the PK-232 is a relatively simple task. The PK-232 must be connected to a source of 12 VDC via the barrel connector on the rear panel. The PK-232 itself should be situated so that it is within a few feet of both the radio and terminal equipment and so that the front panel is easily viewed from the operating position.

The PK-232 connects to the communications terminal through an RS-232 compatible interface. Included with the PK-232 is a cable that attaches to the DB-25 socket on the back panel. Two outputs are available. One of the outputs is terminated with a DB-25 plug that will fit the serial port on most RS-232 compatible terminals. The other output is terminated with a Centronics parallel plug that attaches to the parallel port of an Epson graphics compatible printer for the reception of facsimile. The PK-232

owner's manual contains wiring information for the cable.

Most amateurs use microcomputers running terminal emulation software as their communication terminals. If you are planning to use a microcomputer as a terminal, check to make sure you have the proper software (a plain ASCII telecommunications program will work fine) and the necessary RS-232 port. Most microcomputer systems contain an RS-232 port, or one is available as an option.

Two radio cables are provided with the PK-232. However, it is up to you to wire the appropriate connectors for the radios you are going to be using. Most amateurs will probably choose one HF radio and one VHF radio.

The average PK-232 station probably consists of a PK-232 connected to a microcomputer running terminal emulation software; a modern, synthesized HF transceiver; a 2 meter FM radio; and an Epson graphics compatible dot-matrix printer. The HF rig is used for RTTY, AMTOR, HF packet, and FAX. The 2 meter rig is used for 2 meter packet operation and possibly RTTY. It is easy to switch between radios using the front-panel switch. The modem configurations, which differ for HF and VHF, are changed using PK-232 commands through the terminal.

Operating the PK-232

Operating the PK-232 can take some getting used to, especially if you haven't operated a computer-controlled data communications device before. There are a multitude of commands that the PK-232 recognizes which are entered through the communications terminal. These commands are used to configure the PK-232 for operation, select the communications mode, and establish and control communication with another station. It is very easy to see exactly what the PK-232 is doing from the front-panel indicators. The manual does a good job of explaining all the commands, so it shouldn't take too long before you are on the air operating.

The latest software upgrade for the PK-232 includes a useful utility, SIAM (Signal Identification and Acquisition Mode). Using SIAM it is possible to tune any unidentified digital signal and the PK-232 will identify the type of signal as well as the transmission characteristics. Using SIAM is is also possible to copy Morse code in Russian Cyrillic alphabet and Japanese Katakana characters.

The manual is one of the best of its kind that I have seen. In about 250 pages the manual covers almost all aspects of operating the PK-232, including a good introduction to Packet radio operation. Included are two addendums which provide information on FAX operation and additional software enhancements. An optional technical reference manual that describes the inner workings of the PK-232 is available.

Conclusion

The PK-232 is an effective data communications unit. I have found it to be an excellent unit and would recommend it to almost all amateurs looking to add digital communications capability to their stations. With a list price of $319.95, the PK-232 costs about twice as much as the typical packet radio TNC or RTTY TU. However, if you plan to operate more than two modes, the extra cost can be justified by the unit's capabilities and interfacing simplicity.

For more information on the AEA PK-232, contact Advanced Electronic Applications, Inc. at 2006 196th SW, Lynnwood, WA 98036. CQ

We've all known someone like Tom, and there's even a bit of Tom in all of us. It all has to do with what the definition of vacation means to you.

What I Did Last Summer

BY SAMUEL R. ALCORN*, KB2BXH

I've known Tom, KA2——, for years. He got me started in the hobby, lends me gear, and allows me to dip into his well-stocked junk box for parts the local dealer always seems to have on order. We've become good friends over the years, but in all that time I've never known him to take a vacation.

"Too busy," Tom would say. Self-employed, he took the work as it came, fearing if he turned it away, he'd lose it. It was needless worry, though. Tom was good and his clients would have waited. It took years to get Tom to believe it, though. We, our wives and I, finally convinced him of the merit of enjoying some of the fruits of his labor. We'd vacation together.

Having been to a few Caribbean islands, I suggested St. Lucia for its beauty and friendliness. "Sounds great," everyone said. Plans were made. "We'll have a great time," I said. "We'll kick back, enjoy some pina coladas, and do some serious relaxing. Maybe work up a nice tan."

It never crossed my mind that Tom had other plans.

"Which rig should I bring?" he asked a couple of days before our departure.

"I thought we planned this vacation to be low key," I said.

"I can't think of a better way to relax. Speaking of key, I'm gonna run strictly code," he said.

We left JFK Airport in New York early on a dreary overcast morning, perfect timing for a Caribbean getaway in the sun. Tom and his wife carried three suitcases—one for clothes and two for radio gear. The woman at the BWIA counter struggled getting the latter to the conveyer belt. "I hope I have enough coax," Tom said. He had packed 200 feet of the stuff and had already cut some wire for 15 and 80 meter dipoles. In addition to the transceiver and wire, Tom had packed a logbook, key, SWR meter, low-pass filter, headphones, framed operating license with appropriate documentation and approval from the St. Lucian government to operate his gear, and some other stuff he said might come in handy.

*64 Midland Blvd., Maplewood, NJ 07040

"Forgetting anything?" I asked jokingly. The thought troubled him most of the BWIA flight south.

"Beautiful," Tom said after the 1½ hour drive from Hewanorra International Airport on the south coast to Cap Estate and our hotel on the northern tip of the island. He wasn't referring to the hotel or its facilities, but to the tall palm trees just outside our suite. I knew he was thinking of antenna possibilities.

The four of us washed up and made our way down to the hotel bar, overlooking a beautiful pool and private white sand cove. The sun was setting, and the sky was aglow with pinks and purples, the likes of which only the Caribbean can produce. "A toast," I said, hoisting my first pina colada. "Here's to a great vacation, great friends, and plenty of well-deserved rest."

We made plans to spend the next day around the pool and beach and work on those dark tans. Maybe we'd squeeze in a little snorkeling, which we were told was excellent just 30 yards or so off the beach. Tom, though, had a far away look in his eyes. I knew that look. I'd seen it before. It spelled DX.

The next morning I awoke to the sound of low voices outside my window. The sun had barely poked its nose above the horizon, but Tom was outside with two of the hotel's workers erecting antenna wire. They had nothing more than a step ladder, but Tom had the thinner youth shimmying up a palm tree. "A little higher," he said. "Another couple of feet. That's it. Tie it there." He repeated the process for the other end of the wire.

"Tom, isn't it a bit early for that kind of stuff?" I asked.

"No, sir. Fifteen meters will be opening up soon," he said.

I think the guys were relieved to climb only one tree for the 80 meter antenna. Tom was using an inverted-Vee and he staked it off with some one-by-twos he had brought along. He gave each $10 for their efforts, but I wondered what they thought of this guy having them climb trees before the sun was up.

"Holy cow," he said after a few adjustments. "Look at that SWR," referring to the 1:1 match the meter was registering. By now everyone was up. Tom's wife suggested breakfast. "You go ahead. I'll join you in a couple of minutes," he said. "I've got a couple of things to check."

Tom never made it to breakfast. We brought back a tray and a pot of coffee.

"Yikes! There's a pileup. Listen to them call me," he said, pulling the headphone jack for a few seconds. Indeed, there was a crush of CW calling. "You guys go on ahead. I'll join you out by the pool just as soon as I work a few of these guys. They've probably been looking for a St. Lucia for years."

Tom never made it to the pool that day. We brought lunch back for him, and I took the liberty of including a couple of bottles of Mackeson Stout with the label that reads "Good for strength and vigor." He worked the key steadily until the band shut down near dusk. I looked at his logbook. He appeared to have worked more than 150 QSOs in the space of about 10 hours. He felt pretty good about the productive day and joined us all for drinks and dinner. We had had a beautiful day ourselves with cloudless skies and were sitting back listening to the steel-band music when Tom excused himself. We found him back in the suite working smack in the middle of the 80 meter Novice band. "I can't believe it. Nothing but 599s," he said. "These guys are getting a thrill." He worked the band late into the night before his wife convinced him to hit the sack and let the brass key cool down.

The next morning promised another beauty of a day. We talked about taking a boat over to Pigeon Island, packing a beach picnic, and seeing the 17th century British army garrison there. We'd make a day of it. But Tom begged out. "I get seasick, you know," he said. "I'll get a book and spend some time out by the pool."

And we believed him. But late that afternoon we found him asleep at the transceiver. A quick check of the logbook revealed another hundred or so QSOs. He had on swimming trunks, but by the looks of his skin he'd spent no time in th sun. "Tom," his wife said, giving his shoulder a gentle tug, "Let's get you into bed."

"QRZ?" he said, before shaking off his grogginess.

That evening we dined on the slabs of fresh red snapper in a Creole sauce, pumpkin soup, and pina coladas. Tom said he couldn't remember the last time he had felt so relaxed and he and his wife held hands like honeymooners. "This was a great idea, Jack," he told me. We listened to the noises of the Caribbean nightfall setting in and talked about going into Castries, the capital, the next day for a little shopping.

I could see Tom's reluctance the next morning about going into town. But he brightened up some after I told him we'd be back a little after noon. "That'll give you plenty of time to work 15 meters," I said. "Who knows, we might find a ham shop in town." "Let's get going," he said, leading the way.

Tom unfortunately found what I took to be the only amateur store in all the Caribbean. He struck up a conversation with the owner and when Tom saw us getting a little itchy, told us to go on and he'd meet us back at Barclay's. When we spotted him in the crowd, he was lugging something wrapped in brown paper. A souvenir, we thought. Seeing our interest in the package, he said, "Wire. Twelve gauge. Thought I might give the guys on 160 meters a shout while we're here."

He spent the remainder of the afternoon measuring and cutting wire. He, of course, had packed a few essential tools. Tom found the two workers who'd helped him install the earlier structures. "When was the last time you saw a half-wave dipole on 160?" he asked me. The coax connector made it to the transceiver with 2 inches to spare. "Next time," he said, "we'll remember more coax."

That evening we dined on West Indian beef roti wrapped in pita bread and washed it down with more pina coladas. We watched another Caribbean nightfall wash the sky in blackness. Tom excused himself just after dessert. "A lot of QRN," he said, when we made our way back to the suite. But he kept at it, occasionally removing the headphones and rubbing his ears. He took on the appearance of a man on a mission from God.

The next day, after he first worked a dozen or so amateurs, we coaxed Tom out on a round-the-island ride to take in the rain forest scenery, the Grand Pitons, and the sulfur springs on the southwest shore of the island. Tom wasn't impressed. "Nice view," he said. "Think what you'd work from here," referring to the perch on the half mile high volcanic mountain.

With a day left on our vacation, we joined forces to convince Tom to get a little sun. "How could you venture so far from home and not manage to soak up any rays?" we argued. He saw the battle lost and pledged himself to pool and beach time the next day. He even stayed through dessert that night at dinner. His spirits had been dampened.

During the night the torrent began. The sound of the downpour slapping the roof woke us. We had trouble seeing much beyond a few feet in the rain. It continued at dawn. Tom was feeling better because if the rain kept up he'd have no excuse about pounding away on the key. "Great," he said. But when he saw our glum faces, he added, "Tough break for you guys."

Even as he motioned to the transceiver's power switch, though, the lights in the suite flickered. On. Off. On and then off. "Gads," Tom said. A verbal expletive was also muttered. We were confident the power would be on soon, though. We all had read about these short tropical rains. But two hours later it was still coming down. I ventured to the manager's office. There'd been a mudslide taking out the power on this side of the island, he said. The manager wasn't very optimistic about getting the power back, nor about the weather for that matter.

This set Tom to brooding. We broke out a bottle of rum we had picked up in town, a bottle labeled with a thin strip of paper simply saying, "Strong rum." Tom's wife fished a deck of cards out of her bag and we started to play a little poker. "Strong stuff, alright," Tom said after a nip of the brownish liquid. But it seemed to spark something in him. "We need a taxi," he said. "All we need is a taxi." Strong stuff indeed, It had warped his brain that quickly.

Before we knew it he was out the door. A few minutes later a honking sounded outside. Tom had rented a taxi and was having the driver pull the car up as close as he could to our suite. Tom ran in, soaking wet. "We're going mobile," he proclaimed. "I never ran this sucker on 12 volts before, but it's time for this power supply to start paying for itself." Tom spent the rest of the day huddled in the back seat of the taxi, working 3 continents on 15 meters. He came in to use the bathroom once. The driver, who sat in the front switching on the wiper blades every now and then, was sent in once to fetch a cold beer. When the band gave out, he paid the driver and gave him a nice tip.

During dinner that evening and after the radio gear had been packed away for the trip home the next day, Tom was already busy making plans for next year. "We'll pack a beam," he said. "Something simple, maybe four elements. All we need is a tower. What's the best way of shipping something like that?" CQ

CQ REVIEWS:

The Aftronics SuperSCAF

BY LEW McCOY*, W1ICP

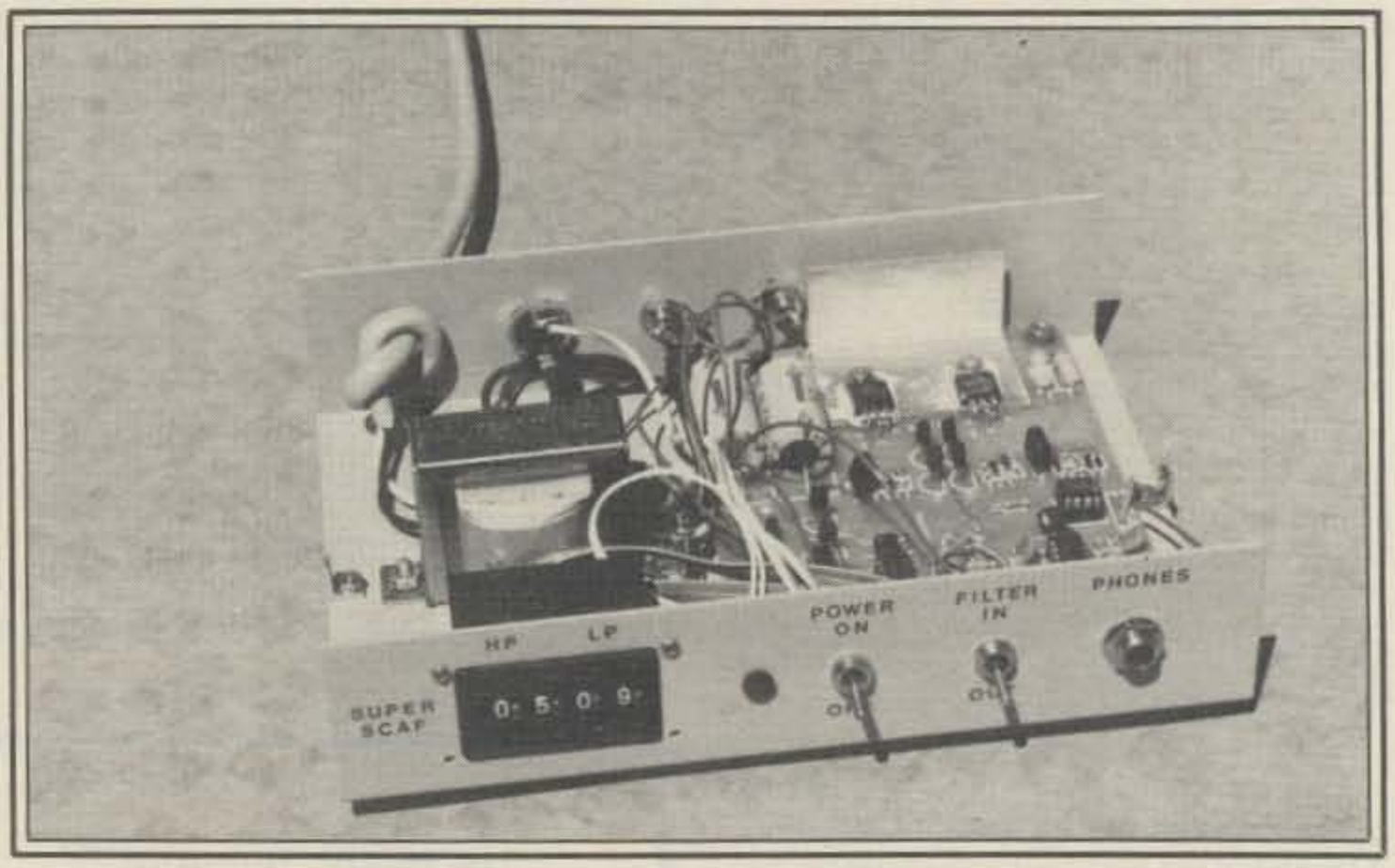
The SuperSCAF is an audio filter that is used at the audio output of a receiver to improve the selectivity of the receiver. Basically, that is what the unit is, but there is a heckof a lot more to the device than that.

I have designed and described many audio filters over the years, but if the truth were known, I have never been very excited about this type of selectivity. It always appeared to me that the best selectivity was obtained either by crystal or mechanical filters in the IF (intermediate frequency) section of the receiver. You could obtain good selectivity without "ringing" something that was characteristic of most audio filters.

Just for the historical record—and I think I have my facts pretty straight—By Goodman, W1DX, probably did more in receiver selectivity design than anyone else (and wrote many articles that established modern design criteria). He was a believer in selectivity being obtained in the IF section, and because he was both my boss and teacher, he did a pretty good job of convincing me. So what has this got to do with a product review of the SuperSCAF? First, I have to convince the reader that I never thought much of audio selectivity so it would take a very good circuit to change my mind. And it is changed!

SuperSCAF is essentially a "switched capacitor audio filter," hence the "SCAF" part of the name. It is designed and marketed by AFTRONICS, Inc., which is a company run by the designers (and amateur radio operators), Rich Amdt, WB4TLM, and Joe Fikes, KB4KVE. (Incidentally, these two just received the ARRL 1986 Technical Excellence Award for the design of SuperSCAF.) Their unit is marketed as a kit ($136.95).

Exactly what makes the SuperSCAF so special? Let's look at a few of the important specs and then go from there. I will attempt to make this review as simple to understand as possible. If the reader wishes a more technical discussion, then I refer you to an article by the designers that appeared in the April 1986 issue of *QST*.



This is the front view of SuperSCAF. From the left are the BCD switches for setting the passband, on/off light, on/off switch, filter in/out switch, and headphone jack.

First, the bandwidth of the filter is adjustable between 40 and 3700 Hz. Yes, that's right, 40 Hz! The skirt selectivity is 150 dB per octave (a crystal filter, a good one, is about 70 dB per octave).

The heart of the SuperSCAF is designed around the GOULD/AMI Semiconductors S3528 and S3529 ICs. For example, the S3528 is a low-pass filter and '29 is high-pass. These chips contain a seventh-order elliptical filter, a clock generator, a programmable clock-frequency divider, and a pair of buffer amplifiers used for signal input and output of the IC.

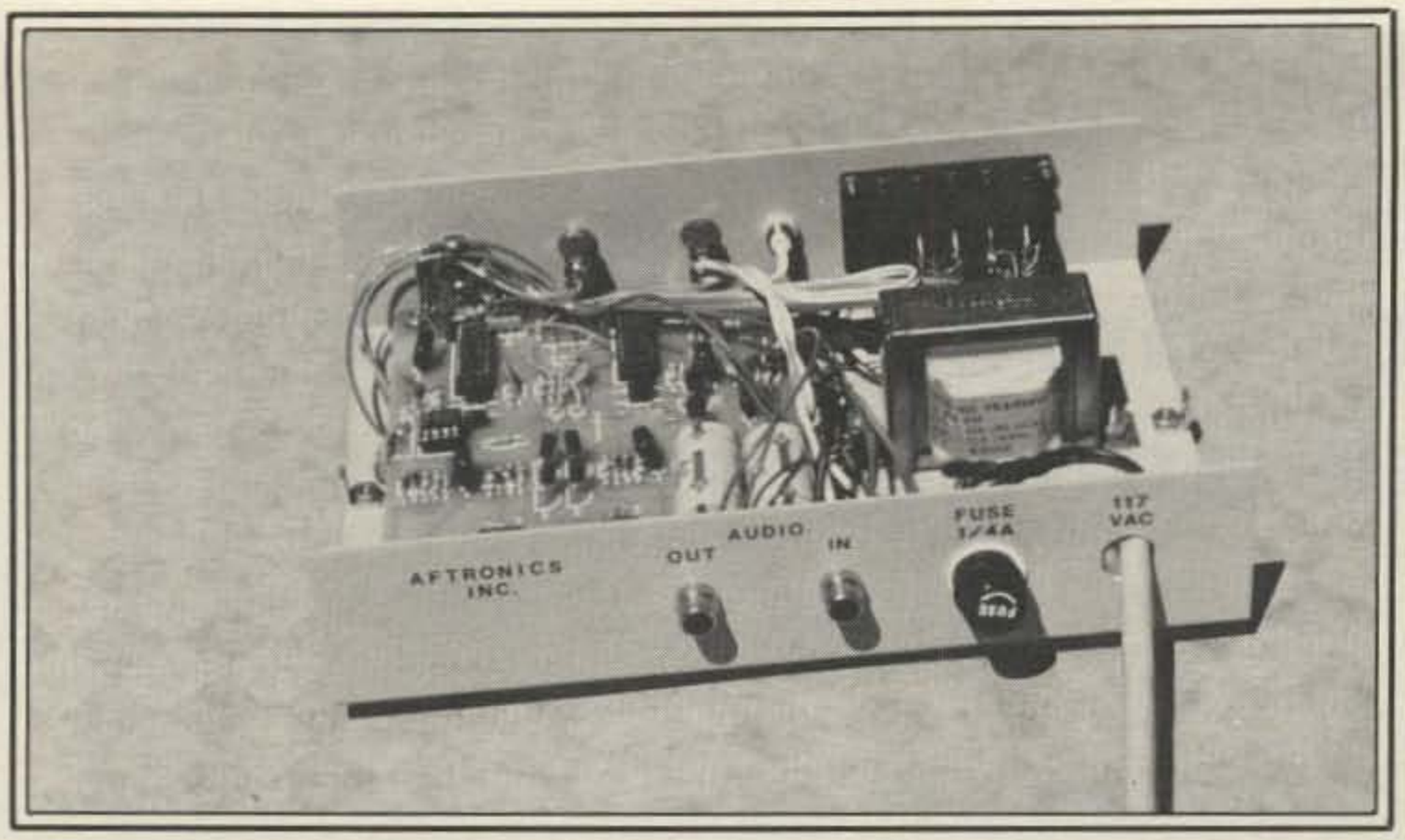
One feature of these ICs is the ability to place either the low-pass or high-pass cutoff frequency as desired by using binary-code decimal switching. As many as 40 different cutoff frequencies can be chosen by proper switch settings.

If one wanted to use the cliche "as wide as a barn-door," a good analogy can be made to the use of SuperSCAF. If one visualizes a barn-door with sliding doors to close the opening and relates that opening to the audio output of a receiver, one can get a good idea of how SuperSCAF performs. One door would be the low-pass filter and the other the high-pass filter. SuperSCAF has two panel-mounted BCD switches for setting the low- and high-pass frequencies. The widest setting (doors wide open) is 3900 cycles, and the lowest (doors almost closed) is (would you believe?) 30 cycles. Any noise or signals outside these frequencies are not in the audio output. It just "ain't" there!

In actual practice, the filters are set up so that the cutoff frequency is 100 times the BCD switch reading. For example, if you set the low-pass thumbwheel switch to 10, nothing above 1000 cycles gets through (100 times 10). This sounds more complicated than it is, and it takes less than one hour of listening and playing with SuperSCAF to become familiar with the unit.

Again, to me the selectivity is amazing. I found that I could copy on CW extremely weak DX signals that were right up close to earbusting U.S. stations. It didn't take long to realize that the unit did an excellent job separating SSB signals. Another point: The SuperSCAF improved the re-

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



This rear and inside view shows the component layout. The power transformer is at the right, next to the circuit board.

ception of low-frequency Packet operation considerably. Any interference to a Packet signal can make Packet operation very frustrating.

In my tests I used SuperSCAF with several different receivers, and in all cases a marked improvement in selectivity was noted. I used it with one receiver that had several mechanical filters providing several degrees of selectivity, including a 200-cycle narrow CW filter. I must admit that I didn't expect any improvement when I added SuperSCAF to this receiver. However, I quickly found that in many checks SuperSCAF definitely provided not a little, but a lot of improvement.

I tried SuperSCAF with one rather old tube-type receiver that had an old-fashioned crystal filter (which worked hardly at all). At first, there was so much drift in the receiver that I had difficulty tuning and following signals, particularly when using SuperSCAF with narrower filtering. After the receiver settled down (which took about an hour), I found that with SuperSCAF the old dog was just as selective as my most high-priced receiver. By now the reader could assume that I am very impressed by SuperSCAF, and I am.

The unit comes as a kit, which takes about four hours or so to wire. Everything about the kit—etched circuit board, components, and cabinet—is first class. The instruction book is complete and easy to follow. I could show a circuit diagram, but it wouldn't add anything to this review. The earlier referenced *QST* article is detailed in this respect. Simply, there are the two Gould ICs and the BCD switches for each. The remainder of the circuit consists of a power supply and audio amplifier.

Setup for operation is quite simple. SuperSCAF is plugged into the audio output of the receiver (headphones output or speaker), headphones are plugged into the unit (or a speaker; there are provisions for both), and the unit is ready to operate. SuperSCAF's input accepts either low- or high-impedance inputs, and the audio output is 1.5 watts at 8 ohms. The unit is 8"W × 1½"H × 5¾"D. It is priced at $136.95, which includes shipping, and is available from Aftronics, Inc., P.O. Box 785, Longwood, FL 32750. CQ

CQ REVIEWS:

The Pac-Comm TNC-200 Terminal Node Controller

BY JONATHAN L. MAYO*, KR3T

Since the early days of amateur packet radio, TAPR (Tucson Amateur Packet Radio Corporation, an amateur packet radio research and development organization) has developed TNCs (Terminal Node Controllers). TAPR's first widely distributed TNC is known today as the TNC-1. Several companies manufactured copies, or clones, of the TNC-1.

TAPR's next TNC, known as the TNC-2, was also very popular. It was less expensive than the TNC-1 and offered many new features. While TAPR no longer manufactures TNCs, today there are numerous TNC-2 clones available.

The Pac-Comm TNC-200

Of these TNC-2 copies, the Pac-Comm TNC-200 is a direct and faithful duplicate of the TAPR design. Most all other current TNC-2 manufacturers have modified the basic design. Pac-Comm sells the TNC-200 in a variety of configurations as shown in Table I. I recently ordered the CMOS full kit, which is the subject of this review.

The CMOS (Complimentary Metal Oxide Semiconductor) versions draw less power and generate less heat than the NMOS (N-channel MOS) versions. The CMOS TNC-200 draws about 120 MA at 12 VDC, while the NMOS TNC-200 draws about 250 MA at 12 VDC.

Physical Design and Features

The TNC-200 measures in at 6"W × 10"D × 2"H. The case is light-gray extruded aluminum. The back panel contains a power switch, a barrel power connector, a radio connector socket, a DB-25 socket for the RS-232 connection, and a series of DIP switches for setting the terminal and radio baud rates. These connectors are discussed later in the section on interfacing.

*1817 Saratoga Court, Allentown, PA 18104

Assembled and tested unit	$174.95
Full kit with cabinet	$129.95
Bare circuit board and manual	$39.95
Manual	$ 9.95
Low-power CMOS option	$15.00 add'l
32K RAM option	$10.00 add'l

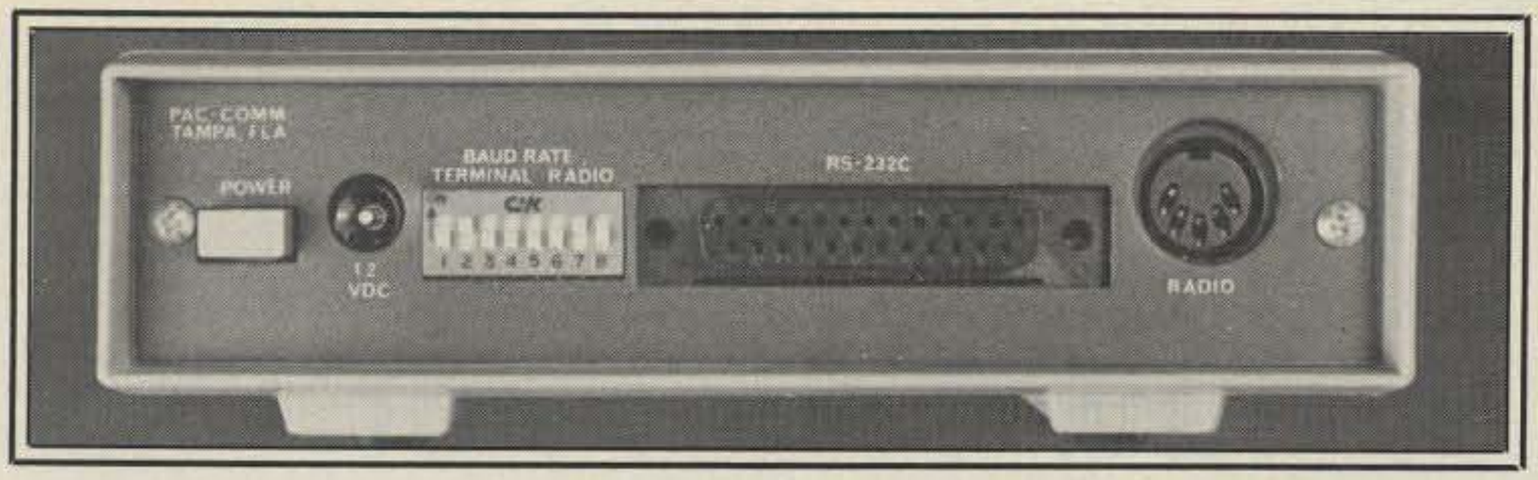
Table I– Price/configuration data for the TNC-200.

The front panel contains five indicator lights. They are color coded so that they can be discerned in dim light. The **PWR** (power) indicator lights whenever 12 VDC is supplied to the unit and the power switch is turned on. The **CON** (connect) indicator lights whenever the TNC-200 is connected, or linked, to another packet station. The **STA** (status) indicator lights whenever there is user information contained in the TNC-200's memory that has not been acknowledged (received successfully) by the packet station to which the TNC-200 is connected. The **PTT** (Push-To-Talk) indicator lights whenever the TNC-200 is transmitting. The **DCD** (Data Carrier Detect) indicator lights when a signal is being received by the TNC-200. By monitoring the status of the indicator lights, it is possible to keep track of exactly what the TNC-200 is doing.

The TNC-200 (or any hardware TNC for that matter) serves as an interface between a terminal and a transceiver. The basic packet radio station is composed of four main components: the terminal/computer, a TNC (Terminal Node Controller), a modem, and a transceiver. The TNC is the "heart" of a packet radio station. The TNC organizes and controls the transmission and reception of the data.

The TNC-200 is actually a small microcomputer; the digital section of the TNC-200 is based on a Z-80 microprocessor. The TNC-200 (and most other TNCs) also contains a built-inmodem. The modem (MOdulator DEModulator) converts the digital signals used by the TNC and terminal into analog signals which can be transmitted over radio. On the receiving side, the modem converts the analog signals back into digital signals. The built-in modem in the TNC-200 can be configured for the Bell 202 standard, which is commonly used for packet operation on VHF

The Pac-Comm TNC-200. (Photo courtesy of Pac-Comm)



The back panel of the TNC-200. (Photo courtesy of Pac-Comm)

frequencies, and the Bell 103 standard, which is commonly used for HF operation. However, an external tuning indicator is helpful for HF operation.

Manual

The TNC-200 manual is a close copy of the original TAPR documentation. The type is rather small and the pages are bound with a metal clasp, making it difficult to lay the manual open without creasing the pages. The sheets are triple punched, so I removed the clasp and put the manual in a binder.

The first part of the manual is a reference section. It describes how to interface the TNC to the terminal and radio. It also contains a detailed listing of commands.

The second part of the manual is the assembly section. I found it easy to follow. Each step is checked-off as the parts are installed.

Assembly

I was able to assemble most of the kit in an evening. The parts are separated into manila envelopes, and a checklist is included at the beginning of the assembly manual. Be careful and do not rush when assembling the kit. There are a lot of parts and an equal number of things that can go wrong.

My unit did not work at first. I spent several hours with an oscilloscope and another TNC-200 before the problem was located—a solder trace between one of the memory chip's data lines and a ground line. Be sure to follow the Integrated Circuit (IC) handling instructions as explained in the manual, especially when using CMOS chips. A modem calibration routine is built-in, so a frequency counter is not necessary.

Interfacing

After the TNC-200 is assembled and mounted in the cabinet, the TNC must be interfaced ot the terminal and radio. Any RS-232 compatible terminal may be used; most operators use the serial port of a microcomputer running terminal emulator software. Check your transceiver's manual for the proper wiring, and use shielded cable for the audio lines. The TNC-200 comes with a bare 5-pin DIN plug for the radio connector. However, you will have to supply all the necessary cables. The terminal and radio baud rates are set by switches on the back of the TNC-200. The manual contains all the information you will need to get the TNC interfaced properly.

Conclusion

I have found the TNC-200 to be a capable unit. I have used my unit for both home and portable operation. In fact, I have a portable packet station consisting of a Model 100 portable computer, the TNC-200, and an IC-02AT that fits in a briefcase. Based on price and performance, it is hard to beat the TNC-200 for a basic, reliable TNC.

For more information on the TNC-200, contact Pac-Comm Packet Radio Systems, Inc., 3652 West Cypress Street, Tampa, FL 33607-4916. CQ

Feel like tinkering? AD1B describes a nifty little antenna project that also makes use of your computer.

A New Twist For The HF J-Pole Antenna

BY THOMAS M. HART*, AD1B

I recently became interested in the possibility of building a compact high frequency antenna for portable workand did some reading on the subject. It seems that the price for most physically small antennas is a narrow band width and exotic coil construction. My thoughts then went towards the possibility of a J-pole antenna, a simple design that is anything but compact when used in the normal fashion, as I was to discover after I did some computations.

There has been a lot of interest in the J-pole antenna for VHF work, particularly on the six and two meter bands, but much less information on HF applications. The "J" is, however, a popular and simple vertical antenna that has been described in a large number of articles that emphasize that the J-pole features ease of construction, low cost of materials and the convenience of direct feed by coax. Another nice feature is that there is no need for a ground system or for a group of radials.

The ARRL *Antenna Book* describes the J-pole as a half-wave vertical radiator fed by a quarter-wave stub matching section (see fig. 1). It also indicates that the J-pole has been popular in mobile applications, although it is not as widely used as the quarter-wave whip.

My interests are in development of a simple 20-meter antenna for fixed and perhaps mobile work, one that does not rely on coils, traps or other electrical methods of size reduction. I wanted the derivative of a full sized antenna using some type of compacting approach for the problem of achieving a reasonable size.

How about a Helical J-pole antenna, I thought; it may have been tried, but I have never found a reference to that particular configuration. To test the concept, I used the cardboard tube from a paper towel roll and would a two meter J-pole antenna

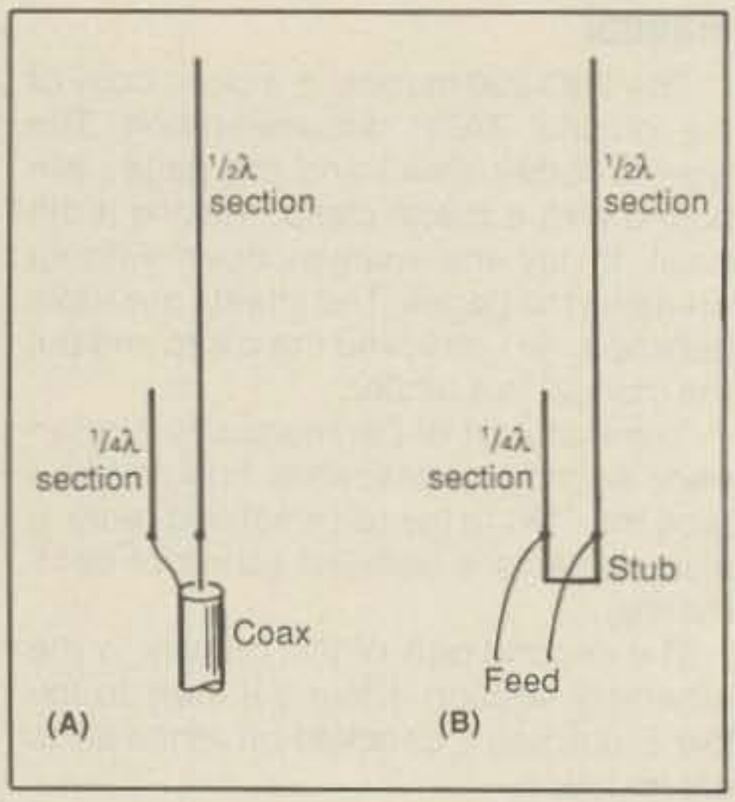


Fig. 1– The basic J-pole antenna. At (A) it is fed with coax and at (B) twinlead or openwire.

½λ section = ½λ* .965
¼λ section = ¼λ* .830
Stub = .0136λ
λ = 300/MHz Meters

Fig. 2– The VE2CU formulas for the HF J-pole antenna. Refer to fig. 1(B).

around it. The VHF antenna worked fine and seemed to offer a reasonable match to my Yaesu Memorizor. The next step was to try the concept on a larger scale. Since cardboard was impractical for the larger size of the high frequency antenna, I settled on 1.5 inch PVC tubing for a supporting mechanism.

The next question was the determination of the dimensions of the antenna; many slightly different formulas have been reported in the literature. The most useful formulas were in an article by VE2CU (*QST* March, 1981), which are shown in fig. 2.

I prepared a short BASIC program for

*54 Hermaine Ave., Dedham, MA 02026

```
10 CLS
20 REM "j-pole program"
30 A$ =  "**********************************************************************
**********"
40 FOR N = 1 TO 6: PRINT A$: NEXT N
50 PRINT "**********************************************************************
**********"
60 PRINT "**********
**********"
70 PRINT "**********                    HF J-POLE  ANTENNAS
**********"
80 PRINT "**********
**********"
90 PRINT "**********                  COMPUTATION OF DIMENSIONS
**********"
100 PRINT "**********
**********"
110 PRINT "**********                          AD1B
**********"
120 PRINT "**********
**********"
130 FOR N = 1 TO 6: PRINT A$: NEXT N
140 PRINT: PRINT
150 PRINT "                                                ENTER 'C' TO CONT
UE...."
160 Z$ = INKEY$:IF Z$ = "" THEN 160
170 CLS:FOR N = 1 TO 6: PRINT :NEXT N
180 PRINT
190 PRINT "To determine the size of a J-POLE antenna for a selected HF"
200 PRINT "band,  enter the FREQUENCY in MHZ:"
210 INPUT F
220 L = (984/F)
230 X= .0136*L
240 Y= .2075*L
250 Z= .483*L
260 CLS
270 FOR N = 1 TO 4:PRINT: NEXT N
280 PRINT
290 PRINT "                                        HIGH FREQUENCY J-POLE:"
300 PRINT "       ! !"
310 PRINT "       ! !"
320 PRINT "       ! !                    <-  .5 wavelength"
330 PRINT "       ! !"
340 PRINT "       ! !"
350 PRINT "       ! !"
360 PRINT "       !    break             < - separation between Y and Z"
370 PRINT "       ! !"
380 PRINT "       + +  coax              <- center to left; braid to right"
390 PRINT "       ! !                    <-  .25 wavelength "
400 PRINT "        _                     <-   stub (distance from short to coax)"
410 PRINT
430 PRINT "Half-wavelength:     ";INT(Z*10)/10
440 PRINT "Quarter-wavelength:  ";INT(Y*10)/10
450 PRINT "Antenna Length:      ";INT((Z+Y)*10)/10
460 PRINT "Stub Length:         ";INT(X*10)/10
480 PRINT
490 PRINT "FOR ANOTHER COMPUTATION, HIT ANY KEY...."
500 Z$ = INKEY$: IF Z$ = "" THEN 500
510 IF Z$ = "C" THEN GOTO 170
520 STOP
```

Fig. 3– The J-pole computer program.

my IBM PC in order to determine the dimensions of the J-pole at various frequencies (see fig. 3 for the program listing—it is easily adaptable to a variety of computers). Settling on 14.3 MHz, I ran the program and built the antenna from

```
                                HIGH FREQUENCY J-POLE:
       ! !
       ! !
       ! !                  <-  .5 wavelength
       ! !
       ! !
       ! !
       !    break           < - separation between Y and Z
       ! !
       + +  coax            <- center to left; braid to right
       ! !                  <-  .25 wavelength
        _                   <-   stub (distance from short to coax)

Half-wavelength:      33.2
Quarter-wavelength:   14.2
Antenna Length:       47.5
Stub Length:          .9

FOR ANOTHER COMPUTATION, HIT ANY KEY....
Break in 510
Ok

1LIST   2RUN  3LOAD"  4SAVE"  5CLS  6FILES7AUTO 8RENUM9EDIT   0NEW
```

Fig. 4– A sample run of the computer program.

300 ohm twin lead that I purchased at Radio Shack. The process of winding the coil around the mast is tedious, but not particularly difficult. At ten inch spacings, I made a band of electrical tape to prevent the spirals from slipping. The initial spacing between turns was about one-half inch, later trials were made with one inch spacings.

Well, how did it work? Not bad, I answered myself. I live near Boston, Mass. and was able to work stations in Illinois, Arizona and Tennessee with reasonable signal quality with the antenna attached to a fence at a height of six feet above the ground.

What are the pros and cons of the compact J-pole? It is small, one version was only four feet high. It is cheap enough, with a little scrounging it should be possible to build one for under $10. It does work, my experiences were quite a pleasant surprise.

As to the cons . . . the helical J-pole is a compromise antenna that will never perform as well as a full-size model, but perhaps this is something that will work for you in portable or mobile applications. I suspect that the helical J-pole would be easy to clamp to the rear bumper of a car, using two clamps and a metal plate. This would certainly be a very simple and readily available antenna for anyone on a limited budget who is interested in mobile operations. CQ

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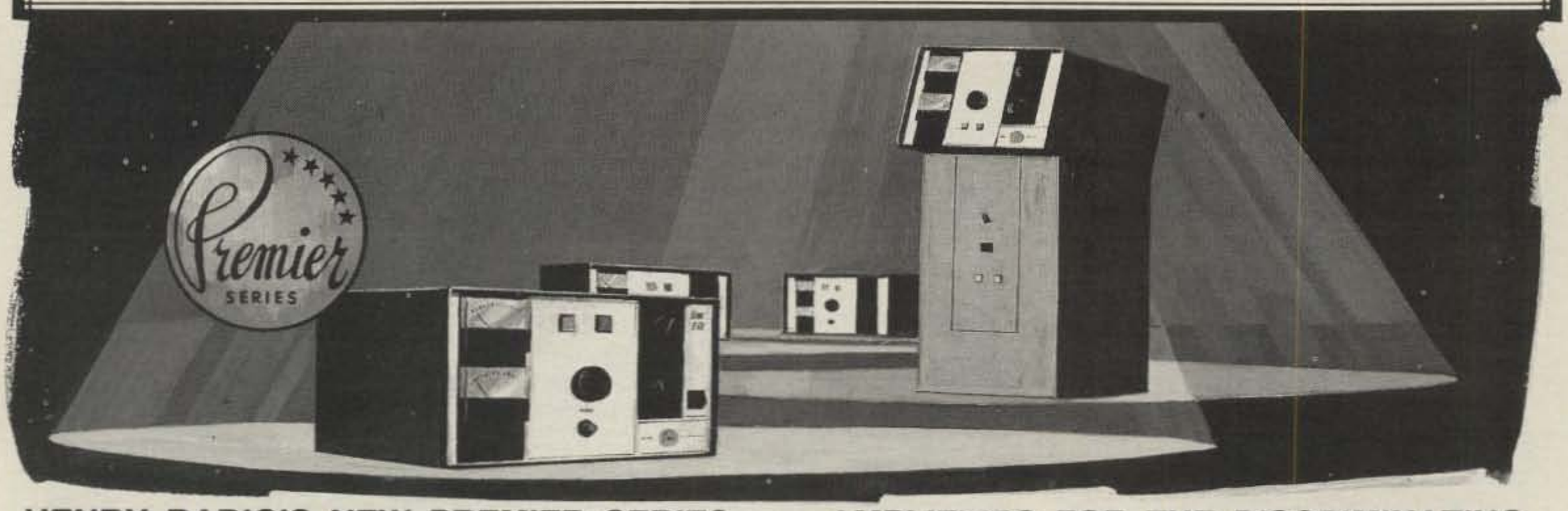

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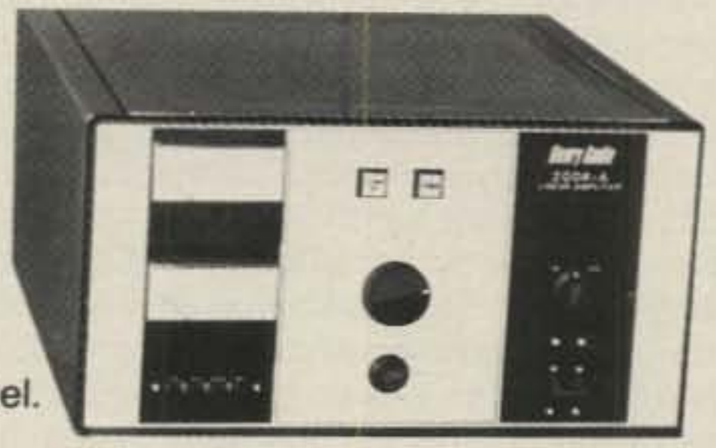

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Welcome To My Shack

BY KIRSTI JENKINS-SMITH*, VK9NL

Send me a picture of your shack! The mail sometimes brings requests like that, giving me a feeling of inadequacy. I look at photos of other peoples' shacks. Some are big and roomy. Some are tiny or may be a mere nook in another room. But they all have one thing in common: not a thing is out of place. The operating table is polished to a high gloss. Rig, linear amplifier, and other equipment expertly lined up in rows. Pen, pad, and log book—neat!

Our shack is not like that. Sometimes I wish it were separated from the rest of the house by a secret passage to keep innocent visitors from getting a look at it. It is amazing how much one can fit into a room 6′ × 9′ with a bit of willpower. Apart from necessities like rigs, etc., I have just finished counting 29 cardboard boxes in varying sizes full of stuff.

Shelves line part of the walls. Originally meant as bookshelves, they seem to have been taken over by other things. There are boxes of QSL cards, stacks of magazines, and, yes, the 6 meter beam indicator gathering dust.

The operating area is two tiered. This is necessary when two operators share a shack, and one of them does not appreciate a good rig like the FT-301. Sure it drifts a little and the volume control crackles, but it is a friendly sort of rig, full of personality.

Jim took the linear with him when he went to Papua New Guinea for an extended period, leaving a big piece of operating table free for more useful items. A few tools and coax connectors live with fluffy bits of dust in a cardboard box. Another box contains rubber stamps and stamp pads. An old desk mike makes a useful stand on which to hang connecting leads, and there is an assortment of odd QSL cards, postcards, old postage stamps, a few perished rubber bands, and two staplers, one of which I know is empty.

*P.O. Box 90, Norfolk Island, 2899 Australia

"It's not net time again, is it?"

I try to keep the top of the rig and power supply free of clutter. The fact that they have grilles may well mean that I should let them "breathe." But there is room underneath the rig! Oh yes, room for more odd QSL cards, old enelopes, stamps, and important memos of three-month-old skeds. Moving down to the main table we come to where I keep things I need to have within reach at all times: list of beam-headings, DXCC countries list, log, pen that works, pad. I also have a crossword for passing the time while checked into nets, QSL cards for filling in while idly listening around on the bands, a box of cheap envelopes bought at Woolworths during my last big outing to the mainland, and magnifying glass for looking up callbook addresses and reading some of the radio magazines which use microscopic print. For some reason there is also an old nut (no, don't be rude!) and a nailfile I thought I had lost.

Within reach of the operating table is a two-drawer filing cabinet, the top of which is table height and handy for putting things down. There is a postal-rate guide, cellotape, a hand drill, my multimeter, and a reel of beige cotton. The cotton is there because this is essentially my sewing room. Next to the filing cabinet stands my sewing table and machine. I even have a sewing basket, on top of which is a strong magnet with a broken paperclip and an old staple stuck to it.

QSL cards take up a lot of room. The shelves on the back wall hold eight shoeboxes full of cards, and underneath are card filing cabinets packed full, with four more boxes under the table. Full log books and box files containing expedition logs live on the top shelf.

Another wall has more shelves packed full of books and radio magazines, some in languages we do not understand, like Czechoslovakian, Italian, Indonesian, Japanese. But we hoard them all.

On the floor, partly hidden by the inward-opening door, are a number of empty cardboard boxes (in addition to the

other 29) in various shapes and sizes. I keep them there in case they come in handy. Keeping things for this purpose is an island disease affecting the brain. Jim has not lived here long enough to have caught on yet, so we sometimes have heated arguments when I want to keep useful things like empty margarine containers and old toothbrushes. Only when he is away can I really get down to taking care of things. Hence the boxes behind the door. There was a time when I could see a frantic glint in Jim's eyes when trying to convert him to the "island way of life." He evidently thought there was something wrong with me. But then one day he went visiting someone who has lived here even longer than I, and so is in a more advanced stage of collectomania. Since then he just looks thoughtful.

There is a spare seat in the shack. It is at present piled high with old envelopes off which I intend to cut the stamps one day. We have come the full circle of the shack. The last of the boxes live under the operating table. Two are full of unused QSL cards, and two contain odds and ends.

One of these days I am going to shove everything to one side, polish the table, and snap a photo of the tidy corner. Who knows? Maybe someone will look at the picture, admire the neatly lined up equipment and high-gloss table, and wish that he/she too, had a shack like ours! CQ

CQ SHOWCASE

AntennasWest Solar Supply

The QRV-SOLAR 23 solar power supply provides power for repeaters, portables, RV stations or even home station. An easily installed, unbreakable solar panel with linear current boosting circuitry is the heart of the system. Rated at 23 watts, the QRV delivers 1.65 A at 14 V. At

lower voltages, current capacity is higher. An extensive manual explains the optional mounting methods. Priced at $289.95, the unit requires a storage battery (user supplied). An optional mounting kit is available for mast installation at $34.95. For more information, contact AntennasWest, 1971 N. Oak Lane 1300 E., Provo, UT 84604-2138, phone 801-374-1084.

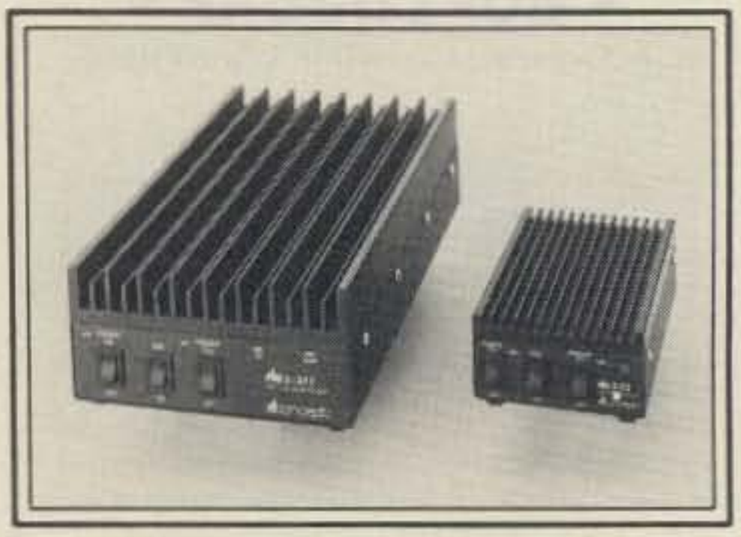
Hamtronics™ CA137-28 Weather Satellite Converter

Hamtronics, Inc. has announced a receiving converter designed for reception of weather fax pictures transmitted from satellites operating in the 137 MHz band. Basically a modified version of the CA144 two-meter amateur converter, the CA137-28 converter translates all signals received in the 136–138 MHz satellite band for reception on tunable 28–30 MHz wideband FM receivers. To make the conversion in dial frequency, simply subtract 108.000 from the frequency you want to receive. The receiver uses a low-noise front end to provide sensitivity of less than 0.2 uV. It operates on +13.6 VDC at 30 ma.

The CA137-28 converter is available in three versions. A wired and tested version is available in a 4″ × 4″ × 2″ cabinet for $69. The same unit in kit form is $49. A kit to build just the PC board module, less case, is $39. (Shipping and handling is $3.00). GaAsFET preamps of various types are also available for this band. For a complete 40-page catalog of Hamtronics™ products by return first-class mail, send $1 ($2 for overseas) to Hamtronics, Inc., 65-F Moul Road, Hilton, NY 14468-9535. To order a converter by phone, call 716-392-9430.

EZ-Speak—Programming Aid for RC-85/RC-850

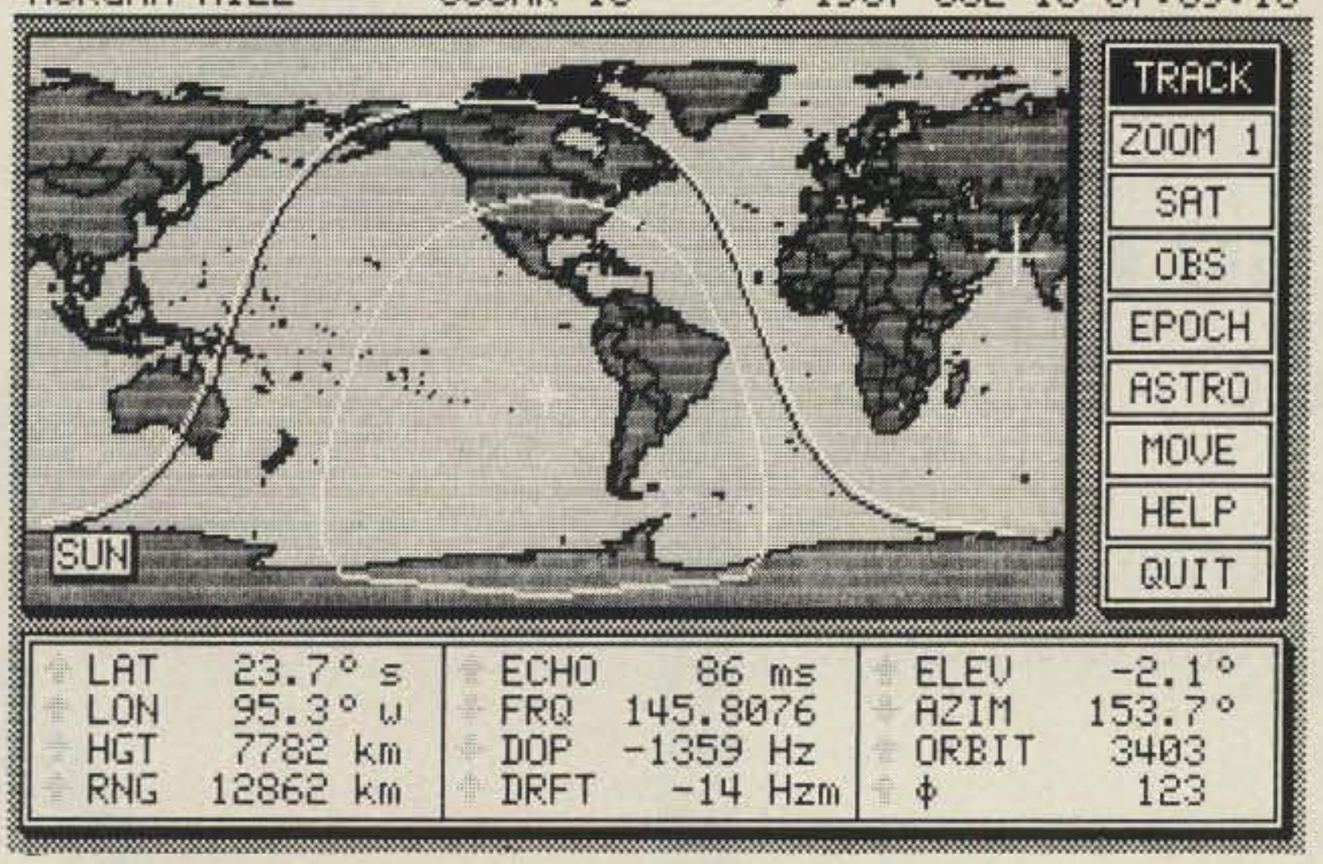
EZ-Speak allows a control operator to completely program and configure the popular ACC RC-85 and RC-850 repeater controllers from a microcomputer keyboard. This ends the time consuming drudgery of programming via a telephone keypad. Options are selected from menus. EZ-Speak even dials and unlocks the repeater. The control operator has the option of programming single-step fashion as well as in a 'batch' mode. EZ-Speak is available for either Commodore 64® or MS DOS® compatible computers. The MS-DOS version requires a Hayes-compatible modem to generate the DTMF codes. EZ-Speak is priced at $39.95. For more information, contact Electron Processing, Inc., PO Box 708, Medford, NY 11763, phone 516-764-9798.



RF Concepts Amplifiers

The two original cofounders of Mirage Communications, Everett L. Gracey, WA6CBA, and Kenneth E. Holladay, K6HCP, have announced the formation of their new company, RF Concepts, "RFC." There are currently five 2 meter amps and one 220 MHz amp available. All are made in the USA and all come with VSWR protection and GaAsFET preamps. RFC amps come with a 5-year warranty and a 6-month warranty on the RF transistors. Additional products being planned include a repeater amplifier, repeater controller, and a dual band 144/440 MHz for an HT.

For more information, contact RF Concepts, 2000 Humboldt St., Reno, NV 89509, or circle number 105 on the reader service card.



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COMMUNICATIONS EQUIPMENT, INC.

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FEATURES INCLUDE:

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- " — NORTHERN OR SOUTHERN HEMISPHERE
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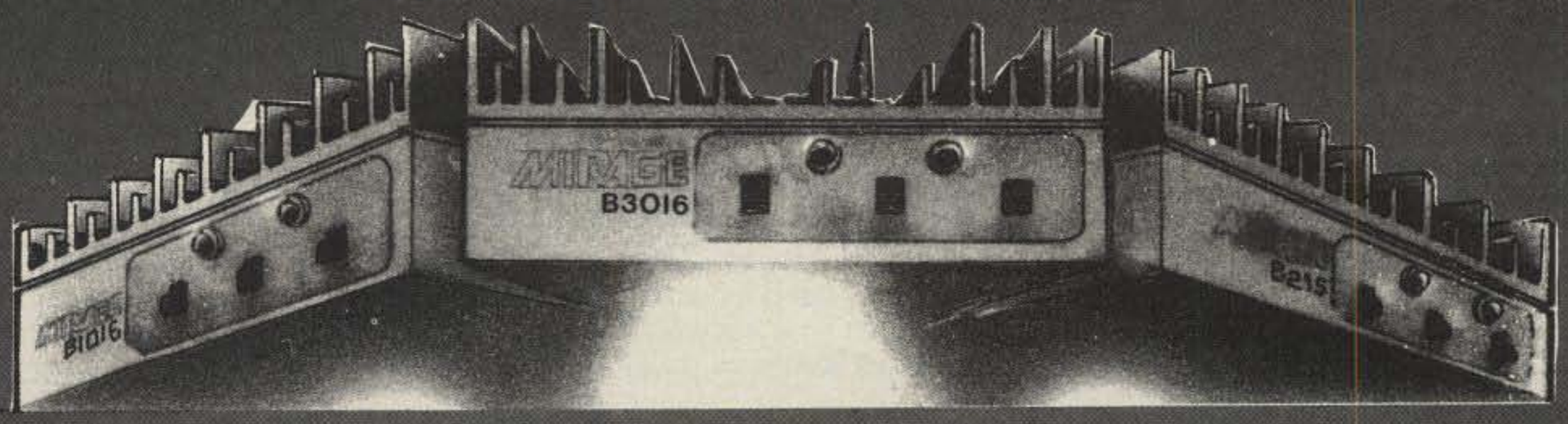

BASE/MOBILE AMPS

2 Meter
B23A - 2W in - 30W out
B108 - 10W in - 80W out
B215 - 2W in - 150W out
B1016 - 10W in - 160W out
B3016 - 30W in - 160W out

1¼ Meter
C22A - 2W in - 20W out
C106 - 10W in - 60W out
C211 - 2W in - 110W out
C1012 - 10W in - 120W out
C3012 - 30W in - 120W out

6 Meter
A1015 - 10W in - 150W out

440 MHz
D24 - 2W in - 40W out
D1010 - 10W in - 100W out
D3010 - 30W in - 100W out

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CIRCLE 3 ON READER SERVICE CARD

Announcing

The 1988 CQ World-Wide 160 Meter DX Contest

CW: January 29–31
Starts: 2200 GMT Fri.

SSB: February 26–28
Ends: 1600 GMT Sun.

Conditions and activity on the 160 meter band are at their maximum. We can expect over 100 active countries on both Phone and CW. Here is your chance to run up your state and country totals in a very short time. The "DX Window" has not been seriously observed for several years. Since many stations could not operate there anyway, the only frequency restrictions are those of your own country. We still encourage Pacific DX to transmit 1907–1912 kHz and specify a listening frequency. W/VE transmission there is counterproductive. Any station can always specify a listening frequency if he so desires.

Classes: Single and multi-operator. Use of a spotting net makes you multi-op.

Exchange: State for U.S., area for Canada, and prefix or country abbreviation for DX having unusual prefixes. Signal reports optional.

Scoring: Contacts with stations in own country, 2 points. Contacts with stations in other countries in same continent, 5 points. Contacts with stations in other continents, 10 points.

Multiplier: Each U.S. state (48), Canadian area (13), and DX country. Maritime Mobiles separated by at least 100 miles. Canadian areas: VO1, VO2, NB, NS, PEI, VE2, VE3, VE4, VE5, VE6, VE7, NWT, Yukon. KH6 and KL7 are considered countries, but not also states. U.S.A. and Canada may not be counted as country multipliers. Maritime mobile points determined by location. ARRL DXCC and WAE country lists and WAC boundaries are the standards.

Final Score: Total QSO points times the sum of all multipliers (States + VE areas + DX countries + Maritime mobiles).

Penalties: Three additional contacts may be deleted for each unacknowledged duplicate or unverifiable contact removed from the log. A second multiplier may be removed for each one lost by the above action.

Disqualification: You may be disqualified for violation of your country amateur radio regulations, unsportsmanlike conduct, or claiming excessive duplicate or false multiplier contacts. If the corrected score without penalties shrinks more than 3% from that claimed, disqualification will be considered. Disqualified stations or operators may be barred from competing in future *CQ* contests for up to three years.

Awards: Certificates to the top scorers in each class, each state, Canadian area, and DX country. Also the following plaques.

	CW	SSB
Single Operator		
World	by K5AAD	by K5AAD
USA	by K4TEA	by K4JRB
Europe	by K4UEE	by N4NX
Africa	by K4SB	by WB4ZNH
S. America	by K4TKM/6	
Asia	by WD4RCO	
Multi-Operator		
World	by N4RJ	Southeastern DX Club

The above plaques may be won by the same station every other year. Winner of a world plaque will not also receive a sub-area one. It will go to the runner-up.

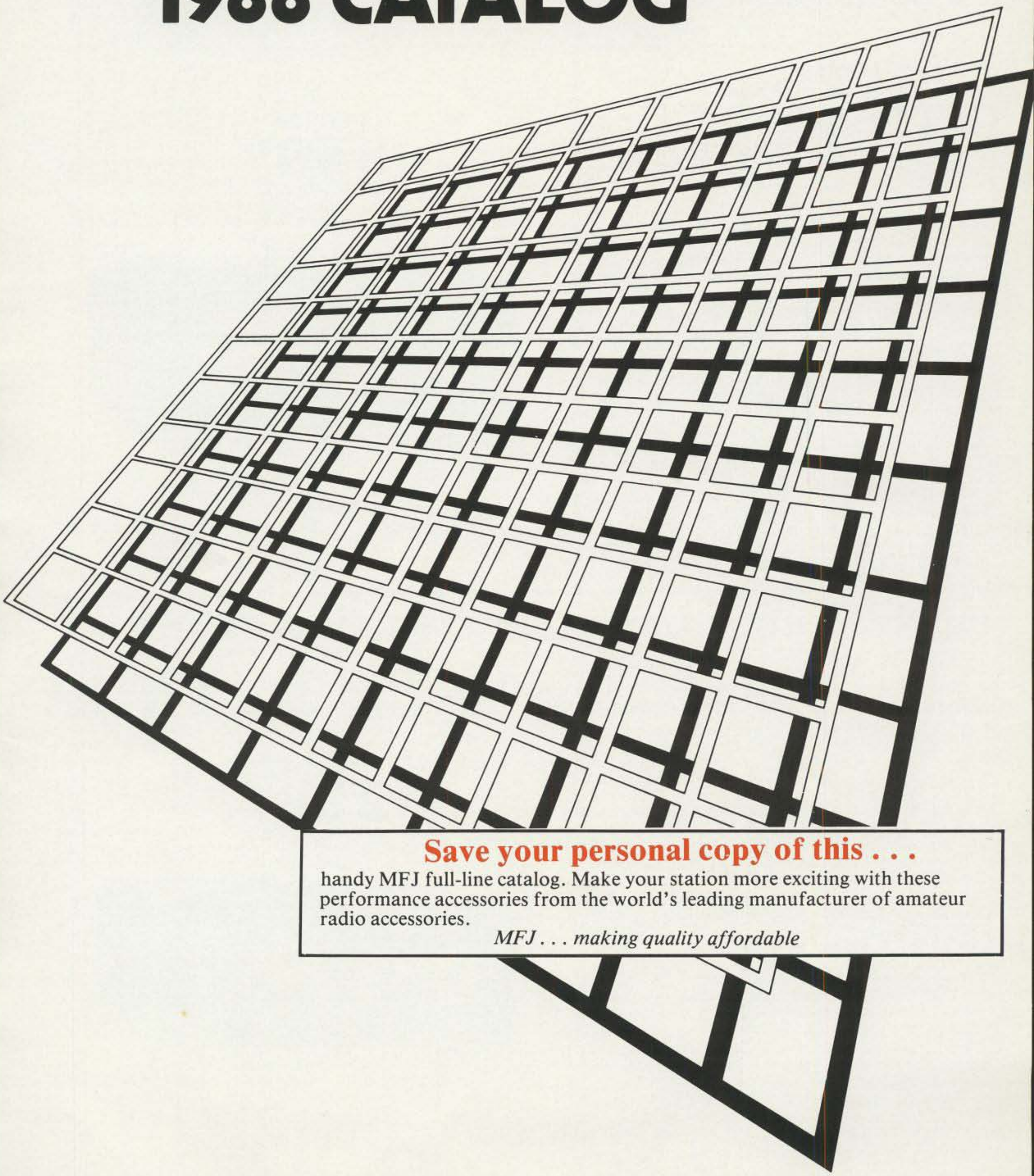
Sample log and summary sheets may be obtained from *CQ* by sending a large SASE with sufficient postage to cover your request. You can make up your own, 40 contacts per page, columns for GMT, exchanges, multiplier, and points. Show the multiplier and its sequential number only the first time it is worked.

Include a summary sheet with your entry showing the scoring and other essential information and a signed declaration that all rules have been observed. Mailing deadline for CW entries is February 28, and March 31 for the SSB section.

Send logs to 160 Meter Contest Director Donald McClenon, N4IN, 3075 Florida Avenue, Melbourne, FL 32904 USA. They may also be sent to CQ 160 Meter Contest, 76 North Broadway, Hicksville, NY 11801. Please indicate CW or SSB on the envelope. CQ

MFJ ENTERPRISES, INC.

1988 CATALOG



Save your personal copy of this . . .

handy MFJ full-line catalog. Make your station more exciting with these performance accessories from the world's leading manufacturer of amateur radio accessories.

MFJ . . . making quality affordable

CROSS-NEEDLE METER ROLLER INDUCTOR TUNER

This compact MFJ Inductor Tuner has everything! Run up to 3 KW PEP and match everything from 1.8 through 30 MHz: coax, balanced lines, random wires. Built-in balun, dual-range cross-needle SWR/Wattmeter. Flexible six position antenna switch. Built-in dummy load.

- ***Roller Inductor***
- ***Built-in Dummy Load***
- ***SWR/Watt Lighted Meter***
- ***Antenna Switch***
- ***Built-in Balun***

MFJ-989B

$349.95

Shipping Code E

Meet "Versa Tuner V". It has all the features you asked for! The new, smaller size matches smaller rigs - only 10¾ x 4½ x 14 7/8. **Matches coax, balanced lines, random wires continuously from 1.8 to 30 MHz.** It features 3 KW PEP, the power rating you won't outgrow (250 pf-6KV caps). **Roller inductor** with a 3 digit turn counter plus a spinner knob for precise inductance control lets you get that SWR down to minimum every time. It has a 4:1 ferrite balun and a built-in 300 watt, 50 ohm dummy load. Cross-needle SWR/Wattmeter in 2 ranges (200/2000 watts). Meter light requires 12 VDC. An optional AC adapter, MFJ-1312, is available. The 6 position antenna switch lets you utilize 2 coax lines through tuner or direct, or random/balanced line or dummy load. MFJ-989B also features SO-239 coax connectors, ceramic feedthru and a binding post ground.

The MFJ-989B has a deluxe aluminum low-profile cabinet with sub chassis for RFI protection. With black finish, black front panel with raised letters, the unit will match any ham shack. Plus a tilt ball for your easy viewing. **One full year limited warranty.**

CROSS-NEEDLE METER 1.5 KW VERSA TUNER III

Run up to 1.5 KW PEP and match everything from 1.8 through 30 MHz: coax, balanced line, random wire. Built-in balun. Dual range cross-needle SWR/Wattmeter. Flexible six position antenna switch.

MFJ-962B

$229.95

Shipping Code E

The MFJ-962B 1.5 KW Versa Tuner III lets you run up to 1.5 KW PEP and match any coax, balanced line or random wire feedline continuously from 1.8 to 30 MHz. This gives you maximum power transfer to your antenna for solid QSOs and attenuates harmonics to reduce TVI and out-of-band emission. Cross-needle SWR/Wattmeter in 2 ranges (200/2000) watts). **Flexible six position antenna switch** lets you select 2 coax lines through tuner or direct or random wire/balanced line and tuner bypass for dummy load. All metal, low profile cabinet gives you RFI protection, durability and sleek styling. This unit has a black finish which features reverse lettering on front panel. It measures 10¾ x 4½ x 14 7/8 inches. A flip down wire stand tilts tuner for your easy viewing.

The MFJ-962B 1.5 KW Versa Tuner III features 4:1 ferrite balun, 250 pf-6K volt capacitors and a 12 position inductor. It has a ceramic rotary switch and 2 percent meter. Every single unit is tested for performance and inspected for quality. Solid American construction from quality components makes this a superb unit. **One full year limited warranty.**

MFJ-949C DELUXE VERSA TUNER II

Buy one of the world's finest 300 watt antenna tuners with features that only MFJ offers like . . . dummy load, SWR, forward reflected power meter, antenna switch, balun. Matches everything from 1.8 through 30 MHz.

- *Lighted Cross-Needle Meter*
- *Built-in Dummy Load*
- *Antenna Switch*
- *Built-in Balun*

The best value ANYWHERE in a 300 watt RF output tuner. Why fool around? Buy the MFJ-949C Deluxe Versa Tuner II and Buy Satisfaction Today!

This is MFJ's best VERSA TUNER II and one of the world's finest 300 watt RF output tuners!

MFJ-949C Deluxe Versa Tuner II gives you a combination of quality, performance, and features that others can't touch at any price. You can run full transceiver power output - up to 300 watts RF output - and match your transmitter to any feedline from 1.8 through 30 MHz whether you have coax, balanced line or random wire. The MFJ-949C utilizes a cross-needle meter so Forward power, Reflected power and SWR can be read simultaneously in either 300 or 30 watts. No SWR sensitivity adjustment is needed. A 200 watt 50 ohm dummy load lets you tune up for maximum performance. A **flexible six position antenna switch** lets you select 2 coax line direct or tuner, random wires or balanced line and dummy load. A **large efficient airwound inductor - 3 inches in diameter** - gives you plenty of matching range and less losses for more watts out.

Packed with outstanding features: a 1:4 balun, 1000 volt capacitors, SO-239 coax connectors and binding post for balanced line, random wire and ground. The unit measures 10 x 3 x 7 inches. Every single unit is tested for performance and carefully inspected to insure top quality. **One year unconditional guarantee.**

MFJ-949C

$149.95

Shipping Code B

MFJ-941D VERSA TUNER II

MFJ's fastest selling 300 watt antenna tuner has SWR/Wattmeter, antenna switch built-in balun. Matches everything from 1.8 to 30 MHz.

- *SWR/Wattmeter*
- *Antenna Switch*
- *Built-in Balun*

MFJ-941D

$99.95

Shipping Code B

The MFJ-941D Versa Tuner II has a new SWR/Wattmeter! It gives you a more accurate reading. Switch selectable 30/300 watt ranges. Read forward or reflected power. Front panel mounted **Antenna Switch.** Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load. The unit has a larger, more efficient, 12 position airwound inductor, which gives lower losses and more watts out. Run up to 300 watts RF power output. It matches everything for 1.8 to 30 MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines. **Built-in 4:1 balun for balanced lines. 1000 volt capacitor spacing.** This unit works with all solid state or tube rigs. Easy to use anywhere!

All metal cabinet is stylish with its brushed aluminum front and black chasis. Measures 11 x 3 x 7 inches. **One year unconditional guarantee.**

MFJ-945C VERSA TUNER II

- ***Gives Maximum Power Transfer***
- ***Harmonic Attenuation***
- ***SWR and Dual Range Wattmeter***
- ***Built-in Balun***

MFJ-945C
$79.95
Shipping Code B

The MFJ-945C Versa Tuner II has a SWR and dual range wattmeter (300 and 30 watts full scale) that lets you measure RF power output for simplified tuning.

You can run up to 300 watts RF output power and match any feedline from 1.8 to 30 MHz: coax, balanced line or random wire.

Gives maximum power transfer. Harmonic attenuation reduces TVI, out of band emmissions. Efficient airwound inductor gives you more watts out than a tapped toroid. **4:1 balun** for balanced lines. 1000 volt capacitor spacing. **Mobile mounting bracket, MFJ-20,** $3.00. SO-239 coax connectors. Binding post. 8 x 2 x 6 inches. Add $2.00 shipping for bracket alone.

MFJ-901B VERSA TUNER

- ***Increases Antenna Bandwidth***
- ***Handles up to 200 Watts RF Output***
- ***Matches Everything from 1.8-30 MHz***

MFJ-901B
$59.95
Shipping Code A

Matches everything continuously from 1.8 through 30 MHz: coax, random wires, balanced lines. **Handles up to 200 watts RF power OUTPUT.** Works with all solid state and tube rigs. **Increases antenna bandwidth.** Operate all bands with a single antenna. Tune out SWR on your mobile whip from inside your car. Efficient air-wound inductor gives more watts out than toroid. SO-239 coax connectors for transmitter and coax. Binding post for random wire, balanced line, ground. 5 x 2 x 6 inches.

MFJ-16010 RANDOM WIRE TUNER

- ***Operates All Bands from 1.8 to 30 MHz***
- ***Ultra Compact Size Fits in your Pocket***
- ***Handles up to 200 Watts RF Output***

MFJ-16010
$39.95
Shipping Code A

Operate all bands - anywhere with any transceiver - using a random wire and an antenna tuner small enough to carrry in your hip pocket. Ultra compact 2 x 3 x 2 inch.

Operate from your apartment with a wall to wall antenna or from a motel room with a wire dropped from a window. Throw a wire over a tree and enjoy ham radio on a camping or backpacking trip. Be prepared for an emergency. Take it on a DX-pedition or Field Day.

Handles up to 200 watts RF output. Match low and high impedances by interchanging input and output. SO-239 connectors.

MFJ-931 ARTIFICIAL RF GROUND

Create an artificial RF ground with the new MFJ-931! It 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!

MFJ-931
$79.95
Shipping Code A

How's your RF ground? Do you have RF "hot spots" that "bite" you when you transmit? Do you have RF feedback that causes your rig to quit working on some bands? Do you have TVI/RFI that makes your neighbors hard to live with? Do you get weak signal reports because of extreme ground losses or radiation pattern distortion?

These problems could be caused by poor RF grounding, especially if your rig is on a second floor with no ground at all. Even if you have a good ground, a long connection wire can ruin its effectiveness by isolating true RF ground from your rig.

The new MFJ-931 creates 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.

The MFJ-931 connects between your rig and a random length of wire or a connecting ground wire. It's tuned for maximum ground current using the built-in RF ammeter. It covers 1.8 to 30 MHz, measures 7½ x 3½ x 7 inches and comes with a one year warranty. It's available only from MFJ.

MFJ DUAL BAND VHF ANTENNA TUNERS

MFJ-920
$49.95
Shipping Code A

MFJ-921
$69.95
Shipping Code A

These new MFJ dual band VHF antenna tuners cover both the popular 2 meter band and the new Novice 220 MHz bands. Now you can quickly and easily tune your antenna for minimum SWR and maximum power output. You'll get cool efficient operation out of your rig while getting maximum range.

Both handle 300 watts PEP and match a wide range of impedances for coax fed antennas. These durable tuners are suitable for both mobile and base operation and have SO-239 connectors for input and output and a wing nut for a ground connection. They come in attractive eggshell white and black aluminum cabinets.

The MFJ-921 is $69.95, has a built-in SWR/Wattmeter and measures 8x2½x3 inches. The MFJ-920 is $49.95 and measures 4½x2½x3 inches.

MFJ "DRY" 300 W and 1 KW DUMMY LOADS

MFJ-262
$64.95
Shipping Code A

MFJ-260
$26.95
Shipping Code A

Air cooled, non-inductive 50 ohm resistor in perforated metal housing with SO-239 connectors. Full load for 30 seconds, derating curves to 5 minutes. **MFJ-260 (300 W).** SWR: 1.1:1 to 30 MHz, 1.5:1 for 30-60 MHz. 2½ x 2½ x 7 inches. **MFJ-262 (1 KW).** SWR 1.5:1-30 MHz. 3 x 3 x 3 inches.

MFJ-10, 3 foot coax with connectors, $4.95.

MFJ *VERSALOAD* KW DUMMY LOAD

MFJ-250
$44.95
Shipping Code D

MFJ-250 VERSALOAD kilowatt dummy load lets you tune up fast. Extends life of transmitter final. Reduces on-the-air QRM. Run 1 KW CW or 2 KW PEP for 10 minutes, ½ KW CW or 1 KW PEP for 20 minutes. Continuous duty with 200 watts or 400 watts PEP. Complete with derating curve. **Quality 50 ohm** non-inductive resistor. **Oil cooled.** Includes high quality industrial grade transformer oil (contains NO PCB). **Low VSWR to 400 MHz.** Under 1.2:1, 0-30 MHz. 1.5:1, 30-300 MHz. 2:1, 300-400 MHz. Ideal for testing HF and VHF transmitters. **SO-239 coax connector.** Vented for safety. Removable vent cap. Has carrying handle. 7½ inches high, 6 5/8 inches diameter.

MOBILE ANTENNA MATCHER

MFJ-910
$19.95
Shipping Code A

This MFJ compact Mobile Antenna Matcher lowers your SWR and provides more power into your mobile whip. For solid signals and more QSOs. Your solid state rig puts out more power and generates less heat.

Matches mobile antennas from 10 through 80 meters. Great for vacation ham operators. Easy plug-in installation. Compact size fits anywhere. 2½ x 2½ x 1½.

MFJ PORTABLE ANTENNA

MFJ-1621
$79.95
Shipping Code A

The **MFJ-1621 Portable Antenna** lets you operate in almost any electrically free area, an apartment, a campsite, a resort hotel, even at the beach. It lets you work **40, 30, 20, 15, and 10 meters** by using a telescoping whip antenna that extends to **54 inches.** The antenna is mounted on a self-standing 6 x 3 x 6 inch durable cabinet. The portable antenna features a built-in antenna tuner, field strength meter and 50 feet of RG-58 coax cable.

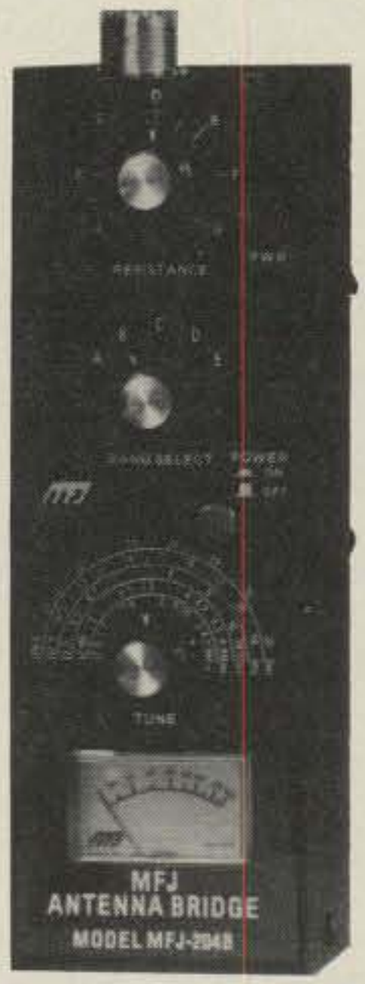
The **MFJ-1621 is *the* complete portable antenna system.** It can be used in practically any location. Just place the antenna in an electircally clear location, set the bandwidth, tune the capacitor for maximum field strength and operate! 5½ x 6¾ x 2¼ inches.

MFJ ANTENNA BRIDGE

The MFJ-204B Antenna Bridge lets you trim your ntenna quickly and easily for its best performance. The ntenna Bridge will give an accurate reading of your ıtenna resistance up to 500 ohms and will cover all ham bands to 30 MHz. When used to measure the resonant frequency of your antenna, you can check to see if the resonant frequency is higher or lower than desired. Then you can lengthen or shorten your antenna based on the information gathered with the MFJ-204B Antenna Bridge. Very easy to use. Just connect the antenna coax lead to the antenna bridge, set the frequency that you desire and adjust the bridge for a null meter reading. Antenna resistance shows on the dial. It's that simple!

MFJ-204B Antenna Bridge also has a frequency counter jack for precise frequency measurement and can be used as a signal generator. The Antenna Bridge is very compact, with all of these great features enclosed in a sturdy 4 x 2 x 4 inch black aluminum cabinet. MFJ-204B operates on a single 9 volt battery or 110 VAC with optional AC adapter, MFJ-1312, $9.95.

MFJ-204B
$79.95
Shipping Code A



MFJ RF NOISE BRIDGE

- ***Measures Resonant Frequency***
- ***Measures Radiation Reactance***
- ***Exclusive Range Extender***
- ***Expanded Capacitance Range***

Great features make this unit hard to beat! Individually hand calibrated resistance scale, expanded capacitance range (+150 pf), built-in range extender gives accurate measurements and much extended measuring range, 1-100 MHz, very simple to use. Comprehensive computer proven manual.

This new **MFJ-202B Noise Bridge** lets you quickly adjust your single or multi-band dipole, inverted vee, beam, vertical, mobile whip or random wire for maximum performance. Tells resonant frequency and whether to shorten or lengthen your antenna for minimum SWR over any portion of a band. This unit works with any receiver or transceiver. 4¼ x 4½ x 2 inches.

MFJ-202B
$59.95
Shipping Code A

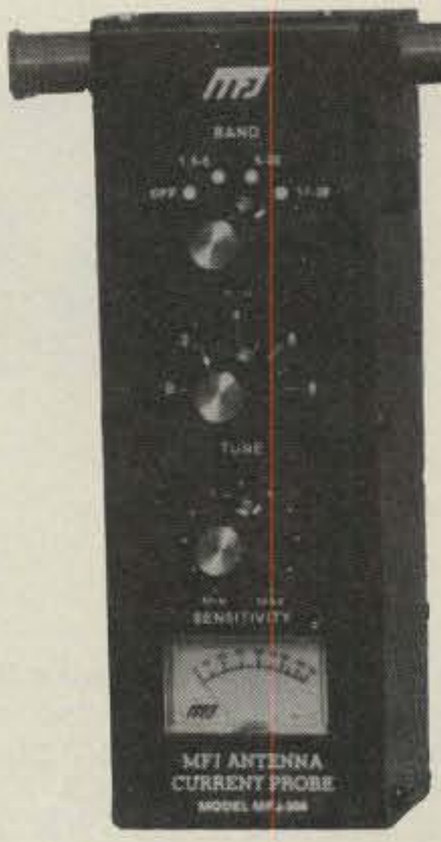
MFJ ANTENNA CURRENT PROBE

This revolutionary MFJ Antenna Current Probe lets you monitor RF antenna currents -- no connections needed! Determine current distribution, RF radiation pattern and polarization of antennas, transmission lines, ground leads, building wiring, guy wires and enclosures.

Indicate transmission line radiation due to high SWR, poor shielding or antenna unbalance. **Detect re-radiation** from rain gutters and guy wires that can distort antenna field patterns. **Detect RF radiation** from ground leads, power cords or building wiring that can cause RFI. **Pinpoint RF leakage** in shielded enclosures. **Locate the best place** for your mobile antenna. **Use** as tuned field strength meter.

Monitors RF current by sensing magnetic field. Uses ın electrostatically shielded ferrite core. FET RF ımplifier, op-amp meter circuit for excellent sensitivity, electivity. 1.8-30 MHz. Has sensitivity, bandswitch, tune ontrols. 4 x 2 x 2 inches.

MFJ-206
$79.95
Shipping Code A



VHF SWR/WATTMETER

MFJ-812
$29.95
Shipping Code A

Now MFJ has a low cost VHF operating aid, the **MFJ-812.** Lets you read SWR from 14 to 170 MHz to monitor antenna and feedlines. Read forward and reflect-ed power at 2 meters (144-148 MHz). 2 scales (30 and 300 watts). Read relative field strength from 1 to 170 MHz. Binding post for field strength antenna. Easy push-button operation: has forward/reflected and SWR/field strength push-buttons. Aluminum eggshell white, black cabinet. 4¼ x 2¼ x2¾ inches. SO-239. 2 color meter scale.

CROSS-NEEDLE SWR/WATTMETER

MFJ-815
$59.95
Shipping Code A

This MFJ-815 Cross Needle SWR/Wattmeter lets you monitor SWR, forward and reflected power at a single glance and it's quality made here in the USA by MFJ.

Read average forward and reflected power in 3 ranges (20/200/2000 watts forward and 2/20/200 watts reflected) and SWR from 1:1 to 6:1 on a 2 color scale. Works from 1.8 to 30 MHz. Accuracy is ±10 percent full scale. Mechanical zero adjustment for meter movement.

Easy push button range selection. Rugged aluminum black cabinet with brushed aluminum front. SO-239 connections. Meter light requires 12 VDC or optional AC adapter, MFJ-1312, $9.95. 6½ x 3¼ x 4¼ inches.

HF SWR/WATTMETER

MFJ-816
$29.95
Shipping Code A

The **MFJ-816 HF/SWR Wattmeter** reads SWR from 1.8 to 30 MHz to monitor antenna and feedlines. Toroidal current pickup for uniform sensitivity.

Read forward and reflected power on 2 scales (30 and 300 watts). Easy push-button operation. Has forward/reflected push button. Sturdy all aluminum egg-shell white and black cabinet. SO-239 connectors. 2 color meter scale. 4½ x 2¼ x3 inches.

2-POSITION COAXIAL SWITCH

MFJ-1702
$19.95
Shipping Code A

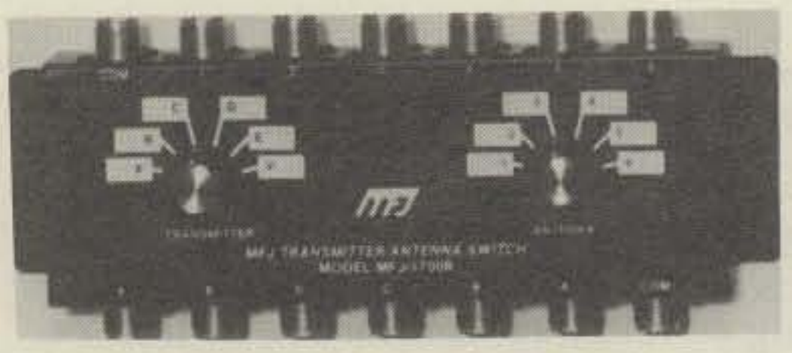
The MFJ-1702 2-Position Coaxial Switch is for 50 ohm systems. It can handle 2.5KW PEP, 1KW CW. It has better than 60 db isolation at 300 MHz and better than 50 db at 450 MHz. The unused terminal is automatically grounded for static/lightning/RF protection. It has low insertion loss, less than 0.2 db and SWR below 1:1.2. The MFJ-1702 has heavy cavity type construction and uses SO-239 connectors. 3 x 2 x 2 inches.

6 POSITION ANTENNA SWITCH

MFJ-1701
$29.95
Shipping Code B

The MFJ-1701 6-Position Antenna Switch allows you to switch between 6 antennas without disconnecting a connector. The MFJ-1701 can be used for 52 to 75 ohm systems, plus handle 2000 watts SSB, 1000 CW. It uses 7 SO-239 connectors with negligible insertion loss and low VSWR. All unused terminals are automatically grounded for static/lightning/RF protection. Convenient mounting holes for desk or wall. 10 x 3 x 1½ inches.

COMBINATION ANTENNA/ TRANSMITTER SWITCH



MFJ-1700B
$59.95
Shipping Code B

If you have more than one rig, this **MFJ-1700B** gives you instant selection of any antenna/transceiver combination.

It contains two high quality rotary switches that allow you to select 1 of 6 antennas and 1 of 6 transceivers in any combination. You can also plug in an antenna tuner, SWR/Wattmeter, linear, etc., so that they are always in the circuit for any combination of antenna and transceiver. **Handles up to the full legal limit** of 2KW PEP for 50-75 ohm loads. All unused inputs and outputs are shorted to ground. Transmitters and antenna switches are separated from each other for high signal isolation. Two heavy duty ceramic rotary switches. 14 SO-239 connectors. Black, all aluminum cabinet. Measures 10 x 3 x 1½ inches.

MFJ-314 220 MHz VHF CONVERTER

Turn your 2 Meter handheld into a hot 220 MHz receiver! Listen in on the new Novice band. Hear new and exciting communications as this important band begins to develop.

This new **MFJ-314 VHF converter** lets you receive 221 to 225 MHz on 2 Meter handhelds that cover 144 to 148 MHz. If your handheld has extended coverage you'll get extended coverage with the MFJ-314 -- simply add 77 MHz to your handheld band limits to determine your coverage.

And you won't miss any 2 Meter calls while scanning the 220 MHz band because you'll simultaneously hear both the 2 Meter and the 220 MHz band!

You'll enjoy scanning, memory, digital readout and other features if they're available on your handheld.

The MFJ-314 mounts between your handheld and your rubber ducky using BNC connectors. A highpass input filter and 2.5 GHz transistor give excellent uniform sensitivity over the entire 220 MHz band. It's crystal controlled and has a Bypass/OFF switch that allows transmitting through the converter. The MFJ-314 is protected from burnout if you transmit (up to 5 watts) with the converter on. It uses a single AAA battery and measures just 2¼x1½x1½ inches.

MFJ-314
$39.95
Shipping Code A

MFJ-280 COMPACT MOBILE SPEAKER

Enjoy crisp, clear audio from this tiny, low cost mobile speaker. The magnetic base lets you put it anywhere and move it anytime. Just unplug the 3.5 mm phone plug, wrap the 30 inch cord around the unit, and slip it into your jacket pocket or glove box. Then, when you're ready to use it again, just plug it in and set it on any metal surface. Leave the screwdriver and splicing tools at home -- **MFJ-280 comes ready to use!** The tilt bracket gives you even more convenience.

It works with all 8 and 4 ohm impedances and handles up to 3 watts of audio. Its dark grey military color matches nearly all rigs. This rugged unit also comes with the famous MFJ one year unconditional warranty and measures just 2½x2x3 inches.

NEW

MFJ-280
$18.95
Shipping Code A

MFJ-284 SPEAKER/MIC

Fits both ICOM and Yaesu Handhelds.

Once you've tried this new **MFJ-284 Speaker/Mic** you'll never want to be without it. You'll be able to comfortably carry your handheld on your belt without ever having to remove it to monitor calls or talk.

You'll never have to turn up your audio annoyingly loud to monitor calls because its handy lapel/pocket clip lets you place it close to your ear for easy listening.

And you'll never have to clumsily remove your handheld from your belt holder to talk because you can conveniently take the speaker/mic in one hand, press its push-to-talk button and talk.

It comes with a lightweight retractable cord that eliminates the "dangling cord problem" and has a connector that fits both Icom and Yaesu handhelds. It features unusually clean audio on both transmit *and* receive. It's an attractive dark grey that matches all handhelds. It sounds good, looks good, works good and is priced right. It comes with the famous MFJ one year unconditional warranty.

NEW

MFJ-284
$29.95
Shipping Code A

MFJ-290 DROP-IN RAPID DESK CHARGER

Works with all ICOM rechargable battery packs

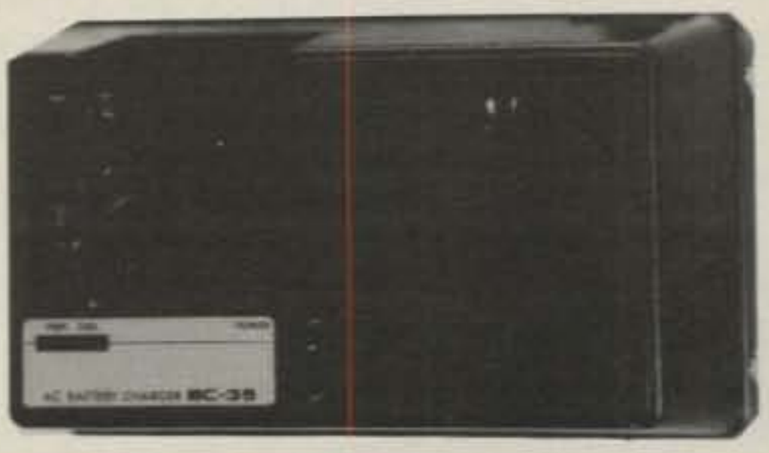
Be prepared! Keep your handheld ready for instant use with the new **MFJ-290 Drop-in Rapid Desk Charger.**

This MFJ battery charger works for all ICOM rechargable battery packs. The IC-u2 series battery packs require the ICOM AD-10 adapter.

It's made of high quality high impact plastic with ventilation holes for cool operation and measures just 7x4x3 inches. It has an ON/OFF switch, power "ON" and charging indicators and operates from 110 VAC.

NEW

MFJ-290
$69.95
Shipping Code B

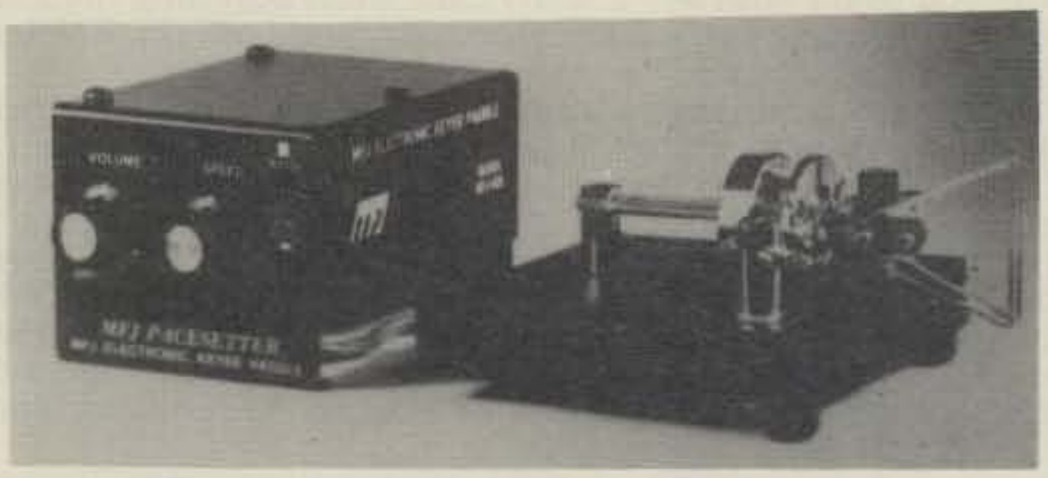


DELUXE MFJ/BENCHER KEYER/PADDLE COMBO

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

MFJ-422B
$129.95
Shipping Code B

MFJ-422BX
$79.95
Shipping Code A



The best of all CW worlds - a deluxe MFJ Keyer in a compact configuration that fits right on the Bencher iambic paddle! You can buy the combination or just the keyer for your Bencher.

MFJ Keyer is small in size, big in features. Curtis 8044ABM IC is adjustable in weight and tone and has front panel volume and speed controls (8-50 WPM). Built-in dot-dash memories. Speaker, sidetone and push button selection of semi-automatic/tune or automatic modes. Ultra-reliable solid state keying: grid-block, cathode and solid state transmitters (-300V, 10 mA max., +300V, 100 mA max.). Fully shielded. Uses 9V battery or 110 VAC with optional adapter, MFJ-1305, $9.95.

Beautiful, functional engineering. The keyer mounts on the paddle base to form a small (4 1/8 x 2 5/8 x 5½ inches) attractive combination that is a pleasure to look at and use.

The Bencher Paddle is a best seller. Fully adjustable gold-plated silver contacts, lucite paddles, chrome plated brass, heavy steel base with non-skid feet.

COMPACT ECONO KEYER

This compact MFJ Keyer gives you dot-dash memories, iambic, automatic, semi-automatic and manual modes. Solid state keying. RF proof.

MFJ-401B
$49.95
Shipping Code A

The MFJ-401B Econo Keyer II is based on the proven Curtis 8044ABM IC Keyer chip.

Sends iambic, automatic, semi-automatic, manual. Use squeeze, single level or straight key.

Iambic operation with squeeze key. Dot-dash insertion. **Semi-automatic "bug" operation** provides automatic dots and manual dashes.

Dot-dash memory, self-completing dots and dashes, jam-proof spacing. Instant start. **RF proof.**

Front panel controls. Smooth linear **speed control.** 8 to 50 WPM. **Volume control** for adjusting built-in side tone. **Tune switch** lets you key transmitter for tuning.

Internal controls: Weight control adjust dot-dash space ratio; makes your signal distinctive to penetrate QRM. **Tone control** for desired side tone pitch.

Ultra-reliable solid state keying: grid-block, cathode, solid state transmitters (-300V, 10 mA max., +300V, 100 mA max.).

Uses 9V battery (not included) or 110 VAC with optional AC adapter, MFJ-1305, $9.95. 4 x 2 x 3½ inches.

DELUXE ELECTRONIC KEYER

Uses the latest Curtis 8044ABM IC. Gives you dot-dash memories, positive and negative weight, volume, tone controls, speaker. Sends iambic, automatic, semi-automatic, manual. Reliable solid state keying. RF proof.

MFJ-407B
$69.95
Shipping Code A

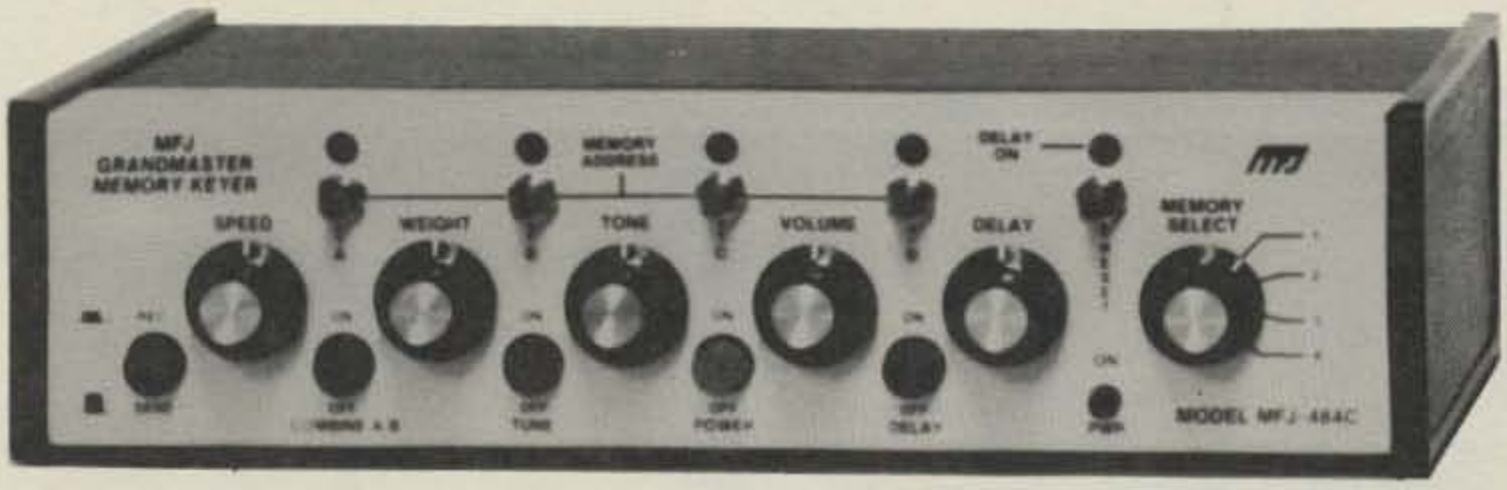
The Deluxe Electronic Keyer sends iambic, automatic, semi-automatic and manual. You can use squeeze, single lever or straight key to send your signal. The MFJ-407B features iambic operation with squeeze key, dot-dash insertion, semi-automatic dots and manual dashes. The keyer also features dot-dash memory, self-completing dots and dashes, jam-proof spacing and instant start keying. A/B switch on rear allows selection of A or B type iambic keying.

Solid state plus and minus keying is provided for use with tube or solid state transmitters. Front panel controls include linear speed, weight, tone and volume controls as well as on/off, tune and semi-automatic switches. Weight control provides positive weight or negative weight. Adjust the dot-dash space ratio, thus making your signal distinctive to penetrate QRM. Tune switch keys transmitter for tuning.

The MfJ-407B is RF proof, has a built-in speaker and uses a 9-volt battery (not included) or 110 VAC with AC adapter, MFJ-1305, $9.95. This hard working product comes in an attractive black aluminum cabinet with a black front plate. It measures 7 x 2 x 6 inches.

MFJ-484C *GRANDMASTER* MEMORY KEYER

All the features you'll ever need . . . So easy to use that you probably won't have to read the instruction manual . . . Lets you send perfect CW!



MFJ-484C
$139.95
Shipping Code A

MFJ Grandmaster series memory keyers make sending perfect CW almost effortless. **MFJ-484C** is so easy to use that you can probably utilize all of its many features without reading the instruction manual.

Controls are logically positioned and clearly labeled. Pots are used for speed, volume, tone and weight because they are easy to use and remember your settings with power off. **Up to twelve-25 character messages** plus a 100, 75, 50 or 25 character message (4069 bits total). A switch combines 25 character messages for up to three 50 character messages. **To record,** just pull out the speed control, touch a message button and send. **To playback,** let out record/send switch, select your message and touch the button. That's all there is to it! You can repeat any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer, simply start sending. LED indicates Delay Repeat Mode. **Instantly insert or make changes** in any playing message by simply sending. Continue by touching another button. **Memory resets** to beginning with button, or by tapping paddle when playing. Touching message button restarts message. **LEDs** show which 25 character memory is in use and when it ends. **Built-in memory saver** uses 9 volt battery, no drain when power is on. Saves message in memory when power loss occurs or when transporting keyer. Ultra compact, 8 x 2 x 6 inches. All ICs in sockets.

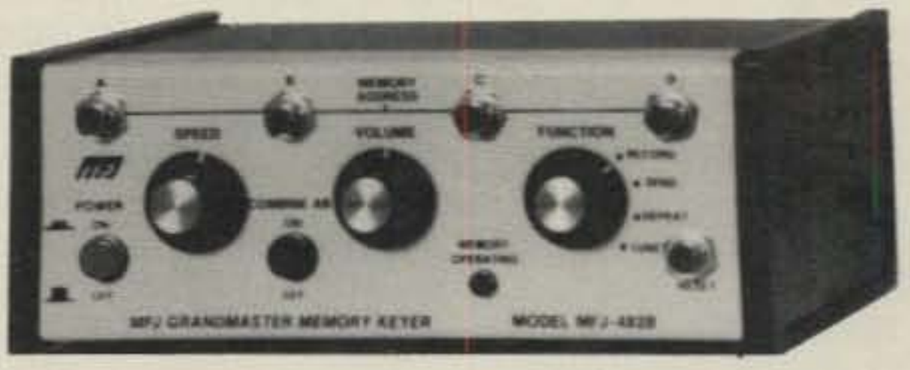
Plus an MFJ Deluxe Full Feature Keyer.

Iambic operation with squeeze key. Dot-dash insertion. **Dot-dash memories,** self completing dots and dashes, jamproof spacing, instant start (except when recording). All controls are on front panel: speed, weight, tone, and volume. Smooth linear speed control. 8 to 50 WPM. **Weight control** lets you adjust dot-dash-space ratio; makes your signal distinctive to penetrate QRM. **Tone control** lets your room fill with volume. Speaker. **Ultra reliable solid state keying:** grid block, cathode, solid state transmitter. (-300 V, 10 mA max., +300 V, 100 mA max.). CMOS ICs, MOS memories. Use 12 to 15 VDC or 110 VAC with optional AC adapter, MFJ-1312, $9.95. Auto-matically switches to batteries when AC power is lost. **Wired Remote Memory Address Board allows control of memory at the paddle, MFJ-75, $14.95.**

MFJ-482B *GRANDMASTER* MEMORY KEYER

Store four-25 character messages or a 50 and two-25 character messages in 1024 bits of memory. **Repeat function** repeats messages. Memory resets with button or paddle. Memory LED. **Memory saver** saves messages when power is lost. Iambic keyer. Dot-dash insertion. **Speed, volume controls** on front. 8 to 50 WPM. **Weight control** for QRM penetration. Tone control for pitch. Speaker. All ICs in sockets. **Tune function keys** transmitter for tuning. **Solid state keying.** 6 x 2 x 6 inches. 12 to 15 VDC or 110 VAC with optional adapter, MFJ-1312, $9.95.

MFJ-482B
$99.95
Shipping Code A



BENCHER IAMBIC PADDLES

Ideal for all MFJ Keyers and Memory Keyers

Bencher Iambic Paddles feature a full range of adjustments in tension and contact spacing, self-adjusting nylon and steel needle bearings, gold plated solid silver contact points that almost never need cleaning, precision machined frame and non-skid feet. "The Ultimate Iambic Paddle." **Black base, BY-1, $61.95; Chrome Base, BY-2, $74.94.**

BY-1
$61.95
Shipping Code A

BY-2
$74.95
Shipping Code A

MFJ DUAL TUNABLE SSB/CW FILTER

lets you zero in SSB/CW signal and notch out interfering signal at the same time. Primary Filter has tunable peak, notch, lowpass, highpass. Auxilary Filter has peak, notch. Noise Limiters for SSB, CW.

MFJ-752C
$99.95
Shipping Code A

The **MFJ-752C Signal Enhancer** is a dual tuanable SSB/CW active filter system that gives you signal processing performance and flexibility that others can't match! For example, you can select the optimum Primary Filter mode for an SSB signal, zero in with the frequency control and adjust the bandwidth for best response. Then, use the Auxiliary Filter to notch out an interfering heterodyne or peak the desired signal. For CW, peak both Primary and Auxiliary Filters for narrow bandwidth to give skirt selectivity that others can't touch. Also, use the Auxiliary Filter to notch out a nearby QSO. The **Primary Filter** lets you peak, notch, lowpass or highpass signals with a double tuned filter for extra steep skirts. The **Auxiliary Filter** lets you notch a signal to 70 db or peak one with a bandwidth down to 40 Hz. Tune both **Primary and Auxiliary Filters** from 300 to 3000 Hz. Vary bandwidth from 40Hz to almost flat. Notch depth to 70 db.

MFJ has solved problems that plague other tunable filters to give you a constant output as a bandwidth is varied. And a linear frequency control. And a notch filter that is tighter and smoother for a more effective notch. **Works with any rig.** Plugs into phone jack. 2 watts for speaker. **Inputs for 2 rigs.** Switch selectable. **Switchable noise limiter** for impulse noise through clipper removes background noise. Use for SWLing as well as SSB and CW. **Speaker and phone jacks.** Speaker is disabled by phones. OFF bypasses filter. Uses 9 to 18 VDC at 300 mA or optional AC adapter, MFJ-1312, $9.95. Measures 10 x 2 x 6 inches.

MFJ SUPER CW/SSB FILTERS

The MFJ-722 "Optmizer" offers razor sharp, no ring CW filtering with switch-selectable bandwidths (80, 110, 150 and 180 Hz centered on 750 Hz), steep-skirted SSB filtering and a 300-3000 Hz tunable 70 db notch filter.

The 8-pole (4 stage) active IC filter gives CW performance that no tunable filter can match. (80 Hz bandwidth gives -60 db response on octave from center and up to 15 db noise reduction.) The **8-pole SSB audio bandwidth** is optimized for reduced sideband splatter and less QRM (375 Hz highpass cutoffs at 2.5, 2.0 and 1.5 KHz, 36 db/octave rolloff).

Versatile, plug into the phone jack, provide 2 watts for speaker or use headphones. Requires 9-18 VDC or 110 VAC with optional adapter, MFJ-1312, $9.95. 5 x 2 x 6.

MFJ-723, $49.95. Similar to MFJ-722. **Less SSB Filter.** 2 x 4 x 6 inches.

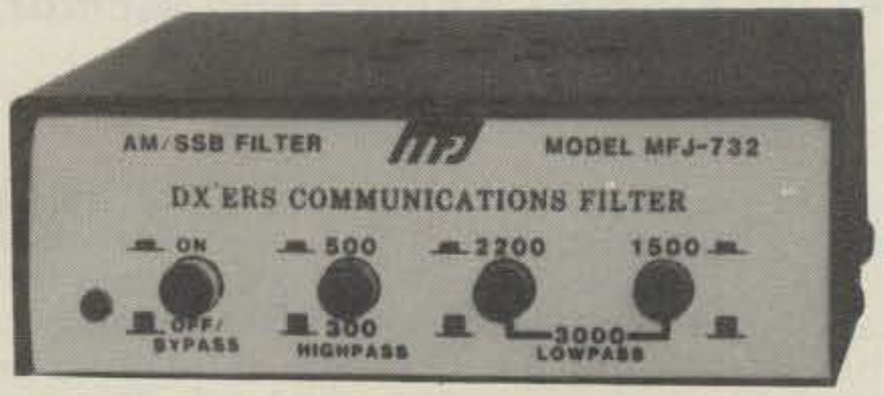
MFJ-723
$49.95
Shipping Code A

MFJ-722
$79.95
Shipping Code A

MFJ DXer's COMMUNICATIONS FILTER

MFJ-732 puts more presence in SSB/AM/FM voice communications, brings more signals out of the "mud" The MFJ-732 is **very easy to use,** just push up to 4 buttons. It has a 10-pole (5-stage) circuit with **Chebyshev superfast roll-off** (up to 58 db/octave). First button: On/Off-Bypass, response 300-3000 Hz; second button: 500 Hz lower cutoff; third: 2200 Hz upper cutoff; fourth: 1500 Hz upper cutoff. **Built-in speaker,** 2 watt amplifier, LED. Use 9-18 VDC or 110 VAC with optional AC adapter, MFJ-1312, $9.95. Measures 5 x 6 x 1 5/8 inches.

MFJ-732
$69.95
Shipping Code A



24/12 HOUR LCD CLOCKS

MFJ 24 hour clocks make your DXing, contesting, logging and SKEDing easier, more precise.

Read both UTC and local time at a glance with the MFJ-108, $19.95, dual clock that displays 24 and 12 hour time simultaneously. Or choose the **MFJ-107, $9.95** single clock for 24 hour UTC time.

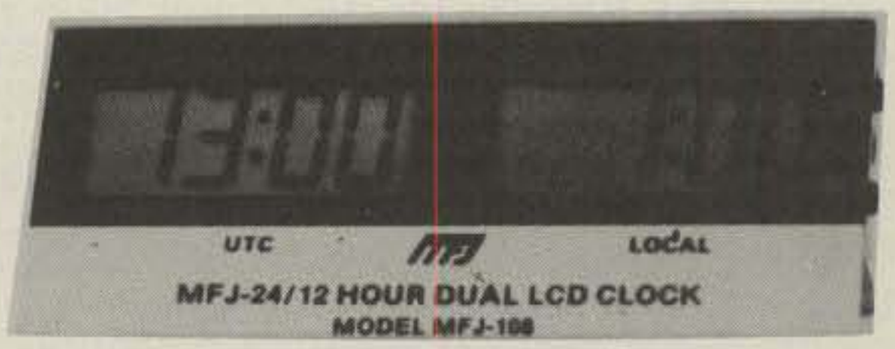
Both are mounted in a brushed aluminum frame, feature **huge, easy-to-see 5/8 inch LCD numerals** and a sloped face that makes across-the-shack reading easy and pleasant.

You can read hour, minute, second, month and day and operate them in an alternating time-date display mode. You can also **synchronize them to WWV** for split-second timing. Both are **quartz controlled** for excellent accuracy.

They are **battery operated** so you don't have to reset them after a power failure, and battery operation makes them suitable for mobile and portable use. Long life battery included. MFJ-108, 4½ x 1 x 2 inches; MFJ-107, 2¼ x 1 x 2 inches.

MFJ-107
$9.95
Shipping Code A

MFJ-108
$19.95
Shipping Code A



C-64/128 CW CODE TUTOR

NEW

This new full feature MORSE Code Tutor Program for the Commodore 64 and 128 not only teaches Morse code but it is also a full fledged **iambic keyer and Morse keyboard!** With the optional $19.95 **MFJ-76 Interface Board** you can plug in an external keyer paddle and key a transmitter or transceiver.

Excellent audio quality and a full menu of features make code learning easier than ever. **Select Random** - -lets you choose the letters you wish to study. **Complete Random** - - sends all alphabet, numbers and punctuation randomly. **Random Message** - - sends a plain English message exactly as given on an FCC test or received on the air. **Message Store** - - lets you enter a message from the keyboard and store for sending. **Direct Keyboard** - -lets you send code directly from your computer keyboard. Use normal CW spacing or the special Farnsworth spacing that sends characters at a fast pace with longer space between characters. A copy of a test similar to an **FCC Novice license test** is included in the manual.

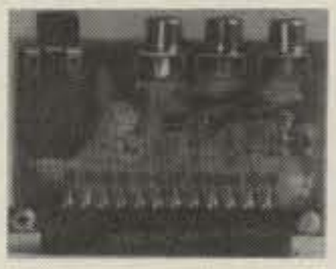
The program is available in disk **(MFJ-1266,$19.95)** or cartridge **(MFJ-1267, $29.95)** versions.

It follows the format of ARRL's "Tune in the World" and can be used with that course or with MFJ supplied code learning course. It is designed for both individual study and classroom use and features **Screen Blanking** for testing purposes. **One year limited warranty.**

MFJ-1266 (disk)
$19.95
Shipping Code A

MFJ-1267 (cartridge)
$29.95
Shipping Code A

MFJ-76 (interface board)
$19.95
Shipping Code A



MFJ VHF CONVERTER

Turn your 2 meter handheld into a hot Police/Fire/Weather scanner with this MFJ VHF Converter.

MFJ-313
$39.95
Shipping Code A

This MFJ VHF converter turns your synthesized scanning 2 meter handheld into a hot Police/Fire scanner on 154-158 MHz with direct frequency readout. Hear NOAA weather, maritime coastal and more on 160-164 MHz. Mounts between handheld and rubber ducky. Feedthru allows simultaneous scanning of both 2 meters and Police/Fire bands. No missed calls. **Highpass input filter** and **2.5 GHz transistor** give excellent uniform sensitivity over both bands. Crystal controlled. **Bypass/Off switch** allows transmitting. Won't burn out if you transmit (up to 5 watts) with convert on. Low insertion SWR. Uses AAA battery. This unit measures 2¼ x 1½ x 1½ inches. BNC connectors. Enjoy scanning, memory, digital readout, etc., as provided by your handheld on Police/Fire band.

MFJ MOBILE VHF CONVERTER

MFJ-312B VHF Converter turns your 2 meter rig into a Police/Fire and Weather band scanner.

MFJ-312B
$59.95
Shipping Code A

Hear exciting Police/Fire calls, weather band, maritime coastal and more on your mobile 2 meter rig.

Scanning rigs become Police/Fire scanners. This ingenious MFJ VHF Converter turns your synthesized or VFO 144-148 MHz FM rig into a hot Police/Fire receiver (154-158 MHz) with direct frequency readout on your rig. Receive weather plus more on 160-164 MHz. **Feedthru** allows simultaneous scanning of both 2 meters and Police/Fire band. No missed calls. Enjoy all benefits of your rig such as squelch, excellent sensitivity, selectivity, stability, limiting, AM rejection. May also be used with handhelds. **Bypass/Off switch** allows transmitting. Won't burn out if you transmit (up to 25 watts) with converter on. Low insertion SWR. **Two MOSFETS (tuned RF amp. mixer),** bipolar crystal oscillator gives excellent performance. **"On" LED.** 9-18 VDC. SO-239 connectors. Mobile mounting bracket. 3 x 4 x 1 inches.

2 METER HANDHELD WATTMETERS

MFJ-840 accurately checks the power output of your 2 meter handheld transceiver. 5 watts full scale. Provides 50 ohm load. BNC connector. 2 x 2¼ x 1½ inches. Black.

MFJ-841. Connects directly in line with your 2 meter HT. Read SWR from 1:1 to 6:1 and forward power to 5 watts. Expanded scale. 50 ohm impedance. BNC connectors. This unit measures 2 x 2¼ x 1½ inches. Black. Switch: SWR, SWR set, power, SWR set pot.

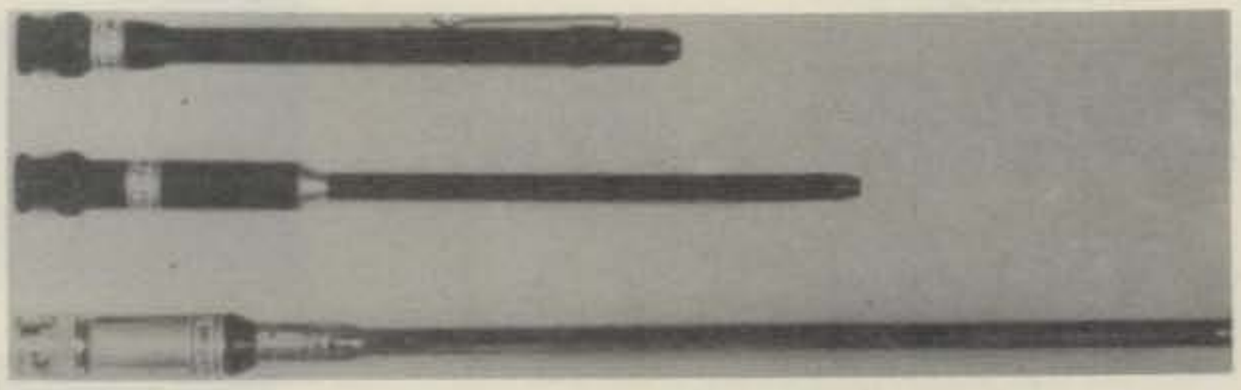
MFJ-840
$19.95
Shipping Code A

MFJ-841
$39.95
Shipping Code A

HANDHELD TELESCOPING ANTENNAS WITH BNC

MFJ-1710
$9.95
Shipping Code A

MFJ-1714
$16.95
Shipping Code A



MFJ-1712
$14.95
Shipping Code A

MFJ-1710, $9.95. Most hams use a rubber ducky on their 2 Meter handheld. They work fine -- for short range. But what about when you are just barely breaking into a repeater? Wouldn't it be nice to slip on a linear that fits in your shirt pocket like a pen and cost only $9.95?

When you're right on the fringe with a noisy signal, try on the MFJ-1710 "pocket linear". It's a 3/8 wave 2 Meter telescoping antenna. You'll get enough gain over a rubber ducky to bring you to full quieting so you can carry on a QSO. It only cost $9.95, has a convenient pocket clip and when collapsed is the size of a ball point pen -- about 5¼ inches -- and 24½ inches fully extended.

MFJ-1714, $16.95. For really long range using a 2 Meter handheld it's hard to beat the MFJ end fed halfwave. It's shorter, lighter, has more gain and places less stress on your antenna connector than a 5/8 wave mounted on a handheld. The MFJ unit works better than a 5/8 wave because a 5/8 wave requires a ground plane to function properly. There is no ground plane on a handheld and a ½ wave does not require one so it works properly and out-performs a 5/8 wave. When collapsed it performs like a rubber ducky.

MFJ-1712, $14.95. This is a very convenient dual band handheld telescoping antenna. It's a ¼ wave for 2 Meters and a 5/8 wave for 440 Mhz. It's 7¼ inches collapsed and 19 inches fully extended.

MFJ-630 CORDLESS PHONE INTERFACE

lets you operate your HF rig remotely by plugging into the base unit of your cordless telephone!

MFJ-630
$39.95
Shipping Code A

Use your cordless phone to operate your HF rig **remotely!**

Wouldn't it be fun to operate the HF transceiver in your ham shack from your living room as you relax watching the evening news? Or how about operating your HF rig while mowing grass, raking leaves or shoveling snow?

MFJ's new cordless phone interface lets you use your cordless phone to remotely operate your rig!

For remote operation, you simply plug the base unit of your cordless phone and the microphone input and speaker output of your transceiver into the MFJ-630 cordless phone interface.

Then with your cordless phone you can operate your rig using VOX anywhere within range of your cordless phone.

Isn't that neat?

You can have remote operation for only $39.95 plus shipping and handling!

The MFJ-630 comes with the famous MFJ full one year unconditional warranty and, if you're not satisfied for any reason, you can return it within 30 days for a full no hassle refund (less shipping and handling) if you order the MFJ-630 directly from MFJ.

It's a tiny 3x4x1 inches, has a modular jack for plug-in connection to the cordless phone base unit and RCA jacks for speaker and microphone connection to your transceiver. You must use VOX operation. The MFJ-630 does not provide remote tuning.

ALL BAND XCVR PRESELECTOR

MFJ-1040B
$99.95
Shipping Code A

Copy weak signals with the **MFJ-1040B Transceiver/ Preselector!**. Rejects out-of-band signals, images. Reduces cross modulation overloading. Excellent signal to noise ratio. **Continuous 1.8 to 54 MHz:** all HF amateur, shortwave bands. Up to 20 db gain. Gain control. Dual gate MOSFET, bipolar transistors for low noise, high gain. **Push button switches** for 20 db attenuator. ON/OFF BYPASS, 2 antennas, 2 receivers. **Dual coax and phone jacks** for antennas, receivers. RF sensing relay automatically bypasses preselector when transmitting up to 350 watts input. Delay control. Jack for push-to-talk. LED. 8x2x6 in. 9-18 VDC or 110 VAC with AC adapter, MFJ-1312, $9.95.

MFJ-1045, $69.95. Same as MFJ-1040, less attenuator, xcvr auto bypass, delay control, PTT

DELUXE HYBRID PHONE PATCH

MFJ-624B
$69.95
Shipping Code A

MFJ-624B Telepatch II gives you crisp, clear, hum-free audio. Use the VOX or push-to-talk. RF pi-filters and PC Board construction eliminate RF feedback. Works with any rig.

VU meter monitors phone line levels to prevent crosstalk, lets you adjust null depth for maximum isolation between receiver and transmitter. **Transmitter and receiver gain controls** eliminate readjusting rig's controls after patching. **Tri-Function switch** gives you OFF for normal operation. **ON** that connects your rig to phone line for patching and **NULL** to let you adjust for maximum null. Simple **2 cable installation** (plus phone line) when rig has patch-in-patch-out jacks. MFJ includes **phone jacks** for patch-in-patch-out, speaker and microphone. Modular phone jack for phone lines. Measures 8 x 2 x 6 inches.

CODE OSCILLATOR

MFJ-555B
$24.95
Shipping Code A

Send clear code with plenty of volume for classroom use. Self-contained speaker with volume/tone controls, aluminum cabinet, 9 volt battery. 555 IC timer. 2 3/16 x 3¼ x 4 inches.

MICROPHONE EQUALIZER

MFJ-550
$49.95
Shipping Code A

The MFJ-550 Microphone Equalizer greatly improves transmitted SSB speech for maximum talk power, evens out speech peaks and valleys to produce cleaner speech on the receiving end and improves mobile operation.

Plugs between microphone and rig. Features include: bass, midrange and treble variable controls that provide a ±12 db boost or cut at 490, 1170 and 2800 Hz; a microphone gain control and an on/off/bypass switch with "on" LED. Bypass switch connects microphone directly to rig. Aluminum cabinet. 9-volt battery, 12 VDC or 110 VAC with AC adapter, MFJ-1312, $9.95.

RS-232 INTERFACE for C-64/VIC-20

MFJ-1238
$39.95
Shipping Code A

Provides RS-232 voltage conversion for VIC-20/C-64 serial port. Use RS-232 printers, modems and other RS-232 peripherals. Switch reverses transmit/receive lines for DTE or DCE operation. Use as null Modem. 25 pin RS-232 connector. Plugs into user's port. Powered by computer. 2¼ x 2¼ inches.

CAPACITANCE METER for VIC-20

MFJ-1258
$29.95
Shipping Code A

Measure 100 pf to 100 Mfd. Includes calibration capacitor, software on tape and hardware interface. **A great buy.**

NEW SW/MW/LW PRESELECTOR/TUNER

MFJ-956
$39.95
Shipping Code A

This new MFJ-956 short, medium, long wave preselector/tuner lets you boost your favorite station while rejecting images, intermod and other phantom signals on your shortwave receiver! It greatly improves reception of 150 KHz thru 30 MHz signals, especially those below 2 MHz.

Connects between receiver and antenna. Has tuner bypass and ground receiver positions. 2 x 3 x 4 inches.

54" OUTDOOR ACTIVE ANTENNA

This 54 inch Active Antenna eliminates outside long wire antennas. Puts you in business where space is a problem. Mount it anywhere, atop houses or apartments, on board ships. Use it with any radio to receive strong, clear signals from all over the world **without an outside long wire antenna.** So powerful that it often **outperforms long wires hundreds of feet long!**

Covers all waves from 50 KHz to 30 MHz, **and all frequencies from VLF thru lower VHF: long wave, medium wave, broadcast and shortwave bands.** Mount away from electrical noise for maximum signal and minimum noise pickup. A very high, dynamic range, impedance transforming amplifier module **eliminates intermodulation.** Hear only the signals that are there.

The control unit has a 20 db attenuator and gain control **to prevent receiver overload.** A receiver switch selects between 2 receivers and an antenna switch selects an auxiliary antenna. LED indicates power "ON". **MFJ-1024 comes complete and ready to use with a 50 foot coax cable and hardware.**

The control unit is 6 x 2 x 5 inches and the remote unit is 3 x 2 x 4 inches with the 54 inch whip antenna mounted onto it. Use 12 VDC or 110 VAC with optional AC adapter. MFJ-1312, $9.95.

MFJ-1024
$129.95
Shipping Code B

INDOOR ACTIVE ANTENNA

"World Grabber". Put this handsome unit on your operating desk and listen to the world! Its performance rivals reception from outside long wire antennas.

Unique tuned circuitry minimizes intermodulation, provides additional RF selectivity and reduces noise outside the tuned band. Amplification also permits using the **MFJ-1020A** as a preselector with an external antenna for added versatility. **Cover 300 KHz to 30 MHz in 5 bands.** Switch select .3 - .7, .7 - 1.6, 1.6 - 4, 4 -11, 11 - 30 MHz. The **adjustable telescoping antenna** gives you maximum signal, minimum noise. **Full controls** for tuning, band selection, gain and function (On-Off/Bypass). LED indicator. FET, bipolar circuitry. Phono jack provided for use with external antenna. **Universal power.** Operates on 9 V battery (not included), 9-18 VDC power supply, or 110 VAC with AC adapter, MFJ-1312, $9.95.

This handsome black metal cabinet with a brushed aluminum front panel easily fits on your desk. Measures 5 x 2 x 6 inches. Wherever you live, city apartment or country home, the MFJ-1020A will grab the SWL world for you!

MFJ-1020A
$79.95
Shipping Code A

MOBILE SW CONVERTERS

MFJ-304
$79.95
Shipping Code A

MFJ-308
$99.95
Shipping Code A

Another MFJ "first"! These low cost mobile shortwave broadcast converters provide new excitement and variety for your driving/listening pleasure.

MFJ has two models for you to choose from! The 4-band "World Explorer I" (MFJ-304) offers complete 19, 25, 31 and 49 meter coverage. These are the most popular HF bands due to their extraordinary distance capabilities at various times of the day and the year. Hear countries from Europe, Africa, the Middle East, Asia, Island Nations, North and South America! And the 8-band "World Explorer II" (MFJ-308) adds 13, 16, 41 and 60 meter bands for even greater listening variety.

MFJ RECEIVER ANTENNA TUNER/PREAMPLIFIER

MFJ-959B
$89.95
Shipping Code B

The MFJ Receiver Antenna Tuner/Preamplifier will match your antenna to your receiver for maximum signal from 1.8 to 30 MHz. The MFJ-959B utilizes a **low noise 20 db preamplifier** to boost weak signals. It also has a 20 db attenuator built-in to help receivers plagued with overload problems from strong signals.

The MFJ-959B can connect two receivers to two antennas with either SO-239 connectors or RCA phono jacks for convenience. Select between tuner-attenuator, tuner, tuner with preamp and bypass. Gain control for boosting signal. Measures only 9 x 2 x 6 inches. 9-18 VDC or 110 VAC with optional AC adapter, MFJ-1312, $9.95.

OUR GUARANTEE

Gives You Two-way Protection

UNCONDITIONAL WARRANTY

MFJ Enterprises, Inc. has the strongest warranty in the Ham Radio industry. All products (except as noted) manufactured by MFJ are unconditionally guaranteed for one year from the date of purchase. This means that we will repair or replace (at our option) any product that fails or is defective for any reason.

MONEY-BACK GUARANTEE

You are not taking a chance when you buy from MFJ Enterprises, Inc. Order any product directly from MFJ and try it in your own setup -- compare it to any other product on the market regardless of price. Then if you are not completely satisfied, simply return it within 30 days for a prompt and courteous refund (less shipping). So order today and try it -- you'll be glad you did.

For Your Nearest MFJ Dealer or To Order By Telephone: Call Toll Free **800-647-1800** and charge it to your MasterCard or VISA, or have us send it COD within the continental USA. Inside Mississippi or outside of the continental USA call **601-323-5869.** Call Monday - Friday between 8 A.M. and 4:30 P.M. CST. **Telex: 53-4590 MFJ STKV.**

To Order By Mail: Send your order along with your check, money order or VISA/MasterCard number and expiration date. Mail to: **MFJ Enterprises, Inc., Box 494, Mississippi State, MS 39762.**

Foreign Orders: Orders outside the USA and Puerto Rico must include payment in U.S. funds, check on U.S. bank, International money order or International VISA or MasterCard. Orders shipped airmail unless other instructions are given.

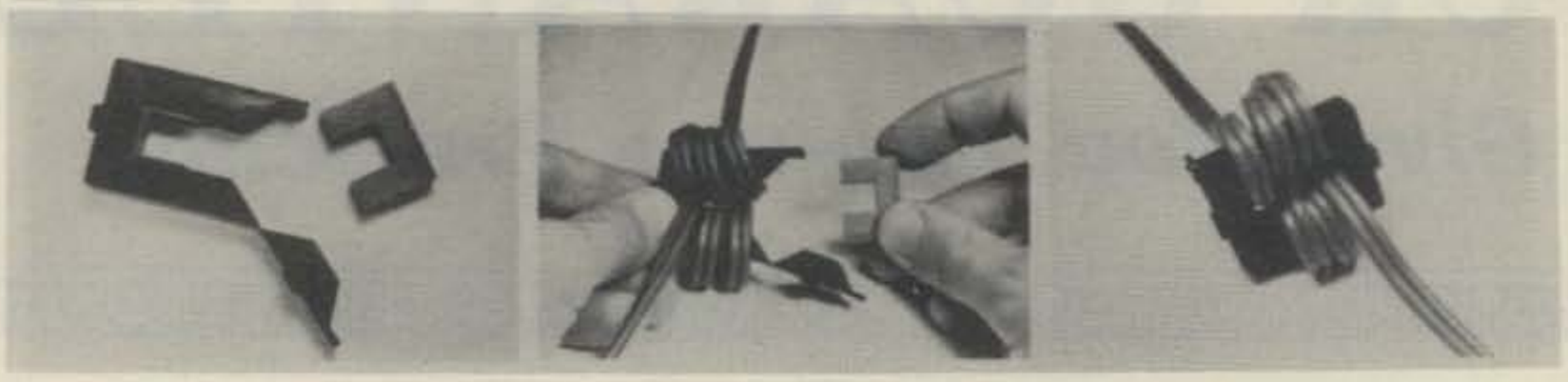
Price Chart for Shipping Charges

Shipping Code	UPS	Parcel Post	Canada	Outside U.S.
A	4.00	4.00	5.00	25.00
B	5.00	6.00	7.00	*Quoted
C	5.00	7.00	9.50	*Quoted
D	6.00	9.00	10.50	*Quoted
E	10.00	15.00	22.00	*Quoted

***Quotes must be obtained for codes B thru E going outside the U.S.A.**

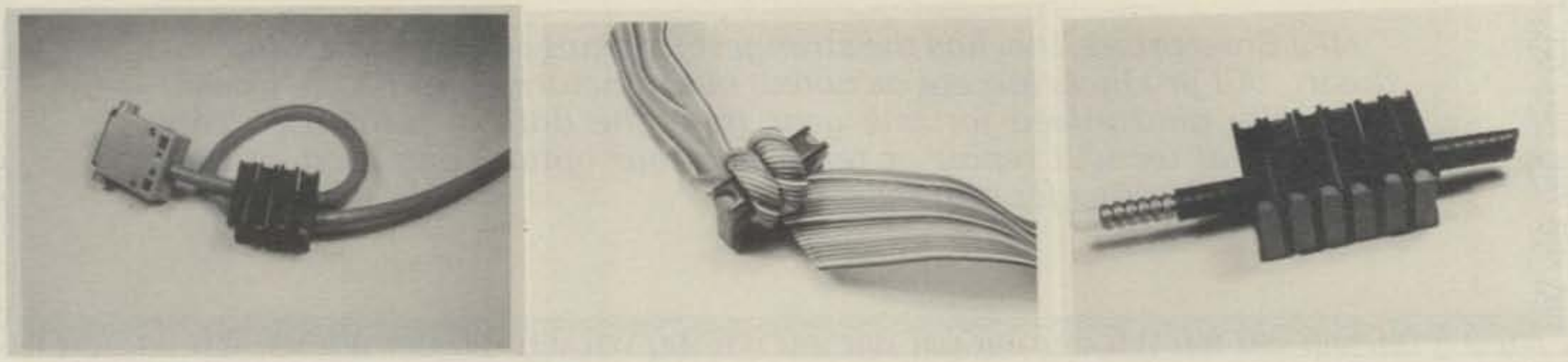
MFJ-701 RFI-FREE CHOKE KIT

Eliminates RFI Easy As . . .



MFJ-701
$14.95
Shipping Code A
Package of Four (4)

One . . . Two . . . Three!



Versatile . . . Stackable . . . Works with all kinds of cables!

Everyone seems to have RFI problems of some kind that affect TVs, radios, stereos, telephones, VCRs, computers, PA systems, burglar and fire alarms, test equipment, modems, monitors and other electronic devices.

The new **MFJ-701 RFI-Free Choke Kit** makes it easy to eliminate common RFI problems. It's based on the proven and highly effective technique of winding the offending cable or wire around a ferrite toriod to choke off and eliminate RFI.

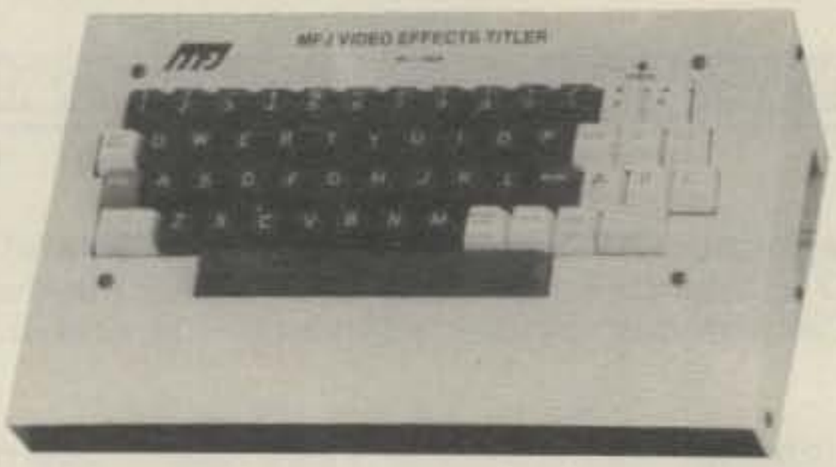
The problem has been finding a toriod with the proper characteristics -- one that actually eliminates RFI -- and one that has a big enough hole to pass through the end of a power cord or AC adapter or microphone cord or speaker leads, etc.

The **MFJ-701 RFI Free Choke Kit** gives you four square toriods that have the right properties for eliminating RFI from .5 to 200 MHz. Each toriod separates into halves and mounts in a tough snap-together plastic frame. This makes it easy to wind around the toriod nearly any kind of wire or cable. For example, computer ribbon cable, coax cable or a power cord with an AC adapter on its end can be wound around the toroid easily. The individual toriods also snap together into a stack. This increases effectiveness for large diameter wires where only a few turns can be used and for rigid cables where the cable is simply passed through a stack of toriods.

Full instructions are provided and installation is easily accomplished within minutes. Order today and eliminate RFI!

VIDEO EFFECTS TITLER

MFJ-1480B
$599.95
Shipping Code D



The **MFJ-1480B Video Effects Titler (VET)** lets you superimpose color titles over a camera image or add titles to existing video footage while editing. Each page will display eight lines of 28 small or 14 large characters in upper and lower case with each line and page in one of 15 colors. The VET retains up to 30 pages of titles in memory, even if power is lost or turned off. It also has direct page access, scrolling and auto centering .

And because it is expandable, *the VET is never outdated.* An external port lets you plug in creative add-on cartridges coming from MFJ that permit special effects, more fonts, flashing, logos, other languages and more!

An optional RS-232 interface (MFJ-1481, $169.95) lets you interface with personal computers. With some programming you can superimpose animated graphics, stored text and countless other effects from an IBM, Apple, Tandy, Commodore and other PCs. You're only limited by your imagination.

All this technology for only $599.95!

ADVANCED VIDEO PROCESSOR

MFJ-1452
$299.95
Shipping Code D

The **MFJ-1452 Advanced Video Processor** greatly improves video dubbing and transfer of movies and slides to videotape. Invert video for viewing or transferring negative film or slides to video tape. Separate luminace (brightness) and chrominance (color) invert switches. **Enhance contrast** by expanding/compressing white and black levels with independent white stretch/destretch and black pedestal controls. **Luminance level meter** will help you accurately set brightness level for professional results. **Unique switch** reverses playback/record VCRs for recording on either. **Color processor** has tint, color intensity, brightness controls. Corrects off-color video, boosts faded color, improves scenes that are too dark or too light. **Split screen image enhancer** brings out detail, makes fuzzy video sharp and clear, gives simultaneous on-screen comparison of enhanced/ unenhanced picture. Noise cancel reduces picture noise. **Automatic stabllizer** stops picture roll and jitter caused by copyguarded tapes. Gives rock stable picture for viewing. ***Warning:*** *Duplicating copyrighted material may be in violation of Federal or State Law.* **3 output** video/audio distribution amplifier. **2 input selector,** sync boost minimizes picture bending/tearing, bypass, separate RF modulator for TV. 110 VAC or 12 VDC 14 x 2 x 8 inches.

MFJ RTTY/ASCII/AMTOR/CW COMPUTER INTERFACE

MFJ-1224

$99.95

Shipping Code B

Complete package includes MFJ-1224, cable, software on disk for C-64/VIC-20.

Use your personal computer as a full featured RTTY/ASCII/AMTOR/CW station for sending and receiving with the **MFJ-1224 RTTY/ASCII/AMTOR/CW Computer Interface!**

It plugs between your rig and most personal computers. **Uses Kantronics and most other RTTY/CW software with nearly any personal computer.**

A 2 LED tuning indicator system makes tuning fast, easy and positive. Distinguish between RTTY/CW without even hearing it. Allows you to copy any shift and any speed (5 to 100 WPM on RTTY/CW and up to 300 baud on ASCII). **Copies on both mark and space,** which greatly improves copy under adverse conditions. A sharp **8 pole active filter** for 170 Hz shift and CW allows good copy under adverse signal conditions. Automatic noise limiter helps suppress static crashes. **Normal/Reverse switch** eliminates retuning while stepping through various RTTY speeds and shifts. The **demodulator** will even maintain copy on a slightly drifting signal. **A +250 VDC loop output** is available to drive your RTTY machine. Convenient speaker output jack. **Phase continuous AFSK transmitter tones** are generated by a clean, stable Exar 2206 function generator. Standard space tones of 2125 Hz and mark tones of 2295 and 2975 Hz are generated. A set of microphone lines is provided for AFSK out, AFSK ground, PTT out and PTT ground. **FSK keying. High voltage grid block and direct outputs** for CW keying. CW transmit LED. There is also an external hand key or electronic keyer input jack. In addition to the Kantronics compatible socket, an exclusive general purpose socket allows interfacing to nearly any personal computer with most appropriate software. (Some computers with some software may require external components.) **TTL compatible lines:** RTTY demod out, CW demod out, CW-ID input, +5VDC ground. Signal lines are buffered and can be inverted using an internal DIP switch. IC regulated DC voltages give stable AFSK tones and RTTY/ASCII/CW reception.

Aluminum cabinet. Brushed aluminum front panel. 8 x 1¼ x 6 inches. 12-15 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ-1223, RS-232 adapter for MFJ-1224, $29.95.

MFJ RTTY/ASCII/AMTOR/CW DELUXE COMPUTER INTERFACE

MFJ-1229

$179.95

Shipping Code B

Complete package includes MFJ-1229, cable, software on disk for C-64/VIC-20.

Engineering, performance, value and features set MFJ's most advanced RTTY/ASCII/AMTOR/CW computer interface apart from all others. **FM (limiting) mode** gives easy, trouble free operation. **AM (non-limiting) mode** gives superior performance under poor signal conditions. **Crosshair mark-space LED tuning array** simulates scope elipse for easy, accurate tuning. Mark and space outputs for true scope tuning. **Transmits on 170 Hz and 850 Hz shift. Built-in RS-232 interface.** Copy any shift between 100 and 1000 Hz and any speed (5-100 WPM RTTY/CW and up to 300 baud ASCII). Push button for 170 Hz shift. **Sharp multi-pole mark and space filters** give true mark-space detection. Ganged pots give space passband tuning with constant bandwidth. Trim pots adjusted for optimum filter performance. **Multi-pole active filters** for prelimiter, mark, space and post detection filtering. Automatic threshold correction. Gives good copy under QRM, weak signal and selective fading. **Sensitivity control. Normal/Reverse switch** eliminates retuning while checking for inverted RTTY. Speaker jack. +250 VDC loop output. **Exar 2206 sine wave generator** gives phase continuous AFSK tones. Standard 2125 Hz mark and 2295/2975 Hz space. Microphone lines: AFSK out, AFSK ground, PTT out, PTT ground. **FSK keying.** Sharp 800 Hz CW filter, plus and minus CW keying and external CW key jack. **Kantronics software compatible socket. Exclusive TTL/RS-232 socket** allows interfacing to most personal computers with most appropriate software. Available TTL/RS-232 lines: RTTY demod out, CW demod out (TTL only), CW-ID in, RTTY in, PTT in, key in. Signal lines are buffered and can be inverted with internal DIP switch.

Metal cabinet. Brushed aluminum front. 12½ x 2½ x 6 inches. 18 VDC or 110 VAC with optional AC adapter, MFJ-1312, $9.95. **Plugs between rig and computer. Uses MFJ, Kantronices, AEA and other RTTY/ASII/AMTOR/CW software.**

RECEIVER ONLY INTERFACE

MFJ-1225

$69.95

Shipping Code A

Use your computer and communications receiver to receive commercial, military and amateur RTTY/ASCII/AMTOR/CW traffic with the **MFJ-1225 Universal Receiver Only SWL RTTY/ASCII/AMTOR/CW Computer Interface.**

It plugs between your receiver and and most personal computers. Use Kantronics, AEA and other RTTY/ASCII/AMTOR/CW software. Copies all shifts and all speeds. Twin LED indicators make tuning fast, easy and positive. In addition to the Kantronics compatible socket, a general purpose socket provides RTTY out, RTTY inverted out, CW out, CW inverted out, ground and +5 VDC for interfacing to nearly any personal computer. Normal/reverse switch eliminates tuning for inverted RTTY. **Audio in, speaker out jacks.** Includes cable to interface MFJ-1225 to VIC-20 or Commodore 64. 4½ x 1¼ x 4¼ inches. 12-15 VDC or 110 VAC with AC adapter, MFJ-1312, $9.95.

SUPER RTTY FILTER

MFJ-725

$39.95

Shipping Code A

This Super RTTY Filter greatly improves copy under crowded, fading and weak signal conditions. Improves any RTTY receiving system. 8 pole bandpass active filter for 170 Hz shift (2125/2295 Hz mark/space). 200 or 400 Hz bandwidths. Automatic noise limiter. Audio in, speaker out jacks. On/off/bypass switch. "ON" LED. 12 VDC or 110 VAC with AC adapter, MFJ-1312, $9.95. 3 x 4 x 1 inch aluminum cabinet.

MFJ-1274 lets you work VHF and HF packet with built-in tuning indicator for $169.95 . . .

. . . you get MFJ's latest clone of TAPR's TNC-2, TAPR's VHF/HF modem and built-in tuning indicator that features 20 LEDs for easy precise tuning

MFJ-1274
$169.95
Shipping Code B

MFJ-1270B
$139.95
Shipping Code B

Now you can join the exciting world of packet radio on both VHF and HF bands with a precision tuning indicator . . . for an incredible $169.95!

You get MFJ's top quality clone of the highly acclaimed industry standard TAPR TNC-2. We've made TAPR's modem selectable for both VHF and HF operation, added their precision 20 segment LED tuning indicator, a TTL serial port, an easily replaceable lithium battery for memory back-up and put it all in a new cabinet.

If you don't need the tuning indicator or the convenience of a switchable VHF/HF modem, choose the affordable MFJ-1270B for $139.95.

All you need to operate packet radio is a MFJ-1274 or MFJ-1270B, your rig, and any home computer with a RS-232 serial port and terminal program.

If you have a Commodore 64, 128, or VIC 20 you can use MFJ's optional Starter Pack to get on the air immediately. The Starter Pack includes interfacing cable, terminal software on disk or tape and complete instructions . . . everything you need to get on packet radio. Order MFJ-1282 (disk) or MFJ-1283 (tape), $19.95.

Unlike machine specific TNCs you never have to worry about your MFJ-1274 or MFJ-1270B becoming obsolete because you change computers or because packet radio standards change. You can use any computer with an RS-232 serial port with an appropriate terminal program. If packet radio standards change, software updates will be made available as TAPR releases them.

Also speeds in excess of 56K baud are possible with a suitable external modem! Try that with a machine specific TNC or one without hardware HDLC as higher speeds come into widespread use.

You can also use the MFJ-1274 or MFJ-1270B as an excellent but inexpensive digipeater to link other packet stations.

Both feature AX.25 Level 2 Version 2 software, hardware HDLC for full duplex, true Data Carrier Detect for HF, multiple connects, 256K EPROM, 16K RAM (expandable to 32K with optional EPROM), simple operation, socketed ICs plus much more.

You get an easy-to-read manual, a cable to connect your transceiver (you have to add a connector for your particular radio), a connector for the TTL serial port and a power supply for 110 VAC operation (you can use 12 VDC for portable, remote or mobile operation).

Help make history! Join the packet radio revolution now and help spread this exciting network throughout the world. Order the top quality and affordable MFJ-1274 or MFJ-1270B today.

TNC TUNING INDICATOR

MFJ-1273
$49.95
Shipping Code A

Now you can tune in HF, OSCAR and other non-FM packet stations fast! This MFJ clone of the TAPR tuning indicator makes tuning natural and easy -- it shows you which direction to tune. All you have to do is to center a single LED and you're precisely tuned in to within 10 Hz. 20 LEDs give high resolution and wide frequency coverage.

The MFJ-1273 tuning indicator plugs into the MFJ-1270, MFJ-1270B and all TNC-1s, TNC-2s and clones that have the TAPR tuning indicator connector.

TNC/MIC INTERFACE BOX

MFJ-1272
$29.95
Shipping Code A

Tired of disconnecting the microphone from your rig everytime you want to work Packet? Then let the **MFJ-1272 TNC/Microphone Interface Box** connect your TNC and microphone simultaneously. It measures just 3½x4¼x1¼ inches -- you get convenience and a clutter free shack at a very affordable price.

MFJ-1272 works with all TNC-1s, TNC-2s and clones. It has a 4 pin mic jack on the front panel. A 4 pin female plug is also provided (not wired). RCA input jack for audio in; RCA jack for audio out to speaker.

Order any product directly from MFJ and try it with no obligation. If you are not satisfied return it within 30 days for prompt refund (less shipping). One year unconditional guarantee

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MFJ . . . making quality affordable

CQ REVIEWS:

The NCG 10/160M HF SSB/CW Transceiver

BY DAVE INGRAM*, K4TWJ

Okay, equipment buffs, how's your knowledge of modern gear? Relax a couple of minutes and then name today's manufacturers of all-band HF transceivers. If you stopped after four, return to square one and start enjoying more time browsing through the advertising section of our magazine. Looking at ads is a fascinating and inspiring pursuit, and it resembles a constant running hamfest without the related crowd and interruptions. Sometimes an ad eludes our quick glance because of its size or color, but a closer look reveals a very impressive unit. The NCG 10/160M transceiver featured in this *CQ* review could easily fall into that category. It hasn't been highlighted in a multipage, multicolor "bright lights and glamor" display, but it is a sharp rig. As an opening opinion, I think the NCG is stout-performing and economically priced transceiver with some very attractive features and frills built-in and ready for action. Its autowatch band scanning works great, its receiver can be offset by any amount for split-frequency DXing, and it can be used in the home or car as desired. There's more, naturally, so read on!

The NCG 10/160M is a midsize amateur-band-only transceiver covering 10 through 160 meters including WARC bands, and it is enclosed in a black case measuring 5"H × 12½"W × 14½"D (including its 2½" rear heat sink). The unit is fully solid state with PLL synthesizer tuning, cool-running internal AC supply, rear-panel 13 volt DC socket, VOX, RIT, IF Tune/Shift, audio speech processor, CW wide and narrow filters, four programmable memories, and a bottom-mounted speaker. Both CW filters are preinstalled, and a hand mike is included. A front view of the rig is shown in fig. 1 and additional specifications are included in fig. 2. There is a carrying handle on the transceiver's left side and four rubber feet on its right side, making it a "single cabinet station" that can be set up and enjoyed almost anywhere. In fact, that's exactly what Sandy, WB4OEE, my XYL, and I did much of the time during the NCG unit's review. We routed an "extension coax" from our new A-3 beam into her room for 10 meter DXing, I moved it into the den for 30 meter CW while reading and watching TV, and later it returned to the ham room for serious study. The NCG went through all trials and scrutinizations with flying colors.

Fig. 1– The NCG 10/160M HF Transceiver is a midpriced, midsized unit easily carried and operated almost anywhere.

The NCG's front controls are arranged in a smooth-operating and quite comfortable manner. Synthesizer tuning steps of 1 kHz, 100 Hz, or 25 Hz are panel selectable, and they provide 100 kHz, 10 kHz, or 2.5 kHz coverage, respectively, during each full revolution of the tuning knob. That knob, incidentally, has a well-balanced feel with just the right amount of

SPECIFICATIONS

GENERAL		**TRANSMITTING**	
• Frequency Range	160 m Band 1.8 – 2.0 MHz	• Final Stage Input (PEP)	200 W (160 m–12 m), 100 W (10 m)
	80 m Band 3.5 – 4.0 MHz	• Modulation Method	Balanced Type
	40 m Band 7.0 – 7.3 MHz	• Carrier Suppression	More than 40 dB
	30 m Band 10.0 – 10.15 MHz	• Side-Band Suppression	More than 50 dB
	20 m Band 14.0 – 14.35 MHz	• Spurious Radiation	Less than −40 dB
	17 m Band 18.068 – 18.168 MHz	• Microphone Impedance	600 Ω – 50 kΩ
	15 m Band 21.0 – 21.45 MHz		
	12 m Band 24.89 – 24.99 MHz	**RECEIVING**	
	10 m Band 28.0 – 29.7 MHz	• Circuit Type	Single Superheterodyne
• Mode	A3j (SSB) A1 (CW)	• I.F Frequency	SSB 9.0000 MHz
• Tuning Speed	3-step (1 kHz/100 Hz/25 Hz)		CW 9.0007 MHz
• Stability	Less than ±200 Hz within 1 Hour	• Sensitivity	Less than −12 dBμ (0.25 μV)
	Less than ±20 Hz after 1 Hour	• Selectivity	SSB, CW Wide CW Narrow
• Power Supply	AC 120 V 60 Hz		−6 dB More than ±1.1 kHz ±200 Hz
	DC 13.8 V Minus Ground		−20 dB Less than ±1.5 kHz ±500 Hz
• Power Consumption	AC Transmitting 550 VA		−60 dB Less than ±3.0 kHz ±800 Hz
	AC Receiving 50 VA		Note.... CW Narrow is required to install option CW Filter.
	DC Transmitting 20 A		
	DC Receiving 0.6 A	• Spurious	Image Ratio..... More than 60 dB
• Antenna Impedance	50 Ω		I.F Rejection ..... More than 60 dB
• Number of Semiconductors	30-IC, 6-FET, 124-TR		Other Spurious Ratio ..... More than 70 dB
• Dimensions (Max.) mm	322(341)W, 132(139)H, 316(402)D	• Delta F Range	More than ±1 kHz
• Weight	9.5 kg	• I.F Tune Range	More than ±1 kHz
		• Audio Ouput Power	Internal Speaker 0.5 W (10% THD)
			External Speaker 1.0 W (10% THD)
		• Audio Ouput Impedance	8 ohm

Fig. 2– Technical specifications of the NCG 10/160M Transceiver.

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

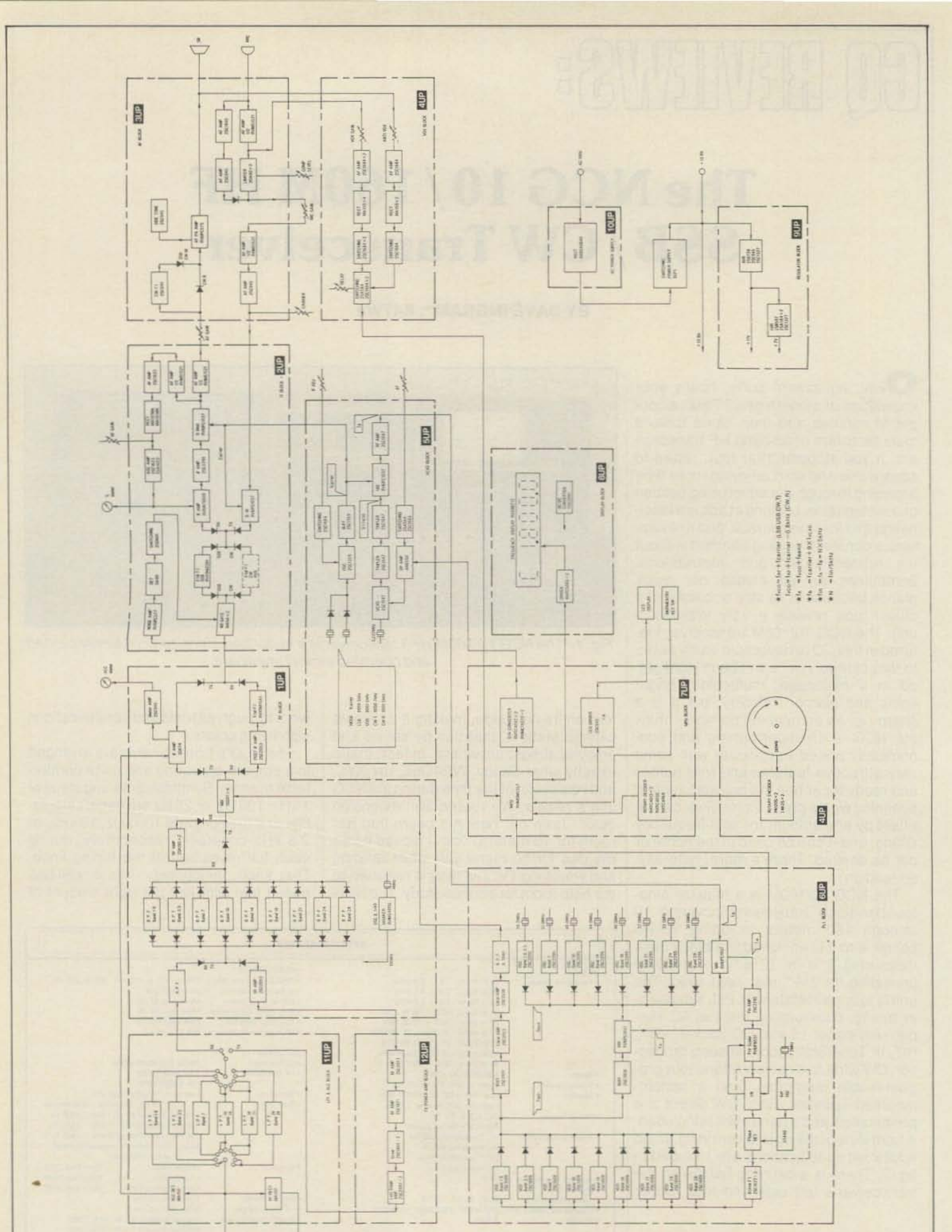

Fig. 3– Block diagram of the NCG 10/160M Transceiver. Discussion in text.

drag or tension to produce a professional touch. There is also an up/down lever switch for hands-free tuning.

Selection of the unit's wide or narrow CW filters is accomplished via the mode switch, and combined use of those filters with the IF Tune and RIT (labeled Delta Tune on the NCG) provides good DXing flexibility. All of the control's rotation range is utilized, so you can easily center a high-medium- or low-pitched tone in the passband for good copy and minimum QRM. A separate control is included for speech processor adjustment, and it works like a champ. Three recessed controls on the right side adjust VOX sensitivity, SSB and CW T/R delay time, and anti-VOX insertion. Internal adjustments include noise blanker level, CW sidetone, dial calibration, and S-meter sensitivity.

Special Features

As previously mentioned, the NCG includes several standard features some amateurs consider "extras." Heading that list are VOX, semi-break-in CW, noise blanker, 100 kHz marker, audio speech compression, and a convenient front-panel key jack. Additional features of adjustable receiver offset for split-frequency operating, four programmable memories, and trimode scanning reflect a noticeable amount of human engineering, however, and warrant further discussion.

Generally speaking, most amateurs approach split-frequency DXing in a similar manner. We tune across a pileup, synchronize our second VFO, then shift one VFO down to the DX station's transmitting frequency while leaving the other VFO on the DX's receiving frequency. The NCG "fits" that technique perfectly. As an example, let's assume you tune into a massacre . . . err pileup . . . on 14.200 MHz calling a TR8 on 14.160 MHz. You press the NCG's **RX OFFSET** switch (its LED illuminates) and then tune down to 14.160 MHz and copy the TR8. When you switch to transmit, the NCG shifts back to 14.200 MHz—simple, effective. If you wish to check pileup action or shift your transmit frequency, merely press the NCG's **TX/RX/REV** switch (the dial changes to 14.200 MHz) and tune as desired. A second **TX/RX/REV** switch press restores split operation on 14.160 and 14.200 MHz (or your newly selected transmit frequency). After working the TR8, you press the **RX OFFSET** and **TX/RX/REV** buttons simultaneously and single frequency operation is restored.

The NCG's four memories can be used in a "fixed" or "tunable" manner, and considering its front-panel rotary bandswitch, four memories are quite ample. I've yet to work more than four stations simultaneously, and using memories as a glorified bandswitch isn't always logical to me. Typically, I'll store a couple of DX stations in QSO using memories 1 and 2 and continue DXing with the VFO. I'll then briefly recall "fixed" memorized frequencies until a QSO ends. After working the DX station, I'll press memory 1 (or 2), write, and VFO, then tune to another station, restore it in memory 1 (or 2), and continue operating. In other words, you can shift frequencies from VFO to memory or vice-versa, or even shift frequencies from memory to memory. The only things you can't do are operate the memories as four independently tunable VFOs and program a memory with a new frequency while that memory is in use (super-operating).

Surely the NCG's most clever feature is its unique **AUTO WATCH** scanning. This scanning may be set in one of three ways: full band scan, programmable upper- and lower- limit scan, or skipping any undesired range and scanning everything else on a band. Relating that to 20 meters, you could scan 13.950 to 14.400 MHz, or 14.00 to 14.027 MHz, or 14.00 to 14.090, skip to 14.175 MHz, and continue on to 14.400 MHz. Specific functions here are programmed according to frequencies entered in memories 3 and 4. The **AUTO WATCH** button activates and stops scanning, and that feature also functions in a unique manner. Scanning begins at a fast and 1 kHz stepped rate, but shifts to a quite slow and 100 Hz stepped rate when it approaches a strong signal. You have time to listen for a few words, then reach over the stop the scanning or let the NCG continue tuning. Six kHz further, scanning switches back to fast mode until it spots the next strong signal. Then again it shifts to slow speed and you have time to decide if stopping is desirable. Signal strengths for determining scan speed shifts, incidentally, can be selected according to the **RF GAIN** control's setting. If you like to keep an ear on band activity or listen for a DXpedition to fireup while you're working in the shack, you'll love the NCG.

Circuitry Overview

As I've mentioned in several of my *CQ* World of Ideas columns, viewing any unit's block diagram is an efficient and unbiased means of technical comparison. Let's thus briefly discuss the NCG's designs illustrated in fig. 3. The print is quite small, so your pocket magnifier will be useful. Let's start at the antenna and follow the receive path (left top). Liberal use of bandpass filters indicates this rig should perform admirably in high RF environments, and the RF amplifier's dual 2SK195s reflect modern low-noise designs. Single conversion is utilized with a 9.000 MHz IF, and popular Japanese devices such as 2SC2053s and 2SC945s are employed in several "low level" receive and transmit stages. Look close "before" the last audio stage and you'll notice the (AF level) CW Narrow Filter.

Moving to the diagram's right side, we can trace the transmit path from the mike, through its amplifier stages and audio compressor, and to the balance modulator. Once again, the use of time-proven and popular designs is apparent. Continue through the crystal filter to the 3SK74 IF amp, bandpass filters, and into the power amplifier section. That section's use of 2SC2053, 2SC1945, and 2SC2097 "finals" is also "modern classic" in design. They've been used with overwhelming success by Kenwood and ICOM and are a positive credit reference for NCG.

The PLL tuning system uses an LED beam-chopping flywheel pulsing an encoder. That stage drives the microprocessor, which in turns sends "count data" to the master oscillator-referenced phase locked loop. That PLL controls the exact frequency of a particular band-selected VCO. The VCO's output is then routed through a buffer, two amplifiers, a filter, and on to the first mixer stage for VFO/frequency control. This single PLL concept is also classic, straightforward, and proven.

Two additional points are not apparent in the block diagram. The NCG uses hefty T/R relay contacts for external linear amplifier control. Its rear socket is a common DIN jack. Also, the rig's output is 100 watts on 160 through 12 meters and 60 to 65 watts on 10 meters. Overall, I personally like NCG's use of tried and proven designs. There's a good feeling of confidence and reliability that's quite important in today's world.

On the Air

The NCG's all solid state circuitry and single box design make it super convenient to set up and operate almost anywhere or anytime. You can move it into a den or onto a patio for a pleasant "out of shack" change of pace, use it mobile, or carry it along on weekend outings. A simple wire antenna completes the latter setup, and you're on the air in minutes. Very nice.

Sandy and I both agree that the auto watch scanning feature is really beautiful. You can set the rig tuning for action and then continue some other nearby pursuit. The NCG switches to slow tuning when spots a station, allowing time to listen, stop scanning, or continue tuning. The use of front-panel pushbuttons rather than a rotary switch for memory selection is another definite asset. I continuously use memories while operating, and stepping through 1, 2, and 3 to reach 4 is slightly awkward.

The IF tune control has good "knobspread" (like bandspread on a dial, eh?) and does a good job of minimizing adjacent channel interference. My QTH is noise infested during several months of a year, and the NCG's blanker couldn't perform miracles. The blanker works great, however, on pulse-type ignition noises. My pet peeve is hot-running solid state transceivers (they remind me of an iron with knobs), and I'm proud to report the NCG runs as cool as a cucumber. The only negative points I've found are the lack of SWR metering and a deficiency of technical theory-of-operation in its owner's manual. The latter item is probably available separately from NCG.

Conclusion

Overall, I think the NCG is a hearty midsize transceiver with impressive performance and features. It isn't overly expensive or cheap; it is "midrange" and practical. I've ran several direct comparisons between the NCG and other modern transceivers, and it holds its own with the best. Actually, all of today's transceivers (not yesteryear's "battlecruisers," but today's solid state gems) are great performers. You really won't hear signals on one rig that you won't hear on another unit. There's also still no substitute for good operator know-how.

The NCG 10/160M transceiver is manufactured by Matsushita Electric Industries Co., Ltd., and imported to the U.S. by NCG, 1275 N. Grove St., Anaheim, CA 92806. It is priced at $985.00. Write to NCG directly for more information. CQ

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CIRCLE 24 ON READER SERVICE CARD

Progress has its price. Computer technology has brought the radio shack into the 21st century. But the cost has been high in terms of RF noise. N7ML shows us how to tame the beast.

RFI and Computers in the Shack

BY MIKE LAMB*, N7ML

Ever since amateurs started using computers, we have been deeply aware of the noise they generate in the form of RFI. What the computer engineers call the 'clock,' we know as an RF oscillator. Worse for us, computer circuitry is almost totally dependent upon square waves.

Add to this the fact that most peripheral devices (printers, modems, Packet controllers, monitors etc.) connect to the basic computer with multiconductor cables. We have everything we need for a jamming transmitter. The clock provides the basic RF generator, while the wires act as antennas. The really insidious aspect of this circuitry becomes clear when we consider what the square waves do—they generate harmonics. With all the dividers working with the fundamental clock frequency, it is no surprise that the computer generates a truly broad spectrum of modulated noise.

Murphy's Law

As the use of computers proliferated in the last decade, so did the awareness that they were a strong source of RFI. A few years back, the FCC added Subpart J to Part 15 in an attempt to force computer manufacturers to act more responsibly. The FCC acknowledged that the manufacturers could not be expected to totally eliminate RF noise from their products, but they certainly could use state-of-the-art means to reduce it. When you read an add that calls attention to an FCC accepted design, that is what they are talking about.

Radio amateurs should be extra cautious when buying any computer or interface device. I would avoid anything that did not show an FCC certification label. Indeed, the FCC requirements are relatively easy compared to the levels that most radio Amateurs or short-wave listeners would find acceptable. Unfortunately, it is not always easy to improve upon the RFI proofing.

*AEA, 2006 196th S.W., Lynwood, WA 98036

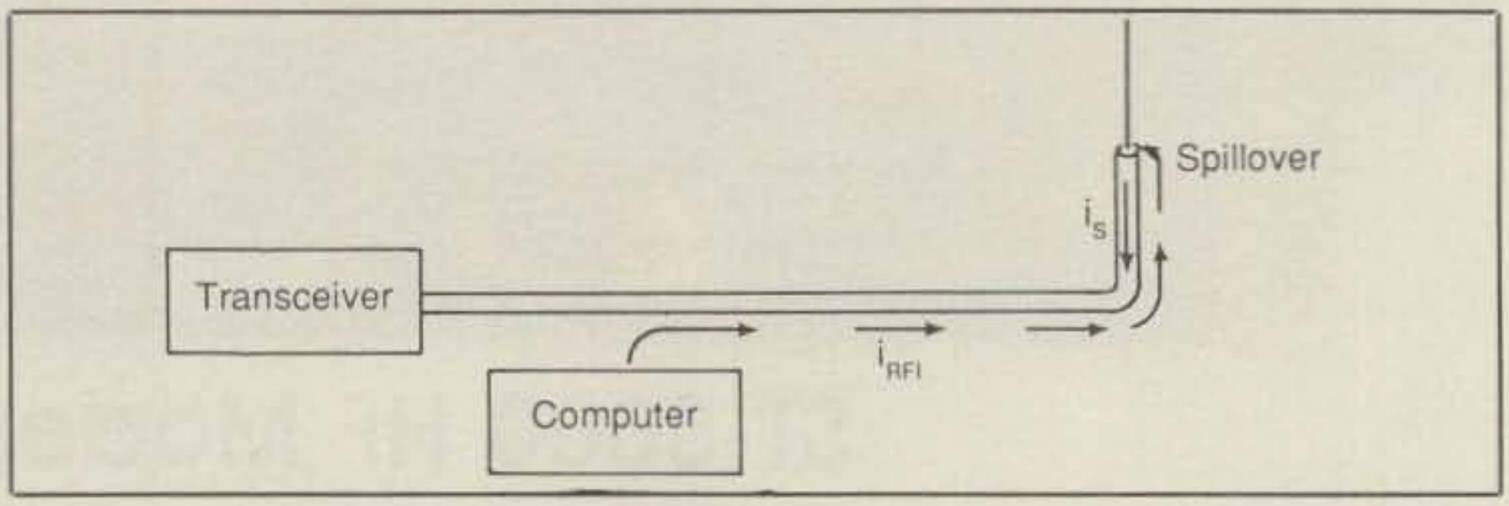


Fig. 1- Typical installation without decoupling. RF "spills over" from the antenna to the outer surface of the coax shield. Current flow on this conductor then radiates back into the shack creating interfering noise for the receiver.

Choking the Monster

Recalling that every computer radiates *some* RF, we must look for ways of minimizing the harm done. There are several external factors that can make matters better or worse for the radio amateur.

First, simply observe the physical placement of the antenna with respect to the computer. If the receiving antenna is in the "near field" of the interference source, there will be a big problem with RFI. In such cases, it matters little whether the computer is "clean" or "dirty."

Keep in mind that the power of a transmitted signal drops off as the inverse square of the distance. For instance, if you move the receiving antenna from two feet to four feet away from the signal (noise) source, the interference power level will decrease to one-fourth the original level. Thus, the first thing to do is to make sure that your antenna and your computer are located as far apart as reasonable.

When RF travels along a piece of coaxial cable, most of the energy flows along the *surfaces* of the conductors. The normal path for the RF flowing along your coax is on the outside of the center conductor and the *inside* of the shield.

RF current can flow on the outer surface of the shield, too. Unless something

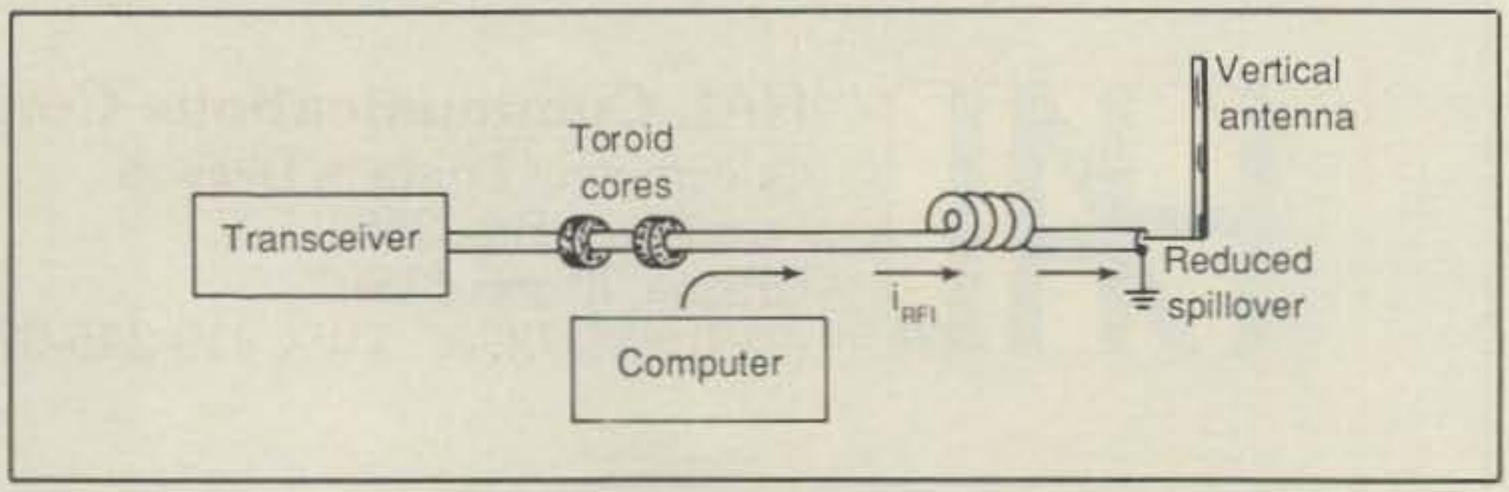


Fig. 2- Reduced "spill over" by use of ferrite cores and choke coils.

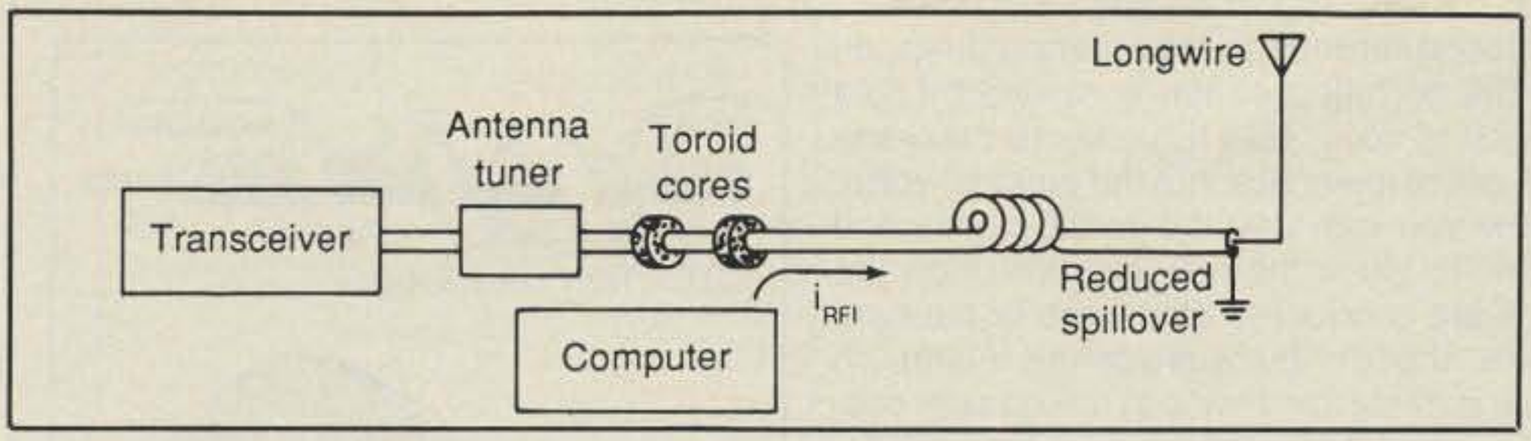


Fig. 3- Here's a method of feed a long-wire antenna that allows you to block the path of unwanted noise back to the receiver.

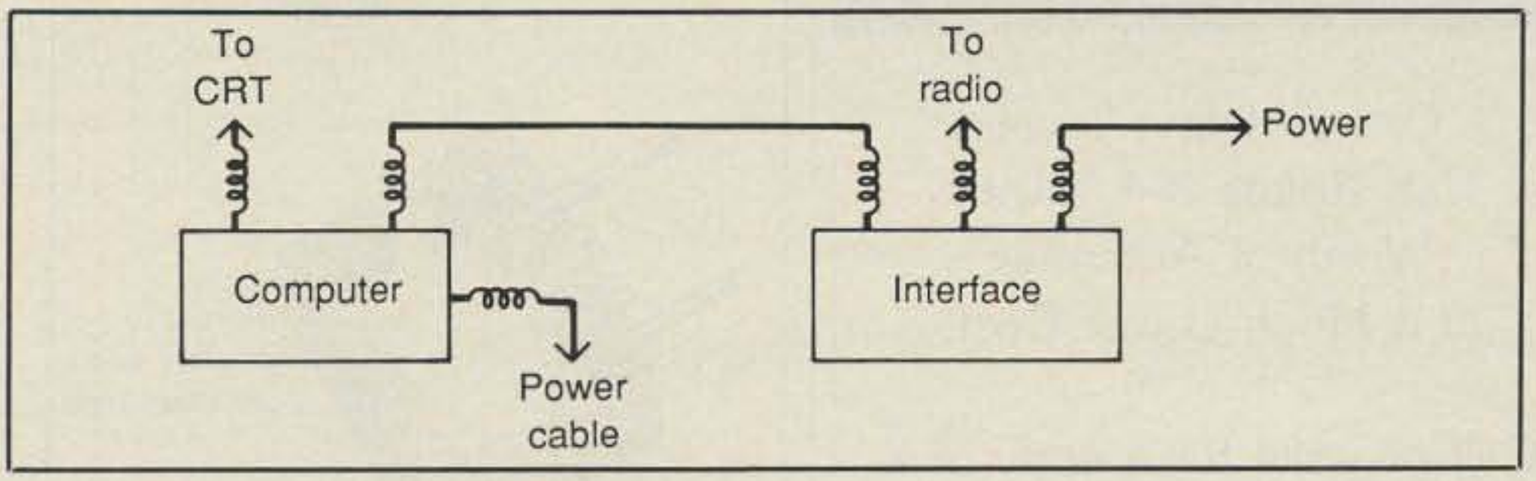


Fig. 4- Various cables coming from the computer and connecting to peripheral devices should be "choked" to prevent them from acting as antennas.

blocks the flow of current on the outer surface of the coax shield, your antenna will probably not perform the way the text books say it should. Current flow on the outer conductor sets up fields, just as it does in the antenna, itself. These fields interact with each other, adding and subtracting, changing the directional pattern of your antenna.

From the perspective of this article, though, something else can happen,as depicted in fig. 1. RF noise from the computer can travel along the outer surface of the coax shield. This current flow sets up fields that induce current flow in the antenna itself, thus providing an indirect, but powerful, path for computer noise to trash the receiver.

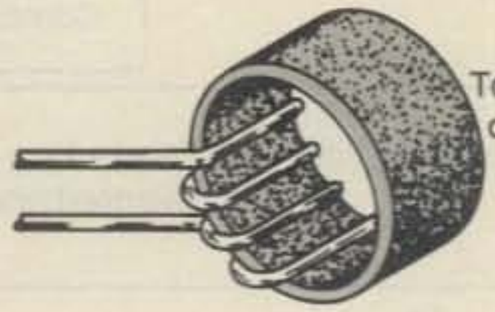
The term used to describe the general idea of keeping the feedline and antenna separate is 'decoupling.' Usually, something that inhibits RF currents is placed at a strategic place on the antenna base or feedline. Fig. 2 shows a couple of possible examples—RF toroid cores over the coax and a coil of coax near the feedpoint. Both provide a high impedance to RF, which reduces the current flow. The coil is formed by wrapping about 10 turns of the coax into a six-inch-diameter coil. Ordinary electrical tape is normally enough to secure the coil in place.

Commercially available baluns provide the same function. Many modern beam antennas are fed with baluns of one sort or another because of the disruption to the pattern that would result otherwise. VHF verticals often have decoupling networks built in, too. Cones, radials and coaxial sleeves all perform this function. Given proper design, each can be effective in decoupling the antenna and feedline. Amateurs with computers in the shack would be well advised to avoid VHF/UHF antennas lacking effective decoupling networks.

For HF operation, you should use a

properly installed beam or dipole antenna fed with a decoupling device—commercial or home made. When it comes to long-wire (or random-length) antennas, it is not feasible to decouple the antenna from the feedline, because it is not possible to distinguish the separation point. One method of attacking this problem is depicted in fig. 3. Instead of attaching the antenna directly to the antenna tuner, as is the normal procedure, connect it to a piece of coax. Use the coax to carry the RF out of the shack into the outside world. Now you can use the toroid cores and coils to block the flow of current on the outside conductor. One word or caution, here, though. Because of the mismatch that is likely to develop in the coaxial section, you can expect high voltages and currents. Use RG-8 or RG-213 as a minimum to avoid arcing and breakdown.

NOTE: Tape cable in place



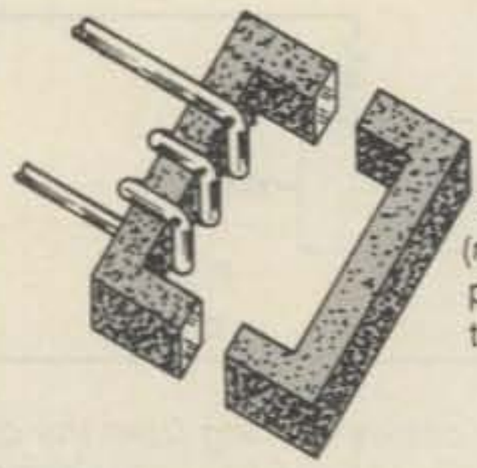


Fig. 5- Ferrite in various forms can be used as a core for improvised RF chokes for cables.

Hundreds of Little Antennas

Every cable connected to the computer or packet controller is a potential radiating antenna for RF noise. The least expensive noise reduction approach is to wind up all the slack cable into about a two-inch coil and tape in place an near as possible to the computer or controller (fig. 4). A more expensive, but equally more effective, approach is to use an RF toroid core to wrap each cable around. Fig. 5 depicts suitable means of using various styles of ferrite cores. You may have to experiment to find the most effective approach for your shack.

Things to Remember

If you have not purchased your computer or packet controller, then make sure that anything you buy meets FCC standards before you purchase. The next thing to ensure is that the antenna is physically as far away as possible. Make sure that your antenna is decoupled from the feedline. Finally, use chokes to suppress RF leakage through peripheral cables attached to your system.

In addition to the vast improvement to your receiving systems, these measures offer an additional benefit. You will be less likely to "lock up" your computer when you transmit. Like life, RF flow is a two-way street. CQ

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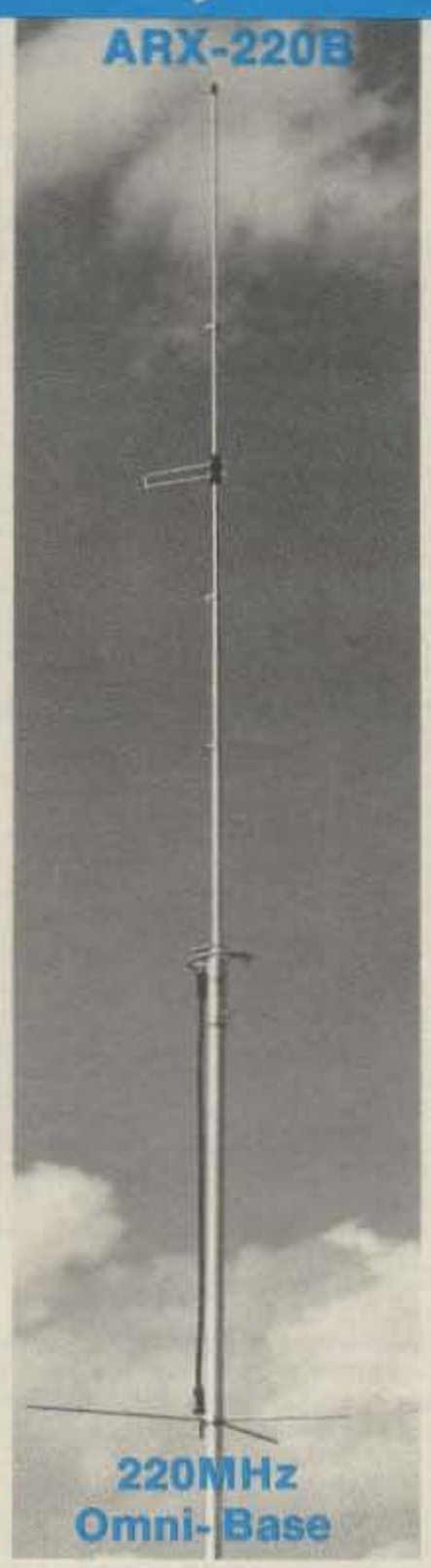

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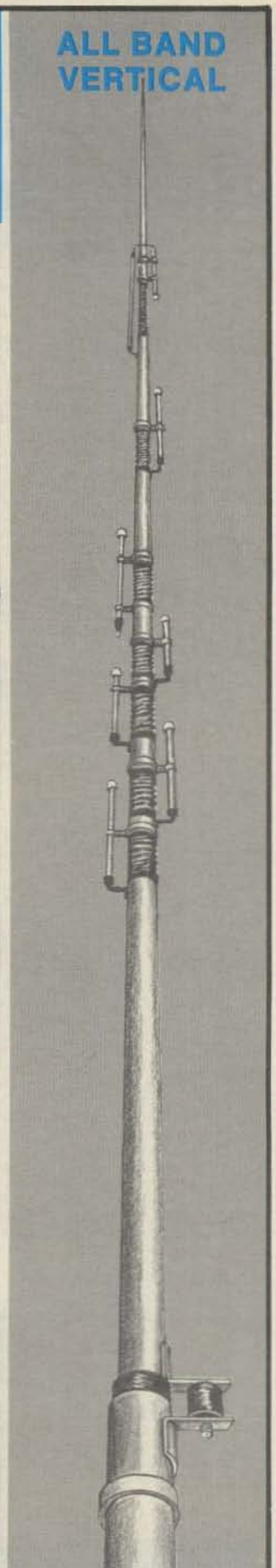

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There's a lot of CB beams out there either not being used or being changed. N4QXK gives us some tips on buying them and converting their use to 10 meters.

How To Modify A CB Beam For The Novice 10 Meter Band

BY DON RATCLIFF*, N4QXK

With Novice Enhancement now a reality, as well as new openings on ten meters, many newcomers are beginning to crowd the 28.3 to 28.5 MHz portion of the spectrum. For several evenings recently it was wall to wall contacts, with almost every state being heard at this Southeastern QTH.

While a dipole can work wonders on the band, the extra punch of a beam can pay off when the band is marginal for the place you wish to reach (or in a pileup). Good antennas for ten meters can be expensive; I priced a new three element ten meter beam at well over $100 and used ones are nearly that. I found a neat, cheaper solution: Modify a used CB beam (which often go for $50 or less).

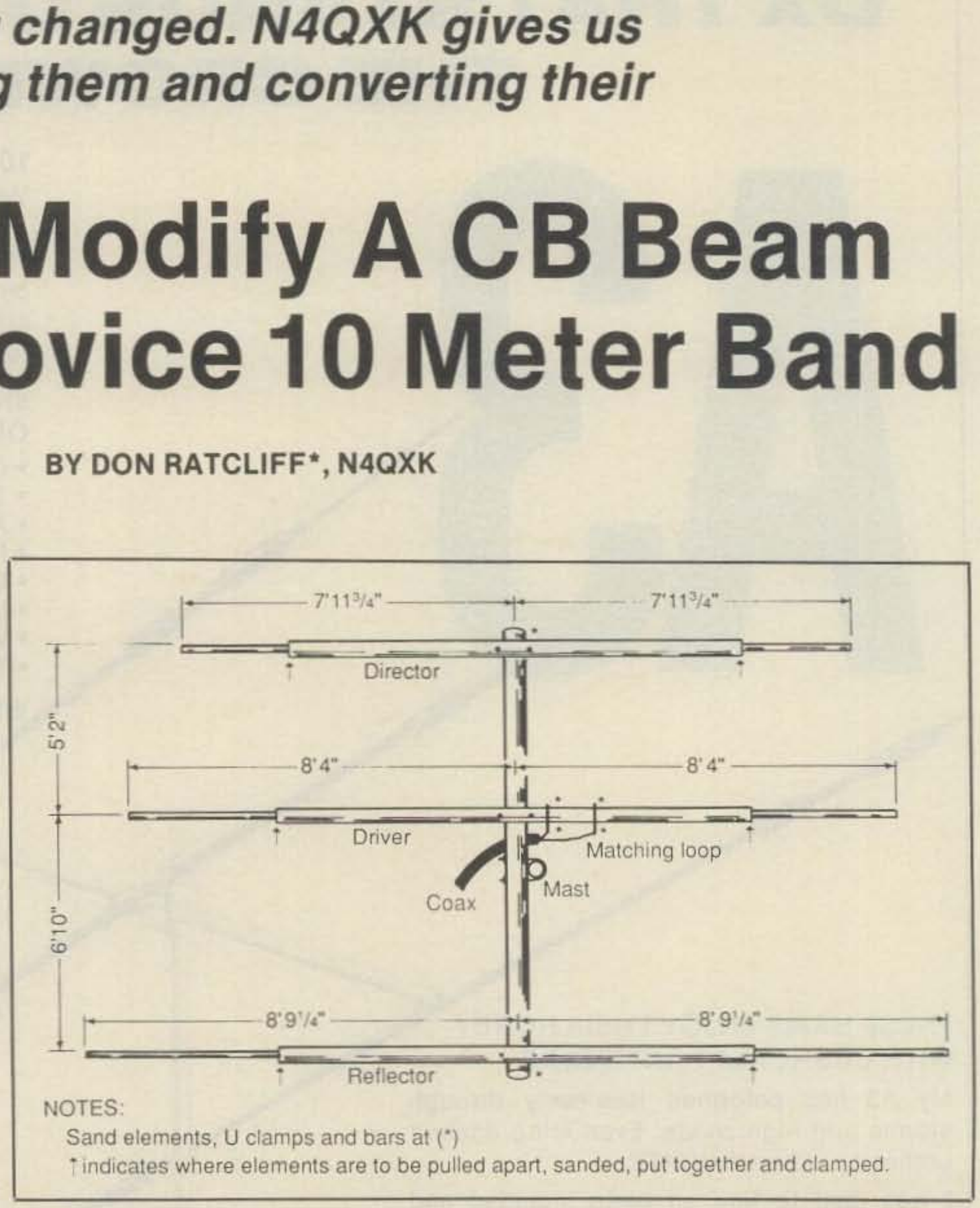
Finding the Antenna

My first step was to put an ad in the local paper, "Wanted: a CB beam." I received a half dozen calls or more from people who wanted to sell what I call "monster" antennas. Monster antennas are those five element, double stacked, multiple polarization things that probably sound the same as the simple three element variety on the air, but bring a "shazam" from anyone that sees the monstrosity. By asking the CB'ers for the names of other CB'ers who had simpler three element beams, I was finally able to track down just what I wanted at the price I wanted to pay.

It was a mangled but intact antenna that went for $25. It was structurally sound, but a bit rusted and had one broken element. The owner complained that it had a 6:1 SWR, but I suspected that might be from the rust, the broken element, lousy coax, or even from a defective SWR meter!

It's important that the CB antenna have elements that can be put together to meet the required dimensions. Sometimes a broken element can be salvaged because only a few inches have been lost (they often break at a junction point). If you can fish out the smaller broken section from the larger tubing and insert the remainder two or three inches, yet still have a long enough element, it's still worth buying (try it *before* you buy).

To get the antenna home, I loosened the U clamps holding the three elements to the boom. These were then tied together with a rope and attached to the side of the car for transporting.



NOTES:
Sand elements, U clamps and bars at (*)
† indicates where elements are to be pulled apart, sanded, put together and clamped.

*Fig. 1– The dimensions for the converted 3-element 10-meter Novice beam. Be sure to clean and sand all the metal to metal contact points (indicated by a *). The arrows indicate the element construction. At these points, where tubing goes into tubing, separate the tubing and sand and clean all surfaces. When the elements are reassembled with the new dimensions, all mating surfaces should be clean, polished metal.*

Taking It Apart

Once home, I took all the sections of elements apart (see arrows in diagram). This was fairly easy for all but one element, after I had straightened them out the best I could. The rough one came apart with the help of a couple of buddies, vice-grips® (don't use them too tightly or the tubing will become unusable), and pliars. Twisting back and forth, as well as pulling, can help. A little mangling can be straightened out later, but be careful not to break off rusted or weak sections (they may then be too short to be usable).

I don't recommend the easier method of just cutting the ends of the elements because you might one day decide you want to lower the frequency resonance a bit, and it's hard to lengthen elements that are cut off! You also cannot be certain that the element sections are making

*1150 Scenic Dr., Tocca, GA 30577

good contact with one another, because of hidden corrosion and rust.

I then sanded the outside of smaller sections that fit into larger sections of each element, and sanded the inside of the larger sections. I took off all of the hardware and replaced most of screws and small clamps. You need to be very careful with the matching loop, that it isn't broken or bent very much. I cleaned the coax connector by spraying TV contact cleaner on and inside it. I also sanded every place metal touched metal, including the U clamps, so that everything made good electrical contact.

If you want to be extra careful, get some of the goop they put in car taillights to minimize corrosion (see a local car parts outlet). It's expensive—a small tube was priced $7, but it will prolong the life of the antenna. It should be applied where the sections of the element slide inside one another, and perhaps on the coax connector.

Putting It Together

Reassembly was a bit more difficult than disassembly (isn't it always?). Making sure the element ends that come together are as near round as possible and straight helps a great deal. The element that gave me problems in disassembly also proved to be troublesome in reassembly. A great deal of twisting and pushing with pliars and vice-grips® helped all but two very stubborn sections. These I took completely apart again, so I could focus on assembling the most stubborn sections (I hadn't forced the easier sections into their final position yet).

The stubborn sections went together only through brute force. This may make them look less than perfect, but with care the antenna can still work well. I had friends hold the element sections where they went together (to keep from bowing) while I placed the large end against the side of the house (with a block of wood to protect the siding). I then used a hammer on the smaller end until the two sections went together and were the correct total length. They may never come apart again (although one did,) the desired proportions were achieved after a lot of pounding.

Using an old antenna book, I calculated the lengths of the elements. My antenna was set for a frequency of 28.5 MHz, since I planned to do very little CW operating and it could be used after I upgraded. As it turned out, the SWR was 2:1 or less from 28.1 to 29.0 for my dimensions, with the lowest SWR at 28.6. If you want to catch the General-class CW band, the elements should each be ½ inch longer. You can also raise the range proportionately by shortening elements by ½ inch for each 100 kHz.

The measurements I used were: Director—15 feet 11½ inches, Driver—16 feet 8 inches, and Reflector 17 feet 6½ inches. The spacing was 5 feet 2 inches between director and driver, and 6 feet 10 inches between driver and reflector. The latter can be played with a bit, if your antenna doesn't allow this much spacing, but try to keep the same proportions.

Don't assume anything about the original antenna. I found that the elements on mine were not evenly positioned on the boom , the Driver was originally 16 feet 10½ inches, but one side was 3½ shorter than the other (and it was the unbroken element!).

I found the original location of the beta match, loosened and sanded the contact points, and then shortened that spacing by half an inch. Don't tighten it too tightly because you may have to experiment a bit with the correct spacing, since it may not have been set correctly at first.

Testing Out the Antenna

I checked out the antenna with a twenty-five foot section of mast, but I understand you don't have to raise it that high to get a fair reading. Set it up so it can be raised and lowered fairly easily, so you can adjust the matching section and perhaps element spacing and length.

Using an SWR meter (I found a local amateur who was glad to loan his; you really don't have to own one if your antenna works well), check the antenna at 28.11, 28.2, 28.3, 28.4, and 28.49 MHz. You should find a curve which starts at about 2.0 (at 28.11) and gradually decreases as you go up frequency. If the SWR is higher than 2.0 at 28.11, you need to loosen the adjustment on the match and make the loop larger. If the SWR is lower than 2.0, you probably need to make the loop smaller.

You may want to invite an amateur with a higher class license to check out the higher frequencies (above 28.5 MHz). Initially the SWR tested out as 2:1 at 28.1, 2:1 at 29.0, and the low point being 1.4:1 at 28.6.

I took the antenna down and made the elements as parallel as I could, using a level, and then secured the mast sections togethr more tightly. This time when the antenna was raised, the extremes measured the same, but the middle frequency was down to a 1.2:1 SWR. On-the-air performance was also excellent: the first contact was Toronto, Canada (not bad from Georgia) and my fourth contact was Santiago, Chile (off the back of the beam), both with excellent signal reports. My modification was a success! CQ

Here is a bare bones regulated power supply that you can build from readily available surplus parts. Let W6HHN show you the way.

The Flea Market Special

BY IRWIN R. WOLFE*, W6HHN

Plenty of amateurs still enjoy building their own gear rather than having only commercial equipment in their shacks. If you are one of them, this easy to build power supply is just for you.

All components can be purchased at flea markets or surplus electronic supply stores. My total cost was a bit under thirteen dollars. Match that with any commercial unit! I also have the satisfaction of having built some of my own equipment.

The circuit is a conventional one with a minimum of parts. Since this is a 'bare bones' design, some of the *niceties* were eliminated, e.g. over current protection, short circuit protection, over voltage protection, etc. A fuse in the primary circuit of the transformer is the only protection I added. [Editor's Note: If you are contemplating using this supply with an expensive piece of equipment, you may want to add some additional protective circuitry.]

Suppose you are going to use it with a transceiver. You will need between 15 and 20 A at 13.8 Vdc for CW. If you operate SSB, the average power is only about 25% of key down CW. When you operate RTTY, the average power requirements will be higher. That results in more heat for the pass transistors. You will probably need an extra pass transistor, or at the very least a small cooling fan for them, if you are a RTTY operator.

Securing the Parts

The most important item is the transformer. You must obtain a suitable one. While there are many available at flea markets and surplus electronic stores, it may be difficult to get the right one. You will need one that will deliver at least 24-V ac each side of center for a full-wave rectifier circuit. If you are using a bridge circuit, you will need a single winding of 24-V ac.

In any case, the dc voltage at the rectifier output, under full load, must not be less than 19.5 V. Below that voltage, the regulation will not be maintained at the 13.8-V value during peak (20-A) load.

You can use two identical transformers if each has a secondary providing 24-V ac with a current rating of 10 A or more. Both primaries and secondaries are wired parallel to each other. Make sure the secondary windings are properly phased by measuring the voltage after

*3467 Rambow Dr., Palo Alto, CA 94306

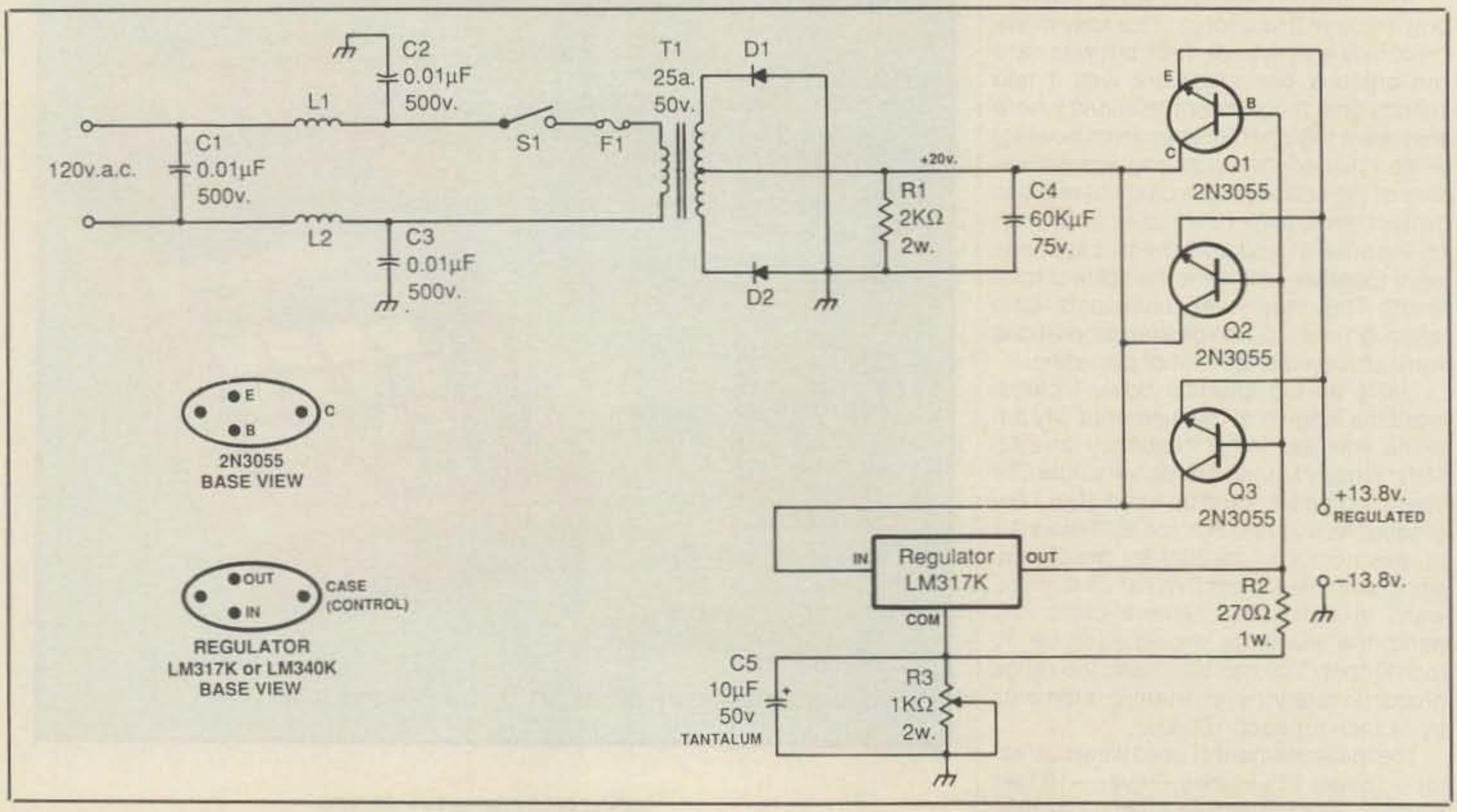


Fig. 1- Schematic diagram for the flea market special.

they are connected. A pair of 12-V transformers with the proper current rating (20 A each or greater) can also be used. Connect the primaries in parallel and the secondaries in series. Again, check for proper phasing (output should measure 24-V ac or greater).

Avoid transformers with outputs more than a few volts above the 24-V mark. As the dc voltage out of the rectifier circuit moves above 20 V, the transistors have more wattage to dissipate. In such circumstances, you will need to add extra pass transistors and/or a cooling fan.

You may come across a transformer with the proper voltage that has no current or kva marking. The core size gives you a pretty good idea of its current handling abilities. If the core width is between 2½ and 3 inches and the core height is between 4 and 5 inches, the transformer is probably a 300- to 400-W unit. The secondary wire size is another good indicator. It should be at least #14 wire size. The going price in my area for such transformers at flea markets and surplus stores is between $5 and $8 each.

Parts is Parts

A good supply of power transistors and rectifiers are usually available at very reasonable prices. If you cannot find them at a flea market, you can definitely get them at a surplus store, local or mail order.

Even Radio Shack, which is not a surplus store, only charges about $2 for 25-A bridge rectifiers or 160-W power transistors. For $1.25, I picked up a full-wave rectifier at a surplus store. I am sure it can handle 50 A.

After buying a heat sink with three 2N3055s mounted on it for $1.50, I found a large power transistor for $1.25. The seller assured me it could handle 25 A with ease. During my breadboard tests, this transistor did handle 20 A for a 15 minute full load test without heating up over 35-degrees C. If you come across a similar one, the power supply becomes even easier to build.

The regulator is another easy to obtain item. I bought a few along with heat sinks for 75 cents each. Electrolytic capacitors with ratings from ten to sixty thousand uF at 50- to 75-V dc seem to be featured at most flea markets for about fifty-cents each.

If you do not have a good supply of resistors and by-pass capacitors, you can always get the exact size you need at a surplus store. I have accumulated enough resistors, by-pass capacitors, potentiometers, etc. over the years to last a few life-times of project building. I am always willing to share my goodies with others. You may find someone like me in your area. (I am also storing about a thousand vacuum tubes of a by-gone era that I am too sentimental to dispose of.) Discarded sub-assemblies of commercial power supplies are common at flea markets and some surplus stores. Usually, you can just about name your price for them. The contain a treasure of transistors, diodes, power rectifiers, SCRs, capacitors, resistors and, sometimes, transformers. You can rescue enough parts to take care of many construction projects, including this one.

One final note on securing parts is in order. Remember, you are buying parts "as is." Maybe they are okay, maybe not. It might be a good idea to carry a small pocket VOM or DVM with you when you go to a flea market or surplus store.

Construction

A chassis approximately 8 × 12 × 3 (DWH) inches should hold all the components. I used a chassis with these dimensions from an old 300-Vdc power supply. It came with a front panel and cover that I capitalized on for this project. Think of it this way, if there are a few extra holes in the chassis, they will probably help with the ventilation. Beauty is in the eye of the beholder.

I installed a 0- to 15-Vdc meter in the cutout of the old meter. It only cost me $2 at a flea market, and the owner assured me it was in good working order. *However*, when I checked it at home with a 1½-V dry cell, the meter indicator went off scale. After a few minutes of substituting

various values of resistors, I found the proper series resistor. Then, I calibrated this meter with my accurate digital voltmeter.

Arrange the components for shortest lead length when assembling the power supply. This is especially important for the transistors and regulator. Before you drill any holes or solder any wires, place the components on the chassis and play an imaginary game of checkers with them. You may discover a better layout than the one you had in mind.

When mounting the transistors and regulator unit on the heat sinks, I found it more convenient to insulate them with mica washers. This permits the heat sink to be at chassis ground rather than requiring it to be insulated. You will need to use some form of "heat sink compound" to ensure good heat transfer to the heat sink.

Regulation

After I arranged all the parts on the chassis, I wired the transformer, rectifier and filter capacitor. With the output connected to some *big* power resistors, I made sure that the output voltage was above 20 V at full load (20 A).

After checking the regulator circuit in breadboard fashion, I made a few minor changes in the resistor values. Using a calibrated oscilloscope, I measured the output ripple after 15 minutes of full-load testing. I considered 0.15 V to be well within acceptable limits.

Using a thermo-couple instrument, I checked the temperature of the various components. The transformer and pass transistors were just barely above ambient (room) temperature. Since I planned to use it mostly with a transceiver operating SSB, I saw no need for a cooling fan.

When operating a few power transistors in parallel, there is a danger of unequal current flow from one transistor to the next. This results in unequal heat dissipation, which can lead to failure of the transistor. Should the transistor "choose" to fail by shorting, which is quite common, the full output voltage of the transformer/filter will be present at the output of the regulator. Catastrophic results would be expected for equipment connected to the supply requiring a regulated 13.8-V dc.

After some searching, I found some 0.1-ohm resistors, which I wired in series with each emitter and collector. Such resistors tend to stabilize the current distribution and prevent a run away condition from developing.

To my chagrin, the regulation, which was within 0.3 V from no load to maximum load, increased to an unacceptable level of 0.8 V. After eliminating the resistors in the collector circuits, there was an improvement, but it was still worse than without the resistors. Since I had a large supply of 2N3055s, I checked each one individually with a 5-A load and found three that were nearly identical.

Using these three matched transistors, I eliminated the resistors from the circuit. At the end of a 15-minute full load test, the temperature of the transistors were within a few degrees of each other. Matched transistors should be checked from time to time to ensure that their operating characteristics have not changed. [Editor's Note: If you are unable to match the pass transistors, you would be advised to consider using the stabilizing resistors. Should this adversely affect regulation, you might consider additional pass transistors.]

Preventing RF Feedback

From earlier experiences with regulated supplies, I knew that RF often finds its way into the regulator circuit unless precautions are taken. If RF does make it back into the power supply, transmitter operation will be erratic. As a precaution, I made a line filter and mounted it on the chassis. It consists of an inductance in each ac-line leg (L1, L2) and disc ceramic by-pass capacitors across the input and from each output leg to ground (C1-C3).

The coil forms are 2½ inches long and ½ inch in diameter. Plastic coated #20 hook-up wire is wound to within ¼ inch of each end. Small strips of masking tape hold the windings in place. The forms I used were wood pieces from an old coat hangar.

Son of FMS

With so many extra parts left over after the Flea Market Special was finished, I couldn't resist building another 8-A supply. I found a 26-V 8-A transformer that was perfect for the second supply.

One small heat sink proved adequate for the regulator and pass transistors. I had a 0- 15-V ac meter that read about 20% high on dc. Adding a small-value series resistor brought it to good accuracy. Now I have a spare supply for my 25-W 2-meter rig.

I am sure you will enjoy building this flea market special. There is a special gratification to owning and using something that you built yourself. CQ

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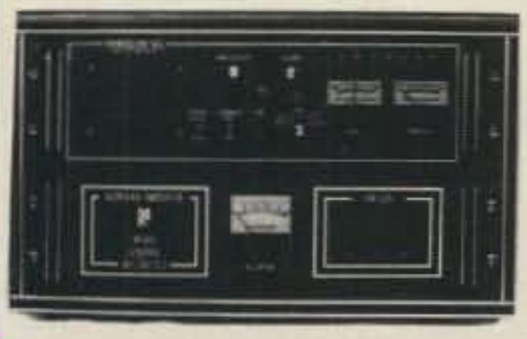

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How To Buy Your First Rig

BY PAUL M. DANZER*, N1II

It is an amazing fact but true: Almost half of those who struggle so hard to earn their amateur licenses never get on the air. Apparently, it is as much of a problem to pick a rig and set up a station as it is to obtain a license in the first place. There are many choices: new or used, transceivers or separates, single band or multi-band, HF or VHF, etc.

In our town we usually run a licensing class once a year. The following questions are the ones most often asked by both newcomers and old timers getting back on the air after a lapse of activity.

Q: After passing the license exam, I guess my first step would be to buy a rig. How should I start?

A: There are two main considerations: (1) what kind of activity you think you are interested in; and (2) what your pocketbook will allow.

Q: OK, let's talk money first. How much do I have to spend?

A: You can get on the air for less than $250 or you can spend over $1500. The higher price will get you a "contest grade" rig with enough gadgets (bells and whistles) to keep you busy for many years, but you can do surprisingly well for the lower price, too.

Q: What can I get for $250 or less?

A: This puts you in the realm of used equipment. There are quite a number of "CW only" transmitters, 50 to 90 watts, going for about $1 per watt or less. You'll probably need the help of an experienced ham to pick out one. It is best to buy it from someone who is willing to tell you all of its faults and help you fire it up.

Q: What about a receiver?

A: There are some oldies but goodies available. Many of them are not up to today's standards, but the addition of accessories such as RF amplifiers/preselectors and outboard audio filters make them quite usable. The biggest problem is age.

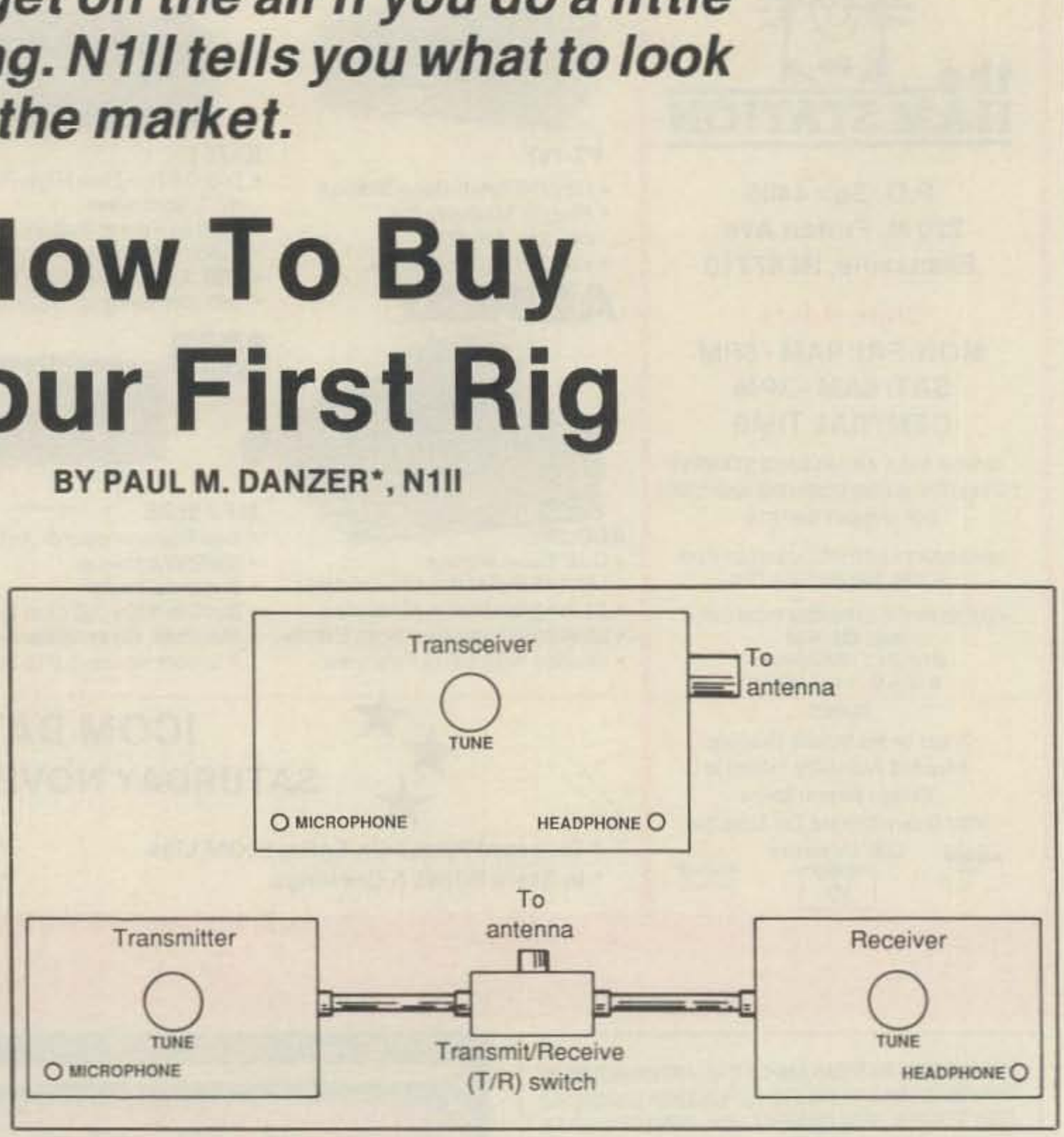

Fig. 1– A transceiver has the advantage of a built-in transmit/receive switch. With "separates" you may have to add an external switch or relay.

Q: How does that affect the equipment?

A: With time, capacitors start to leak and problems develop with the coils. The capacitors are easily replaced, but many of the coils are no longer available.

Q: Is there any advantage in going to a transceiver?

A: A transceiver (fig. 1) simply has both a transmitter and receiver built into a single package. To save money, a few circuits are used for both the transmit function and receive function. The biggest advantage for new amateurs is the fact that once you have tuned in a signal, you are immediately "zero beat" and ready to transmit on the same frequency.

Q: Then what is the disadvantage?

A: Generally, for used equipment the only disadvantage is money. A used transceiver, capable of both CW and SSB, will probably cost you a minimum of $350.

Q: Will I be able to hear as many stations on a used transceiver or receiver as on a new one?

A: Generally, yes—at least on 160, 80, 40, and probably 20. Some of the older equipment is not too sensitive on the higher HF bands, but you can still add an outboard RF amplifier or preamplifier and have performance as good as most of the newer equipment.

Q: Is adding a preamplifier a big job?

A: Assuming you either buy a commercial unit or build a small unit yourself, it should take you all of 5 minutes to hook it up. With a receiver, simply insert the preamplifier in the antenna lead (fig. 2). With a transceiver, you may have to open it up and break the small coax lead from the receiving RF stage to the antenna relay. In both cases, you have to supply the voltage required by the preamp.

Q: I have often heard the expression "broad as a barn door." Will I have problems with the selectivity of older equipment?

A: With some old rigs you will, but with others you will be delightfully surprised. The reason for that is illustrated in fig. 3,

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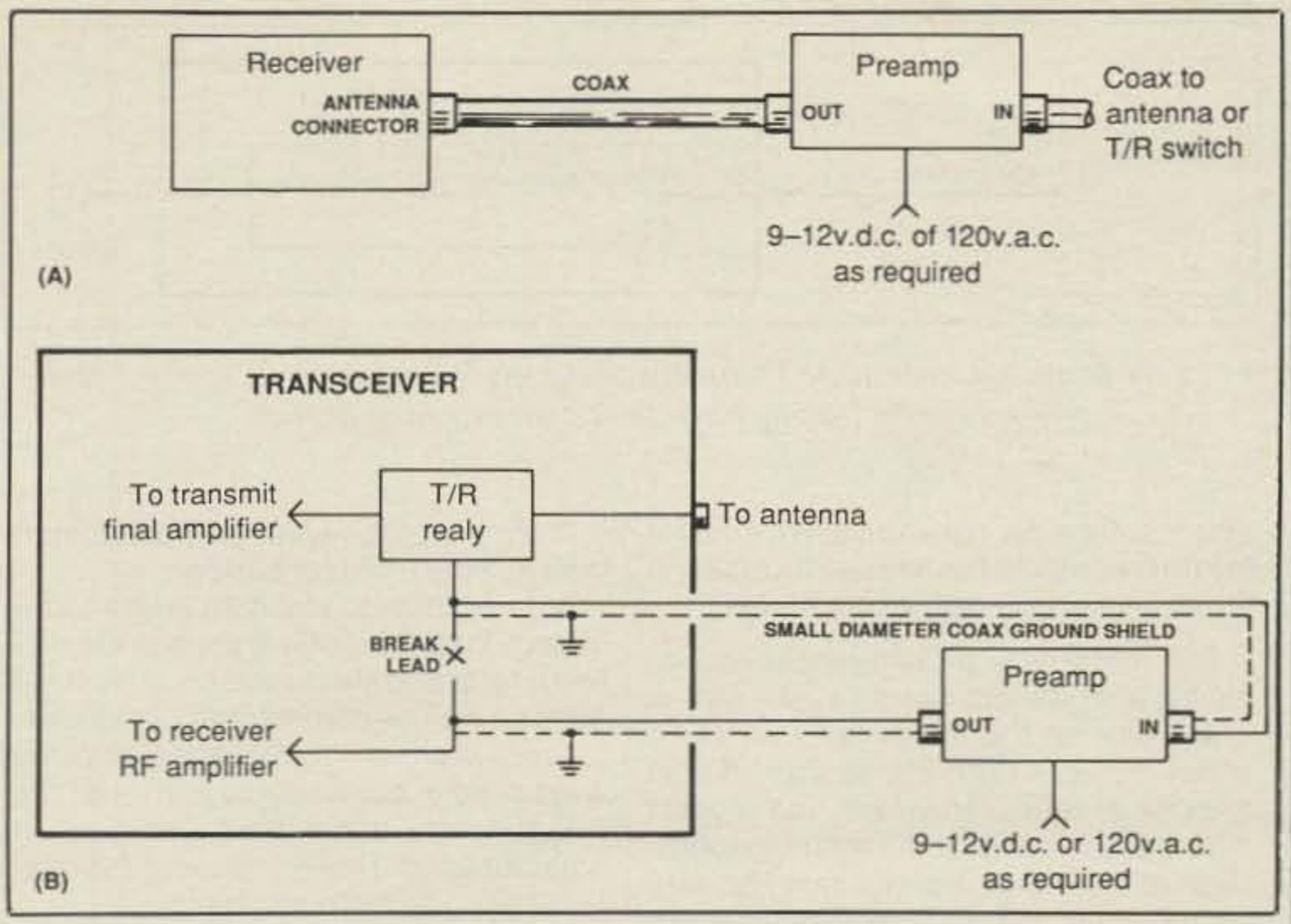

Fig. 2– Preamp installation for a receiver (A) and a transceiver (B).

which is a block diagram of a simple, conventional superheterodyne receiver. Generally speaking, the closer to the antenna terminals that selective circuits are used, the better they function. It is usually not practical to put your narrow bandpass circuits right up front around the RF amplifier. Older equipment often placed these circuits in the IF section. Today many rigs have only moderate selectivity in the IF and utilize audio selectivity at the back end.

Q: Then if the receiver I pick lacks selectivity can I do anything about it?

A: Yes. An outboard accessory filter can be added to the audio section. The best way is shown in fig. 4. The lead to the center of the volume control is disconnected, and an outboard audio filter is inserted. However, if you do not want to go to this trouble, good results can be obtained by placing the filter between the audio output and your headphones. Some commercially available units include an amplifier to drive a speaker (fig. 5). Just remember, usually the lower the level you feed the filter, the better it will work. If you can, place your high-power audio amplification after the filter.

Q: Are there any other factors to consider in choosing between a receiver and transmitter combination or a transceiver?

A: Yes. Using "separates" (as the receiver and transmitter combination is called) gives you one major advantage. You are not restricted to transmitting and receiving on the same frequency, even though most of the time you will want to do so. Transceivers on the other hand, have the antenna switching relay built in. With separates, you may have to either utilize an external relay or build an electronic transmit-receive switch.

Q: Let's assume I find a rig (separates or transceiver) in pretty good shape. What am I giving up by going to an older rig?

A: You may be giving up a few things, but they may be things you don't really need or things that you can do without. For example, today's rigs usually are quite stable. If they warm up for a few minutes, they will stay on a frequency indefinitely. Older rigs tend to continuously drift, first a few kHz, and after an hour or so a few Hz. This means that you cannot set the equipment on a net frequency and expect it to stay there forever without retuning.

Q: As long as I am willing to retune every once in a while, then I am not in too bad shape, assuming I stay away from the band edges, right?

A: That is another little problem. Today's rigs have digital readout with precision down to 0.1 kHz. Many of the older rigs had analog dials with precision of only 5 or 10 kHz. However, you are correct: as long as you stay away from the band or sub-band edges, you are OK.

Q: Are there any big differences in the transmitters?

A: The same considerations of stability and precision hold for the older transmitters as well. Older transmitters have tubes in the final amplifier that require tuning each time you change frequency. Many of the new rigs have broad-band finals that require no tuning. Many of these

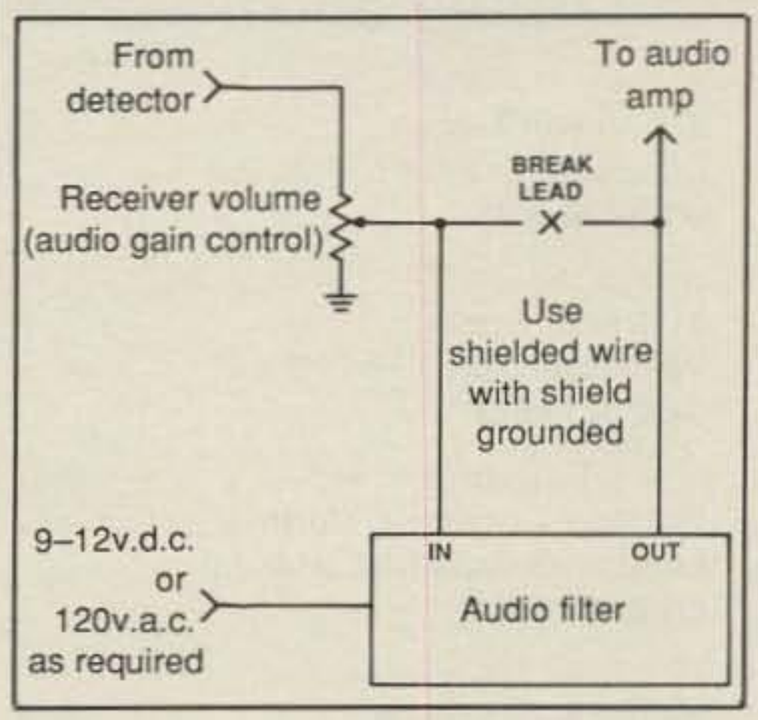

Fig. 4– The ideal way to install an audio filter is to break the connection between the volume control and the audio amplifier and to insert the filter here.

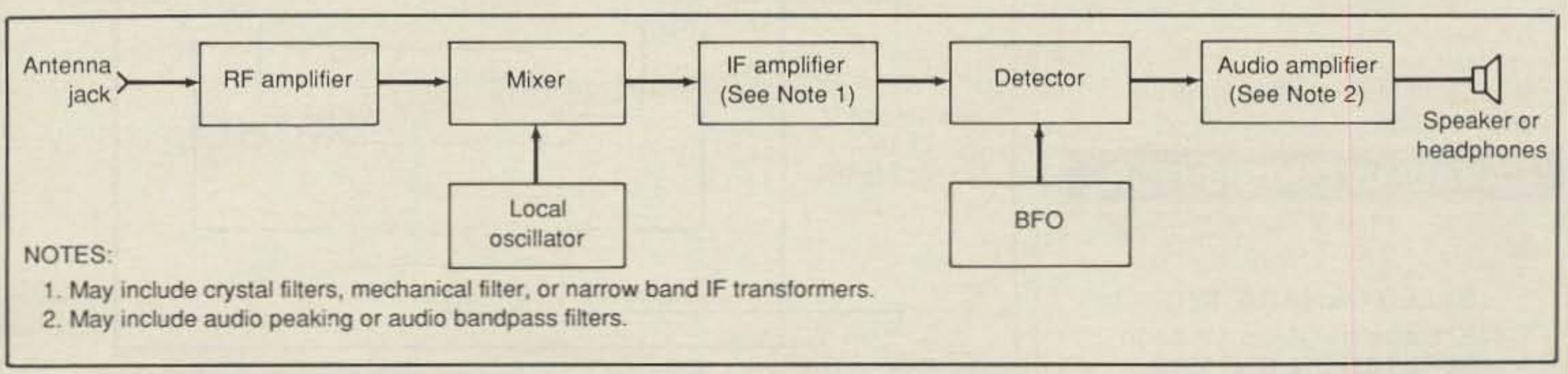

Fig. 3– Block diagram of a typical superheterodyne receiver.

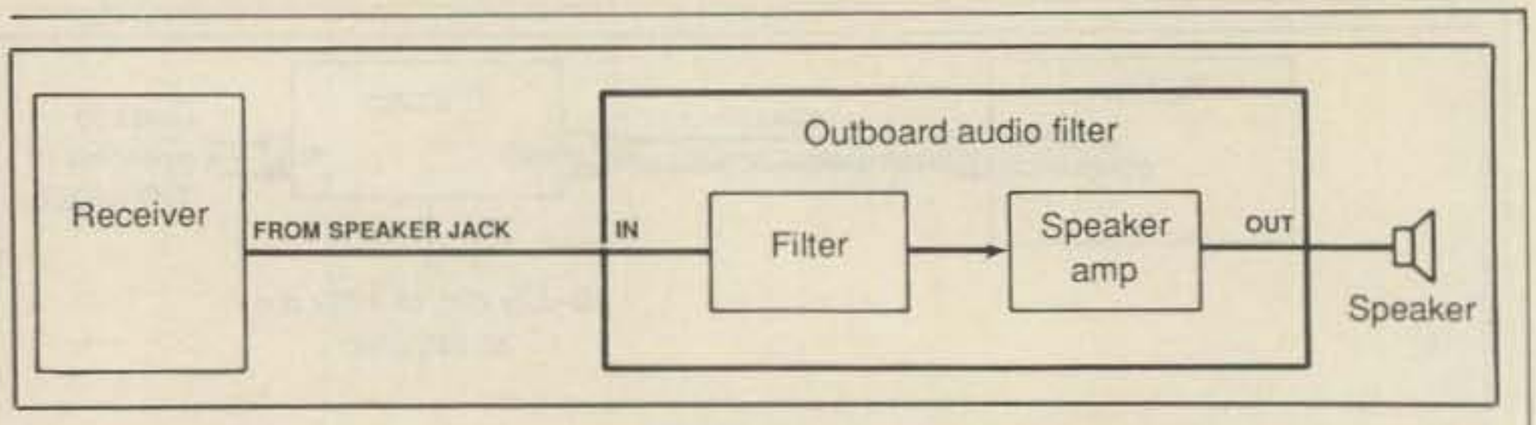

Fig. 5– Some external audio filters are designed to plug into the speaker jack. These units usually have their own amplifier section.

also require a low apparent SWR, and this in turn means you have to use an antenna tuner, so you don't save very much.

Q: Is there really any difference between having a solid-state rig and a tube rig?

A: Some of the things we just talked about, such as drift, are partially due to the use of tubes. However, the biggest difference is the cost of replacing tubes. Most of the transistors will never have to be replaced, but you must periodically test and replace tubes. When many low-power or reveiving-type tubes were a dollar or so, this was not bad. However, since tubes are becoming scarce, their cost today is often $6 or $7 or more apiece. Worse, tube manufacturers often group similar tubes together and make an "average" replacement tube. Sometimes the "average" works OK, but sometimes . . . .

Q: Is it difficult to find a general-coverage solid-state receiver?

A: It really isn't. Actually, its related to the age of the equipment. Many of the old tube receivers were "general coverage." You could receive from the bottom of the standard AM broadcast band (550 kHz) up to 30 MHz, which, of course, included all of the amateur HF bands. Until recently the solid-state rigs were amateur band only.

Q: Why would I want to receive more than just the amateur bands?

A: In addition to standard time and frequency stations (Table I) there are quite a few interesting shortwave broadcast stations as well as commercial CW stations for code practice. In any case, you can always build or buy a simple converter that will translate some frequencies to an amateur band. This will allow you to listen to some non-amateur stations.

Q: Can I do the same for the VHF bands?

A: Yes. In fact, there are not only converters available for receiving, but also "transverters" (fig. 6), which will convert your HF equipment to both receive and transmit on one of the VHF bands. These units usually convert your 10 meter (28 MHz) coverage to a VHF band on both receive and transmit. This usually works fine for CW and SSB. However, don't expect to operate on FM unless your HF equipment is also capable of FM.

Q: It seems like there are a few small rigs around which will put me on the air, low power, for under $200. Why not use one of these for my first rig?

A: Several manufacturers offer "QRP" or low-power rigs which will give you 1 to 5 watts out. However, these are primarily

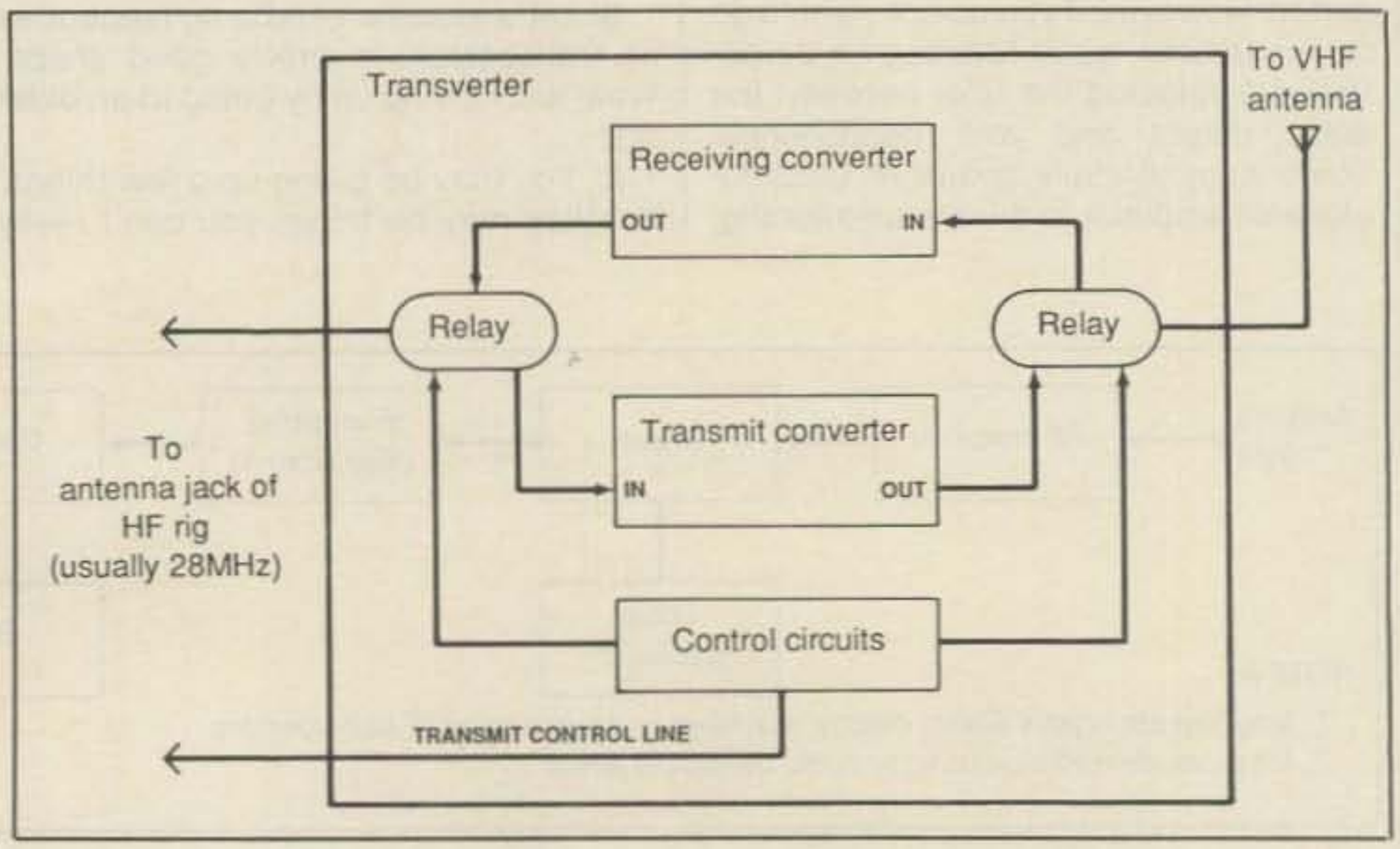

Fig. 6– Block diagram of a typical VHF transverter.

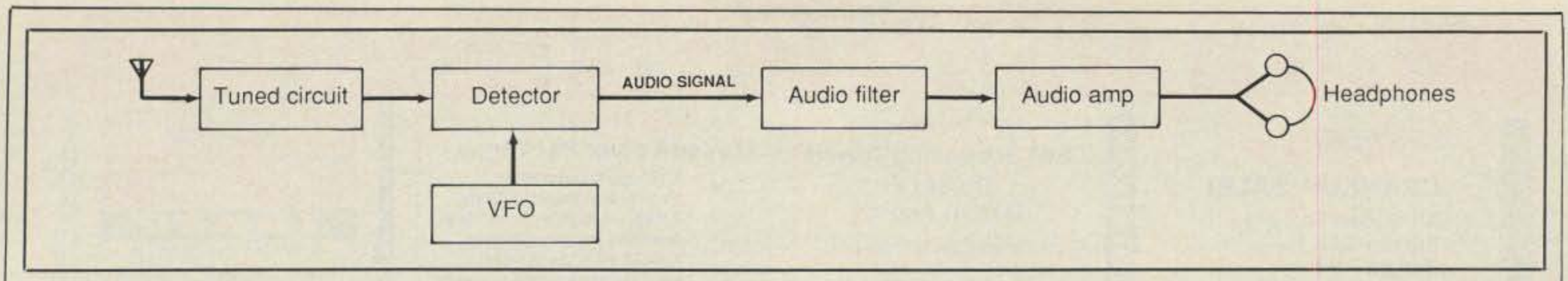

Fig. 7– Block diagram of a direct conversion receiver.

Frequency (kHz)	Call Letters	Location
2500	WWV	USA
3330	CHU	CANADA
5000	WWV	USA
7335	CHU	CANADA
9996	—	USSR
10,000	WWV	USA
14,670	CHU	CANADA
14,996	—	USSR
15,000	WWV	USA

Table I– These stations offer standard time and frequency information that is often invaluable to the amateur. All WWV frequencies are shared on a noninterference basis with WWVH in Hawaii. WWV announcements are made in a man's voice and WWVH's in a woman's voice. These same frequencies are also used by other standard time and frequency stations throughout the world. The strength of WWV usually masks these signals in the US.

designed for portable or low-power enthusiasts. For a newcomer it can be very frustrating to attempt to make contact with low power on a crowded band while the bulk of the other stations are running 100 to 250 watts and swamping him out.

Q: Couldn't I start with one of these rigs and add an amplifier?

A: Sure, but then you probably will be back to spending close to what you would have spent for a larger rig. In addition, these rigs usually have a "direct conversion receiver" (fig. 7).

Q: What is the problem with that?

A: They are simple, low cost, and sensitive. On the other hand, there are selectivity problems, and a number of them are not properly designed, giving you hum and overload. You are better off starting with a conventional superheterodyne receiver, perhaps used, and improving it as we discussed before.

Q: Do the same ideas apply to buying a VHF FM rig and an HF rig?

A: They apply, but the biggest factor is your decision on how you want to use the rig.

Q: I already know I want to use the rig both in my car and at home. What else do I have to decide?

A: Do you travel a lot? If you usually stay around town, an older crystal-controlled rig will suffice. If you travel out of town quite often, you probably will want to buy a synthesized rig. Generally, the cost of a crystal-controlled rig plus several handfuls of crystals in time approaches the cost of a synthesized rig. Most new rigs are synthesized, but you can pick up a few bargains in used crystal-controlled rigs.

Q: What about hand-helds?

A: They are the answer to a dream—at least the newer ones which are synthesized. If you travel, especially by air, they are very convenient. They weigh very little, and a few minutes after you arrive in your hotel room you can be chatting on a local repeater.

Q: It seems that hand-helds are the answer to home, car, and travel.

A: For some people, they are. Many hams find they need to buy an outboard amplifier, especially for car use. A second very popular accessory is a speaker-mike, which eliminates the need for holding the radio in your hand while driving.

Q: I take it there are quite a few accessories available.

A: By the time you add an amplifier, speaker mike, home and auto chargers, extra batteries, and a host of other "goodies" you can easily end up spending more than what a second rig, perhaps bought used, could cost. In addition, if your hand-held breaks down, you end up being totally off the air, while a second rig gives you some backup.

Q: What other options do I have for a VHF rig?

A: Quite a few. Frequency memories, LED or LCD readouts, priority channel override, scanning, telephone encoder pads, subaudible tone (PL®), tone burst, microphone-operated controls, multiband, combination FM-SSB-CW, and a few dozen others.

Q: Then how do I decide?

A: Now we are back to where we started. Take a guess at what kind of operation you are interested in and balance it against your pocketbook. One thing is certain: After a few months or years you will change your mind as to how you want to operate. Newer and different equipment will be in your price range, and you will change rigs. We all do! CQ

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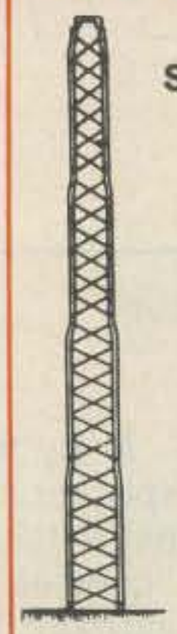

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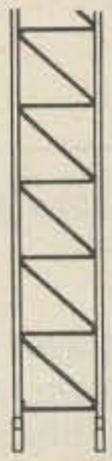

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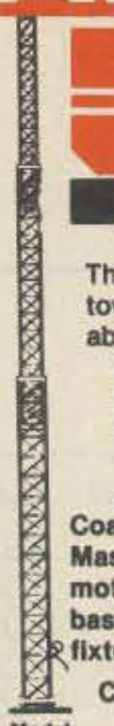

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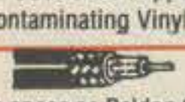

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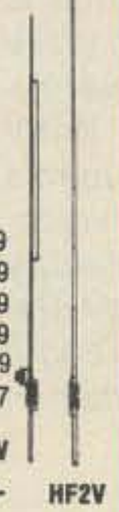

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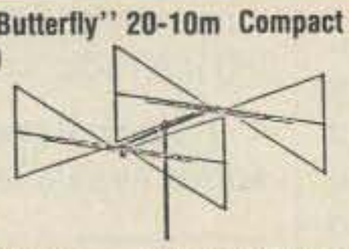

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CIRCLE 123 ON READER SERVICE CARD

We tried to come up with another word for the title, ie frugal, inexpensive, conservative, but cheap is really where it's at.

The Really Cheap Antenna Article

BY JIM KENNEDY*, W7MID

Antennas have been a prime source of concern ever since radio began. This article is not for those of you who have lots of cash and little time; you can go out and buy whatever deluxe antenna installation your heart desires. The rest of us (the majority) need to put up the best antenna for the least money, so here are some tips about being a tightwad!

The methods being described will naturally depend on space available, zoning regulations, and what your neighbors will put up with.

First, verticals. Here in Arizona, swimming pool supply stores sell a pole used to dip leaves out of the pool. It's a sturdy, lightweight, aluminum pole in two sections which adjust out to about sixteen feet. It sells for ten to fifteen dollars. After you get it set to the right length, you can put a couple of sheet metal screws into it to ensure good contact between the sections. It's great for portable use, too.

For another cheap vertical, or a sturdy mast, try the top rail of a chain link fence. These are very strong, made of galvanized steel in 21-foot lengths, swagged at one end so that two or more can be fitted together. The cost? Less than twelve bucks at a local fence company. My sixth grade son used two of these as a 40-meter vertical, braced against the eaves of the house and sitting on a pop bottle for an insulator. He worked out very well with his homemade crystal-controlled rig.

If you have room for a horizontal antenna, consider that your transmitter really doesn't care what kind of wire you use for your antenna. You can tear apart an old motor and get lots of wire. You can use speaker extension wire, or even zip cord, or just about anything else that is strong enough to bear its own weight, as long as it's copper. If the wire isn't straight, you can put it over a doorknob and pull it back and forth to straighten it. If it's solid wire you should stretch it before putting it up because it'll probably stretch when erected. One thing to remember, however: if the wire is insulated, the velocity of propagation in it won't be the same as for bare wire, so the antenna will be a bit shorter than that given by the formula.

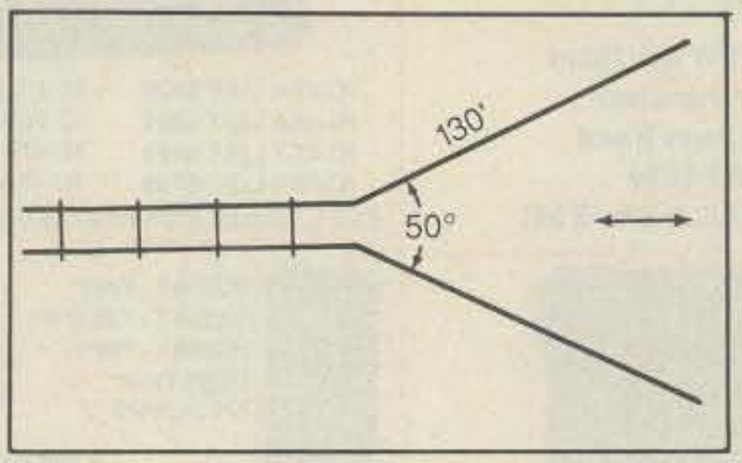

Fig. 1– A simple wire Vee beam.

Your wire antenna needs insulators, naturally. One small egg insulator costs more than a dollar. You can surely find some plastic and drill a couple of holes in it for the end of the wire and for the support rope. Clothesline (without a metalic core) rope seems to do about as well as the more expensive materials to hold up your antenna. Sunshine makes polypropylene rope fall apart rather quickly. You might try rubbing or spraying some silicone car finish on the cotton rope to make it last longer. Get pulleys large enough to pass a splice so you can replace the rope without taking down the mast.

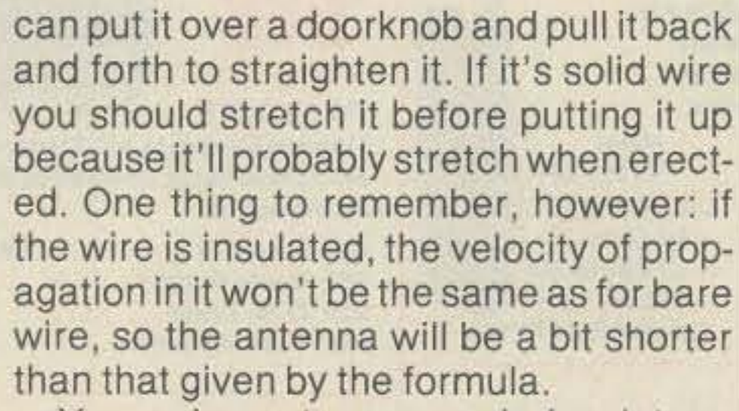

Fig. 2– An "8JK" beam that's easy to build.

You'll need feeders to connect the antenna to your station. Coaxial cable is the most widely used type but it's expensive. Also, if you run very much of it, a considerable amount of power will be lost in the coax at the higher frequencies. You can use some of the aforementioned cheap wire and make an open wire transmission line for practically nothing. It's not as convenient to run as is coax, but it costs less and the power lost is almost nil. If you live out in the country you could put your antenna on a hilltop and run power to it through an open wire line. You can make the spacing of the line anything convenient, using pieces of plastic at intervals to maintain the spacing. Use old toothbrushes, plastic rollers from 35-mm camera film, wood boiled in paraffin—anything you have around. The wire doesn't even have to be the same kind for the full length of the line, but try to use the same kind for lengths opposite each other. Use as few spreaders as possible between the wires so wet weather will have less effect on its efficiency.

One caveat: you'll need an antenna tuner for open wire line. No big deal, just two variable capacitors and a coil.

Cheap Beams, Too

Let's talk about beams. You've undoubtedly noticed that the fellows who work DX well are using beams of one sort or another.

If you put a reflector behind a flashlight bulb it appears much brighter in one direction. This is what a beam does, and when we talk about them we usually think of Yagis or quads, which beam your signal in one direction and which turn towards the station you're trying to contact.

First, a beam doesn't have to rotate; second, it doesn't have to be made of tub-

*349 E. Monte Vista Rd., Phoenix, AZ 85004

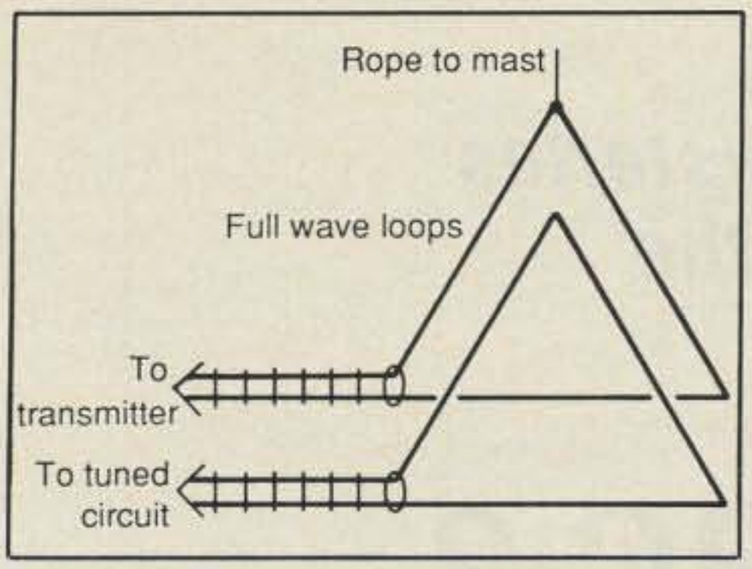

Fig. 3– You can also use wire to construct a two element full-wave delta loop.

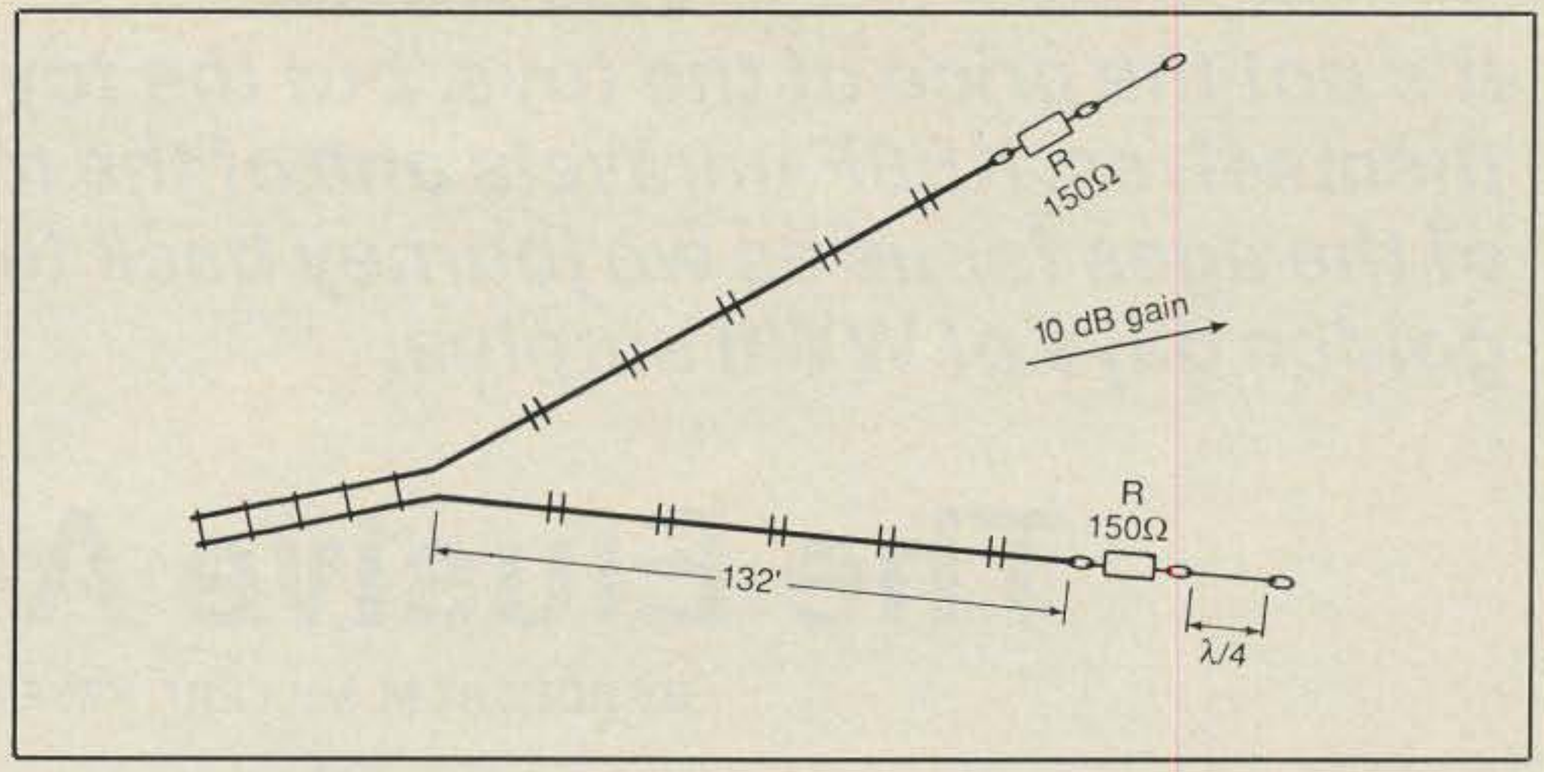

Fig. 5– How to "stretch" an antenna.

ing and cost several hundred dollars; and third, it doesn't have to be unidirectional. At my location, for example, one fixed, bidirectional beam will hit Europe in one direction and Australia in the opposite direction.

Beams are rated for gain in decibels (dB). A gain of 3 dB is the same as doubling your power and each 3 dB after that doubles it again. So, 6 dB doubles your power twice, making your transmitter seem four times as powerful. Ten dB multiplies by ten times. So if you want to increase your power, it's a lot cheaper to do it with an antenna than with a big amplifier. (Of course, if you can manage both you're in Fat City!)

Remember, this is "The Really Cheap Antenna Article." See fig. 1. If you stretch two wires in a Vee shape, each about 130′ long, you'll have a Vee beam for 20-meters with a gain of 5 dB or so. It will also operate on the higher bands with more gain. By comparison, a three element Yagi has 7 or 8 dB gain, depending on who's doing the bragging.

If you don't have much room, look at fig. 2. This is an "8JK" beam, bidirectional with about 6 dB gain, and for 20 meters only about 35 feet long. You can build one for five dollars or so using plastic water pipe for the spreader at each end. It'll operate on two bands.

For 40 meters, you're looking at bigger antennas, of course. I have the antenna shown in fig. 3. It's a full wave Delta loop on a 40-foot pole, with another, similar, loop behind it, spaced 22 feet away. The second loop is tuned to act as a reflector or director with a tuned circuit.

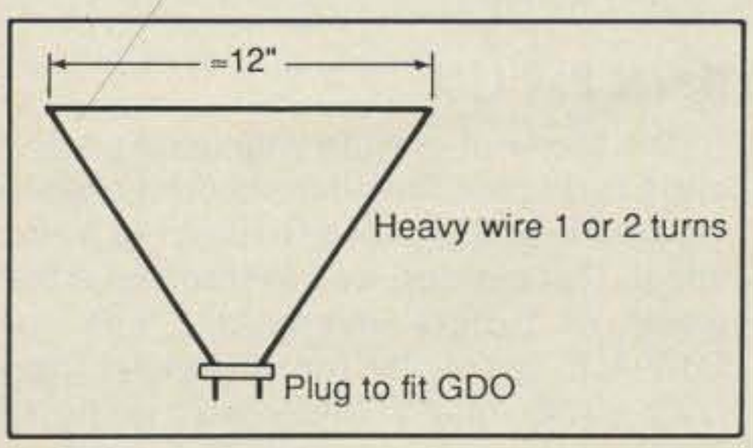

Fig. 4– A tuning aid to help you find resonance.

This isn't really a construction article and the antennas described are nothing new. If something strikes your fancy you can look 'em up in numerous sources, some of which are listed at the end of this article.

Back in the early days of TV, there was a device that let you change channels by remote control. It fastened to the tuner shaft on your TV and contained a small geared-down motor which ran on three dry cells. The one I found says, "ITT Remote Control Tuner" on it. With this fastened to the shaft of the remote tuning capacitor and two small wires to the shack, I can tune the 40 meter beam. You might find one in the junk box of a TV repair shop.

Obviously, it's great if you can get a local amateur in the right direction from you to help by transmitting while you adjust your antenna. You could also take a receiver outside and connect it to the antenna directly where you can watch the "S" meter.

If you have a wire antenna it's hard to couple a grid dip meter to it to find resonance. You can make another coil for your GDO as shown in fig. 4 and it will couple to a straight wire. Naturally, the calibration of the GDO will be off, so you'll have to tune it in on your receiver to find the frequency you're tuned to.

Everyone knows that if you add a coil to an antenna, it acts longer. Conversely, if you add capacitance, the antenna acts shorter. This effect will let you reduce the length of a wire beam or antenna to as much as a quarter of the required length. If you're cramped for space it might be something to look into. It's called "stretching" and fig. 5 gives an example.

I've touched just briefly on the subject of cheap antennas, but I hope something aroused your interest. Besides these examples, there are many other cheap antennas available that have more gain, are unidirectional, and are inexpensive.

Go ahead, be a tightwad! You'll have some fun!

Referenced

1. *Radio Amateurs Handbook*, 62nd Ed., 1985 Page 17-9 (8JK antenna)
2. *The ARRL Antenna Book*, 7th Ed., 1955 Pages 181-1183 (Vee antennas)
3. *The ARRL Antenna Anthology*, 1978 Pages 70-72 (A Stub Tuning System for Quad Antennas)
4. *HF Antennas for All Locations*, RSGB, 1982 Pages 97, 199 ("Stretched" antennas)

CQ

It's not the price of the toys, but the toys themselves. KE6F unravels one of the mysteries of the ages for us as we journey back to the golden days of WWII surplus.

The Elusive ARC-2

BY ROBERT M. MILLER*, KE6F

It was 4:05 PM, November 25, 1986. Another successful buying operation was about to come to a close. I glanced down at the pristine ARC-2 as I gently lowered the garage door. What a coup.

My bliss was suddenly broken by the chilling words of my 16 year old daughter. "You're busted," she giggled as she turned and ran for the front door of the house. "Mom! He's bought more of that radio junk," she yelled as I chased her across the lawn.

My wife of a quarter century plus has mellowed somewhat regarding my amateur radio purchases. But, was she prepared for the renaissance of my quests for the pristine ARC-5 and the illusive ARC-2?

Who in their right mind would want a 75 pound 15 watt AM transceiver? This machine that would probably never generate another watt of RF energy and would require a 28 volt power supply that would cost more than a 12 pound fully state-of-the-art multi-mode rig?"

Here I am. Sitting in the late 20th century, surrounded by computers, sending messages via AX.25 data packets, talking with relative ease to a fellow amateur 3000 miles away on my SSB transceiver and listening to my 800 watt stereo system on a pair of cosmic-cobalt earphones. Everything works flawlessly, but the romance and excitement of the hobby have disappeared and boredom is on the rise.

And as I demonstrate the marvels of modern electronics to my wife, I find it difficult to explain the non-terminal disease that afflicts one out of 20 amateur radio operators over the age of 40. This illness has no name; however, if you monitor the suspected patients closely, you may hear them mutter the tell-tale sounds that confirm the presence of the malady, "Oooh! Oooh! Oooh! I always wanted one of those."

*9655 Appalachian Dr., Sacramento, CA 95827

The germination of my mental disorder occurred 35 years ago, but it has been dormant until recently. I have suffered minor outbreaks of the disorder, but liberal doses of Z80 assembly code and TTL logic kept the malady under control.

To save myself from being consumed by this affliction and to save my marriage of 26 years, I have traced the origins of the disease. With proper therapy, such as the catharsis of this article, I hope to conquer the problem.

In Days Gone By

It was 2:05 PM, Thursday, August 25, 1955, when a less than faithful power lawn mower, knocking and pinging, obeyed the second law of thermodynamics and launched its connecting rod through the side of its crankcase.

If you're asking yourself, "What does a lawn mower's swan song have in common with amateur radio?", then please read on. There is a connection.

Well! As a 13 year old radio aficionado living in the hinterlands of Northern California, the death of my prime source of gadget and toy money was more devastating than the recent rejection by my passion flower, Marcia. The moaning of my business partner, Cousin Bill, over my not putting lubrication oil in the 2 cycle lawn mower's gasoline also did little to cheer me up.

Our client's front yard now resembled a bombed out French hedge row. The thought of finishing the job with a manual lawn mower settled over me the same sadness that one experiences when finding a shiny new 4-400 with an open filament. As I pushed and beat at the clumps of weeds that masqueraded as a lawn, the warming thoughts of a planned shopping binge in San Francisco's war surplus emporiums pulled me out of the depths of my depression.

It was 7:10 AM, Saturday, August 27, 1955, when the nausea, induced by the 10 hour bus trip down the "Redwood Highway," began to subside. The hissing of the Greyhound's brakes and the jerking of the vehicle signaled our arrival in Electro-Mecca.

Cousin Bill and I decided to kill the next hour and 50 minutes in a colorful restaurant located at the corner of Market and 7th streets. As we waited for our eggs and toast to arrive, the aroma of liver and onions from an adjacent booth took its toll on my delicate digestive system.

I made a dive for the door as poor ole Cousin Bill made an ill fated attempt to clean up the mess. I'll never forget the strangled look on Bill's face as the beanery's owner dragged him up to the cash register to pay the bill before ejecting him from the establishment.

Bill, rubbing the back of his neck, made a few unfriendly gestures towards me. We killed the next half hour peering into windows of "Standard Surplus" and other junk establishments that faced San Francisco's famous Market Street.

Market Street may never equal Courtland Street in size or electronic appeal. But the mysterious beauty of an ARC-5 or APS-13 sitting in a dusty surplus store window negates the question of locale.

By nine o'clock the streets were clogged with the city's best and worst: Old men walking bent over and shouting at the cracks in the sidewalks weaved between the other pedestrians. Ageless men, wearing sandwich boards that conveyed messages ranging from "Eat at Ernie's" too "The End Is Near," marched up and down the promenade. A bearded man trotted behind the "End Is Near prophet" with a countermeasures sign that read "Satan Is Cool."

Never Pay List

The moment of truth was upon us. Bill and I had spent the entire summer hacking weeds and dirt clods to build up a war chest. Our mission was to transcend the weeks of anxiety waiting for a GP-7 or TBW-4 to arrive by motor freight from Lima, Ohio. Our $108.57 was going to fund a surplus electronics feeding frenzy that would be remembered for the next three millennia.

A year earlier I had had a chance en-

counter with San Francisco's "Standard Surplus Store." For the staggering sum of five dollars I bought a "Gibson Girl" hand-cranked distress transmitter.

Rumor has it that we tormented the local Coast Guard for months with our clandestine transmissions on 500 kHz. The Gibson Girl's MCW emissions could be heard on a standard broadcast receiver at close range. As we learned the Morse code we also discovered that the little yellow machine was also sending an automatic "SOS." May I convey a long overdue apology to the officers and crew of the Coast Guard Cutter *Yuconna*.

The unit's hand powered generator quickly became a severe hindrance to our daily broadcasts to my amour, Marcia. A desperate attempt at building an AC power supply brought about the instant demise of the unit. We nearly electrocuted Clyde, a young radio fan who was concurrently attaching the 300 foot long wire antenna when Cousin Bill flipped the "Big Switch".

Sparked by the memorys of radio transmitters past, we entered the portals of "Standard Surplus." Under the watchful eye of the rotund, cigar smoking proprietor, we scanned the shelves and aisles for treasure. It was pure heaven as we hopped from bin to bin, pile to pile and shelf to shelf.

I listened to the local patrons barter and argue with the huge smoking mass that lived in the stained tee shirt behind the front counter. The conversations led me to an interesting discovery about our system of retail commerce. A process that our "Yuppie" generation has been preaching for the last few years. "Never pay list price!"

Getting There is Everything

Our prime directive was to purchase huge things that contained lots of meters, tubes and copious amounts of nuts and bolts. This expedition was an effort to build up our stock pile of electronic "things." Things that could be used to build even less useful things.

An IFF transponder unit could yield thousands of parts. A functional transmitter or receiver would not yield much in the way of materials and they were usually too exensive and pretty to tear up. A LORAN unit was a real coup since it contained a mysterious CRT as well as scores of knobs and tubes.

Two hours and $97.67 later we had filled an electric clothes dryer packing box with 155 pounds of WWII's finest non-lethal war materials. The process of dragging our bounty back to the Greyhound Bus Depot surely rivaled the material transportation problems encountered by the builders of Cheop's Pyramid. Hand made skids, 20 feet of hemp and a couple of sympathetic amateurs made the trek possible.

The luggage attendant at the bus depot was less than enchanted by the thought of wrestling with the cubic yard of treasure we deposited on his loading dock. Our tearful eyes, aided by the amateur's chiding, persuaded the attendant to break the size and weight rules and check the container through. May I offer a long overdue apology to the luggage attendant and his chronic hernia.

The splendor of the Golden Gate Bridge paled in significance when compared to the day dreams of all the really nifty projects that would find their genesis in the bargains that rocked in the bowels of the Greyhound bus.

As the bus plodded along U.S. 101 North through the hills of Marin County, Bill and I brainstormed on how to put the materials to good use. Bill, a year my senior and much wiser in the area of electronics, had a minimal grasp of the properties of plate load lines, coupling capacitors, and grid leak resistors. Above all he had demonstrated his prowess by building a two stage amplifier with only one B Plus source. I soon discovered that Bill had learned to use the *General Electric Tube Manual* applications notes. This document gave him incredible authority in matters of high science and electronics.

The Humboldt County fog masked what was surely a beautiful sunset as the groaning bus pulled into the hometown depot. We ran to the luggage claim area and watched with anxious but tired eyes as the grouchy bus driver pulled the remains of the cardboard monster from the undercarriage of the bus.

We were the veterans of many scrounging missions and were prepared for the final two mile leg of our journey. I walked to a small locker in the depot, inserted a stubby key into the lock and withdrew two pairs of iron wheeled sidewalk roller skates.

Bill and I wired the skates to the underside of the semidecomposed container and began the final push towards home. To this day I keep an old skate around the house for use as a moving dolly.

The hundreds of hours of pleasure that were derived from the 155 pounds of black wrinkle and olive drab gem stones will be difficult to forget. My affinity for this junk, junk that never performed any actual function, is an essential ingredient in my pursuit of amateur radio.

The row of ARC-5's on the garage shelf will probably never utter another sound or send another chirpy signal on 40 meters. The BC-375 transmitter, sitting under the workbench, will never terrify the gang on the bottom of 80 meters again. The ART-13, for lack of an 813 tube, has been retired.

Equipment functionality is not a criteria for the true collector. Happiness is knowing the toys are in the garage and ready to perform their real function. They are my time machines, an elixir of youth.

When Clement Moore wrote that "not a creature was stirring, not even a mouse" he hadn't visited a hamshack or been around electronic equipment.

The Curse Of The Critters: Bugs, Gremlins, And Mice!

BY W. CLEM SMALL*, KR6A/1

When our amateur rig, computer or other electronic gear has a malfunction, we often say that it has a "bug" in it. As you know, the term "bug" is a: "Slang term for trouble in a piece of equipment."[1] A bug is further defined as: " . . . trouble which is usually intermittent and difficult to locate,"[2], or "A usually elusive error in a program, circuit, or machine."[3] And, believe it or not, in the past we have even had electrical "bug-traps," to overcome problems that bugged us in certain telegraphic apparatus[4].

The above defined general usage of the term "bug" is reported by one source to have originated in 1945 in the U.S. Navy when one of the first computers, the Mark II, broke down. Upon close inspection, the technicians actually found a moth crushed in a relay. Naturally they "debugged" the equipment, restoring it to operation. It has been supposed that the word "debug" originated from this incident[5].

However we have been "bugged" by equipment problems since long before 1945. In the *Standard Electrical Dictionary*, copyright date 1897, "bug" is defined as: "Any fault or trouble in the connections or working of electrical apparatus."[6] At an even earlier date, an 1878 letter from Thomas Edison reads: "It has been just so with all my inventions. The first step is an intuition . . . then difficulties arise . . . 'Bugs' . . . show themselves . . ."[7] Edison's statement of the problem seems likely to be an ancestor of our current "Law of Cybernetic Entomology," which unfortunately reads: "There's always one more bug."[8]

Again, in another biography of the great inventor, we find: "When report was made that all seemed to be going pretty smoothly, a favorite expression of the inventor's was: "Well, boys, now let's find the bugs." It is said that, special difficulties having arisen in connection with a large order of tickers, Edison locked the men in for sixty hours, until all the "bugs" had been removed . . ."[9].

The technotropic "port" of entry, the RS-232 (for Rodent Sensitive 232) port.

Some Mischevious Elves

In point of fact, the exact date of when the term "bug" was first applied to equipment failures may be lost in history. Nevertheless, it obviously has been with us for quite a long time. But let's look now at another instance of our tendency to blame equipment breakdown on "little critter" types. What I'm referring to here is our use of the term "gremlin." This name is used to represent mysterious little beings who are said to be responsible for equipment malfunctions of unknown origin.

Historically, gremlins have been said to be members: " . . . of a tribe of imaginary elves, whom the RAF, in World War II blamed for all inexplicable failures, mechanical or otherwise, in aeroplanes"[10]. Since these mischevious elves first became popular, they have extended their pervue considerably. Now our "Old Reliable," *Webster's Dictionary*, tells us that gremlins are creatures: " . . . supposed to interfere with the smoothness of any procedure"[11].

In other words, bugs are not enough, we must also have gremlins interfering with "any procedure." That means both our hardware and software! It could be worse though, gremlins are also said sometimes to give assistance, rather than cause mischief. Ever had a piece of gear break down, and then seem to fix itself? Yup, gremlins at work! But, on with our story.

Home Sweet Home

Now, with both of the above mentioned

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little critter-types running amuck of our electronic gear, you might think fate would be considerate to us and leave it at that. But our space-age technology has spawned its own special space-age problems: now we are faced with a new critter-problem from a different but well known critter. Let me explain.

Just a few months ago I was happily using a computer patch to interface my amateur radio transceiver and C-64 computer. With this system I really enjoyed copying AMTOR, a type of handshaking, error-free radioteletype code. Then one day I noticed that the system's performance became erratic. Copy frequently became garbled, tuning became difficult, and finally my copy was nothing but trash.

Well, I called the manufacturer and described the development of the problem. They were friendly and sympathetic, but said that it was a very unusual case. If I'd send it in they'd check the unit over. So, I dismantled the system and prepared to ship the interface. As I was handling that unit, I could hear something rattling inside. Perhaps a transistor, IC, or other component had come loose. So, I opened it up to find, what? Transistors rolling around? No! There was a quantity of little black pellets indicating a visit from a friendly neighborhood mouse.

Now I was panicked, sure that the little critter had chewed up the components and circuit board beyond repair. Close inspection revealed no toothmarks however, only deposits of those accursed little black pellets and some droplets of a liquid nature. Well, after the use of an old toothbrush, a moderate amount of solvent, a number of cotton swabs, and a lot of elbow grease, the computer patch came back to life. When I reconnected the system, decoded AMTOR signals flashed across the C-64 monitor screen once more. Ah, sweet success! And, importantly, now a metal plate was bolted over the unused RS-232 port, to heartlessly affirm the eviction of the poor little mouse from his cozy home. Space age technology had survived another critter attack!

The modified anti-technotropic "port" now features a Rodent Secure 232 port.

The Plot Thickens

I find that my experience with the mouse species is not uncommon. A recent issue of the ETA *Technician's Association News* reports two "Mickey Mouse" repair jobs required on computers invaded by the fuzzy little critters. "Space-age" though the problem may be, mice are not just a contemporary problem. Like the antics of bugs and gremlins, the mischief-making of the mouse has been recorded far back in his-

tory. Even the meaning of the word mouse includes a warning for those who will listen: *The Compact Edition of the Oxford English Dictionary*[12], gives one definition for "mouse" as: "to ransack, rummage, or pillage."

Thus, the moral of my story should now be clear: if you live in "mouse country," carefully block all unused ports or holes in your equipment cabinets, even holes so small that only a very small mouse can enter. The cozy warm interior of electronic equipment is just too tempting to our furry little friends. The results of ignoring this precaution can be disaster for our computing systems.

And, In Closing

So now, with all due respect, I suggest that it is high time for us to add a couple of new words to our electronic and computer dictionaries. The reason being, of course, to describe the *"technotropic"* behavior of the common house mouse, so we can speak not only of debugging equipment and programs, but also of warding off gremlins, and of *evicting mice*. And while we're at it, maybe we should build a few new "bug-traps!

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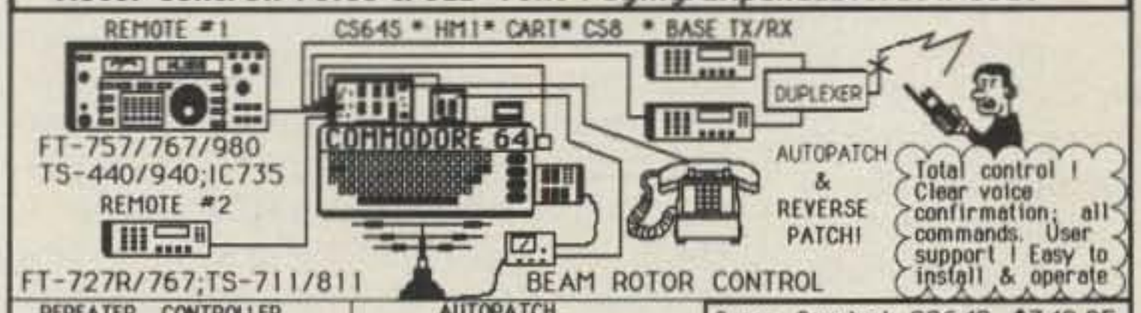

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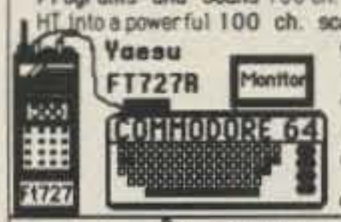

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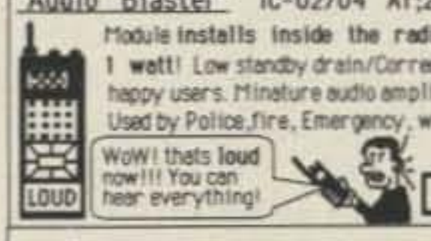

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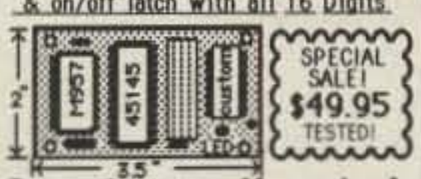

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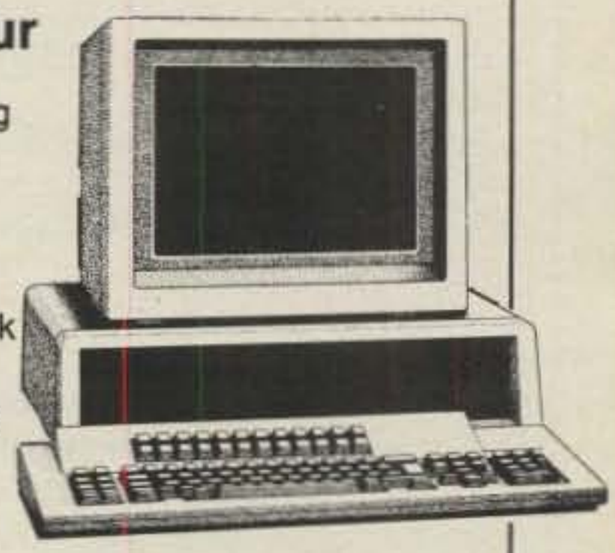

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INFO ON AMATEUR RADIO LICENSING

Amateur License Question Revision Schedule Released

As of January of this year, preparation and administration of all Amateur Radio Operator license examinations are now completely handled by the amateur community itself. No longer is the FCC in the testing business at all. Their only function is in an oversight (supervisory) capacity.

As we mentioned in our last column, Volunteer Examiner Coordinators (VEC's) attending their 1987 Conference held in Atlanta on July 10th established a three year question pool revision cycle during which time all five (Novice, Technician, General, Advanced and Extra Class) written elements are to be reviewed and changed as necessary and new question pools implemented.

Thirteen VEC groups elected a Question Pool Committee (QPC) made up of Jim Clary, WB9IHH (ARRL-VEC, Chairman), R.C. Smith, W6RZA (Greater Los Angeles ARG-VEC) and Ray Adams N4BAQ (Western Carolina ARS-VEC) to develop and maintain the question pools on behalf of all VEC's and volunteer examiners. The QPC will serve for renewable one year terms. (Your author, Fred Maia/W5YI-VEC was named as alternate committee member.)

Several question pool revision schedules were considered. The committee finally decided to implement all new examinations on November 1st. This would give applicants time to study the new license preparation material before the Spring hamfest (and peak testing) season. It would also allow school amateur radio Novice and upgrade classes to start the school year with known examination questions and answers rather than have to deal with a question change in the middle of a school year.

It was also agreed to have a nine month period between question pool finalization and implementation—that is, when the revised questions are first used in actual examinations. Each question pool will be placed in the public domain once released by the QPC. The nine month period will allow VEC's and license preparation publishers adequate time to print new tests and publish study material.

Each written test element will be completed during a one year preparation period. The question revision "timeline" appears in Table No. 1. The QPC will solicit input from the amateur community on each pool's outline (syllabus) and individual questions which will be considered simultaneously. All amateurs, volunteer examiners and VEC's are invited to participate in the test pool re-evaluation process.

Revision Function:	Novice/ Technic. 2, 3A	General/ Advanc. 3B, 4A	Extra Class 4B (*)
Syllabus Revision Input	2/1/88	2/1/89	8/1/87
Syllabus Revision Closes	4/1/88	4/1/89	9/1/87
New/Revised Question Input	2/1/88	2/1/88	8/1/87
New/Revised Questions Close	10/1/88	10/1/89	12/1/87
New Question Pool Released	2/1/89	2/1/90	3/1/88
New Pool Implemented	11/1/89	11/1/90	11/1/88
(Also New Pool Implemented	11/1/92	11/1/93	11/1/91
-Every three years-	11/1/95	11/1/96	11/1/94, etc.)

* = The Element 4B schedule does not track exactly with those of other elements because the time line was not agreed to by all QPC members until early August.)

Table I- Amateur Radio Operator Examination Question Pool Revision Schedule

According to the 1982 enabling legislation, **Preparing VE's** (as they are called) must meet certain license class prerequisites. All amateurs, Technician class and higher, may suggest changes to the Novice (Element 2) pool. Advanced and Extra Class may participate in the Technician and General Class (3A and 3B) revision. Only Extra Class level amateurs, however, may suggest changes to written Elements 4A and 4B, Advanced and Extra Class.

Extra Class Pool To Be First Revised

The Extra Class (Element 4B) will be the first question pool worked on. The new 4B question pool is scheduled to go into effect November 1, 1988. The revised Novice (Element 2) and Technician (Element 3A) will be considered together and implemented on November 1, 1989. Finally, the revised General Class (Element 3B) and Advanced (Element 4A) will be put into effect on November 1, 1990. Another new Element 4B Extra Class pool will again be released effective November 1, 1991—and so forth.

Thus, all amateur radio operator license study material currently in the marketplace will be current for at least another year. It should be recognized, however, that some questions could be amended in between scheduled revisions due to changes in FCC regulations or typographical errors.

Here Is How You Can Help

All questions in each of the various question pools are based on its syllabus —or outline. Any **Extra Class** amateur may submit new topics for the Element 4B syllabus and/or new/revised questions for the current syllabus. By the time you read this, however, suggestions for new syllabus topics will have closed (September 1, 1987). You still have time to suggest new or revised Element 4B questions until December 1st.

New questions should relate to any of the nine subelements (i.e. 4BA - FCC Rules, 4BB Operating procedures, 4BC Radio wave propagation, 4BD Amateur practices, 4BE Electrical principles, 4BF Circuit components, 4BG Practical circuits, 4BH Signals and emissions . . . and 4BI Antennas and feed lines). Question emphasis should be placed on privileges and knowledge required of *Extra Class* amateurs. Don't suggest a question that really should be on a lower class examination.

Suggestions for new or revised Element 4B (Extra Class) questions should be submitted to one of the following QPC members:

Jim Clary/WB9IHH, ARRL-VEC, 225 Main Street, Newington, Connecticut 06111

R.C. Smith/W6RZA, Greater Los Angeles ARG-VEC, 9737 Noble Avenue, Sepulveda, CA 92343 . . . or;

Ray Adams/N4BAQ, Western Carolina

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

ARS-VEC, 5833 Clinton Highway #203, Knoxville, TN 37912

New or revised questions should be submitted one to an 8½" X 11" sheet of paper indicating:
(1.) The Element 4B syllabus topic
(2.) The new/revised question
(3.) The answer with or without suggested distractors (multiple choice wrong answers)
(4.) The answer reference (i.e. the source of the correct answer)
(5.) Your name/address/call sign and class of license.

Here is your opportunity to influence the amateur radio operator question pools. The current Extra Class (Element 4B) question pool (with distractors and answers) is very widely published and we suggest that you review the existing 4B pool before submitting your suggestions to the QPC.

From The Mailbag

Questions of general interest from readers . . .

Is it possible for an applicant to take all of the written examinations before passing any of the code tests?

You bet it is! We have had several instances where a candidate has passed both the Novice and Technician written examinations (Element 2 and 3A) and failed—or did not take—Element 1A, the 5 words-per-minute telegraphy examination. A situation like this can lead to considerable confusion!

When Element 2 and 3A are taken before a three VE (VEC coordinated) test session, a CSCE (Certificate of Successful Completion of Examination) is given the applicant. Element 1A (5 wpm) can later be taken before only two (General Class or higher) volunteer examiners since it is a Novice level test. The successful Form 610 must then be forwarded to the VEC that coordinated the Element 3A (Technician) examination for the applicant to be approved for a Tech license. The VEC will be able to confirm the successful passing of Element 2 and 3A from their records—or it may be necessary for the VEC to contact the VE team that conducted the examination.

It is *very important* that all applicants carefully retain all evidence of passing amateur radio operator examinations. This evidence can be in the form of Certificates issued at VEC coordinated test sessions—or original application Form 610's where an applicant passed a portion of the requirements needed for a Novice license, but failed the other needed test.

Applicants should be insistent that they receive the *original* Form 610 back from the two person VE team when they only pass one of the needed examinations—either the written or telegraphy examination, but not both. This Form 610 is needed by the VE team that will examine the applicant further.

What do I need to do to become an accredited Volunteer Examiner?

We assume that you mean to examine applicants for Technician and higher amateur radio operator licenses. While there are other requirements, Novice level VE's must primarily hold General class licenses. It takes a team of two VE's to conduct a Novice examination.

Teams of three Advanced and Extra Class amateur radio licensees may conduct license examinations above the Novice level. Advanced class VE's may only administer the Technician examinations. General class and higher must be given by teams of Extra Class level examiners. While some VEC programs accredit Advanced class licensees, the W5YI-VEC program only utilizes Extra class VE's since only Extra's can administer all examinations.

Every VEC has their own application form or procedure to become an accredited volunteer examiner—and VE's above the Novice level *must be approved* by the coordinator. It is best to contact the specific VEC to find out their procedure. While our program has an application form, we really only require that a VE candidate affirm in writing that he/she is: (1.) Extra Class, (2.) has a clean enforcement record—no revocations or suspensions, (3.) at least 18 years old land (4.) not engaged in an amateur radio associated business. A copy of their Extra Class license or upgrade Certificate to Extra Class should also be enclosed.

Why are there so many different amateur testing programs?

A good question! Back in 1982, President Reagan signed legislation that allowed the amateur community to "self-test" applicants. The regulation was actually tied to other more meaningful legislation and meant little to anyone except the FCC (who, due to severe budgetary constraints, were trying to turn amateur testing over to the hams themselves) and amateur radio operators.

In late 1983, the FCC sent out a *Public Notice* stating that they were inviting various organization to act as liason between the government and volunteer examiners. While some groups did apply to coordinate ham exams on a local level, we were the first to do it on an international basis.

At present there are twenty some odd groups that act as VEC's—Volunteer Examiner Coordinators. A VEC acts as the link between the volunteer examiner and the U.S. government. VEC's do *not* administer exams—they merely provide the leadership and materials for volunteer examiner teams to handle the testing. They also act as the repository of applications (FCC Form 610) for new or upgraded amateur tickets above the Novice level. VEC's approve application's from their testing teams and forward them to the FCC for license issuance. They are appointed on a regional basis. VEC's may apply to conduct their testing program in more than one call sign area if they so desire.

Each VEC has their own volunteer examiners who they accredit to participate in this ham testing program. Every other VE team and VEC is required to accept the testing results of all other accredited VE teams regardless of who the coordinating VEC might be. Thus a test passed under an ARRL examining team is recognized by every other VE team and VEC. A "Credit Certificate" issued by any VE team is recognized by teams approved by every VEC. The W5YI-VEC program accepts the Extra Class volunteer examiners of all other testing programs.

The FCC has now placed a moratorium on further approving of any new VEC organizations—probably because it takes a considerable length of time to train new coordinators and there does not now seem to be any shortage of amateur testing opportunities. Seveal VEC groups have dropped out of the ham testing business and have not been replaced.

Does a VE testing team need to have a sponsor such as an amateur radio club?

No, not at all. *Any* three accredited volunteer examiners can conduct amateur radio examinations above the Novice level once they have been approved by a coordinating VEC. You merely tell the coor-

dinator that you have the necessary three VE's and are ready to conduct an examination session. You will then be forwarded that particular VEC's testing program instructions, examinations and other materials. You send the successful applications, test papers and necessary reports back to the VEC.

By law (§Part 97.515), VEC's must accredit examiners without regard to race, sex, religion, national origin or membership (or lack thereof) in an amateur radio organization. You need not even be an ARRL member to be an ARRL volunteer examiner. A VEC may, however, refuse to accept a VE for other reasons.

Can you sort out pre-registration, walk-ins and closed to the public testing sessions.

Some VE teams require that you pre-register (and pre-pay fees) before you can be tested for an amateur license—others allow you just to *appear* at the session and they will examine you—a so-called "walk-in" examination. It is up to the VE team how they want to handle it. A *closed to the public* examination session might be one for a ham upgrade class . . . or a private session for a handicapped individual. Although testing might be *closed to the public*, it still must be announced publicly. *Secret* amateur testing sessions are positively *not allowed*. Contact the VE team to determine their ground rules.

How hard is the "paperwork" to complete at a testing session?

Not very hard at all, although different VEC's have different reports that must be filled out. Basically all the FCC wants to know is how many applicants were tested, how many upgraded and how many test elements were administered at each session. VE teams send this report in with the successful *Form 610* applications and test papers to their VEC office. Although the test papers are retained by the coordinator for one year, the session reports are kept longer in the event they are needed by the FCC.

Can I be a volunteer examiner for more than one VEC?

Certainly, and many VE's are accredited with three or more organizations. Since the DeVRY, W5YI and ARRL-VEC groups conduct examinations on a national basis, many VE's elect to become accredited with all of them. The W5YI-VEC program allows its VE teams to utilize examiners accredited with other VEC programs. We also send these examiners our accreditation documents.

Is it permissible to provide amateur communications for an activity when the underlying motive is basically to assist a non-profit charitable fund raising activity?

What is permissible communications is always a tricky question to answer. It depends on the type of communications and who benefits. If the main purpose of the communications is to benefit the public . . . such as to provide some sort of assistance—particularly *emergency* assistance—to the individuals participating in or observing an event, then participation by ham radio operators is okay. If the main purpose is to report progress of an activity to some central unit or to facilitate the operation of the event, then it is not legal and amateur communications may not be used. Communications aiding cyclists during a bicycle race is permitted, reporting race standings is not.

The "*Hands Across America*" ham communications of a couple of years ago was a "borderline" activity in that ham radio was not only used for public assistance purposes, but also used to report on the condition or *linking* of the "line" across the country to the event's sponsors. Crowd control ham communications during a parade is legal—while facilitating ordinary movement of parade floats is not. Participating in a weather net is allowed if it is a *meteorological club-like activity* of the participants. Assisting a broadcast station to gather weather results is definitely not allowed.

Using ham radio to *routinely* assist the police during Halloween is prohibited—while during a specific emergency situation is permissible. Be very careful of the type of ham communications you participate in during such occasions! Ask yourself, who realy am I helping? Who is the benefactor? If the communications primarily assist an outside group or sponsor rather than to lend assistance to the public (or yourself), I wouldn't do it. Just because an event is non-profit or charitable does not mean that the amateur communications prohibitions involving "business" or "third party traffic involving material compensations" do not apply. CQ

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KAM includes watchdog timers on each port, an RS-232/TTL serial port, and a bargraph tuning indicator for HF operation. KAM even comes with an external modem connection point for optional 2400 b/s packet operation. For the greatest degree of sensitivity and flexibility, turn to KAM, Kantronics All Mode.

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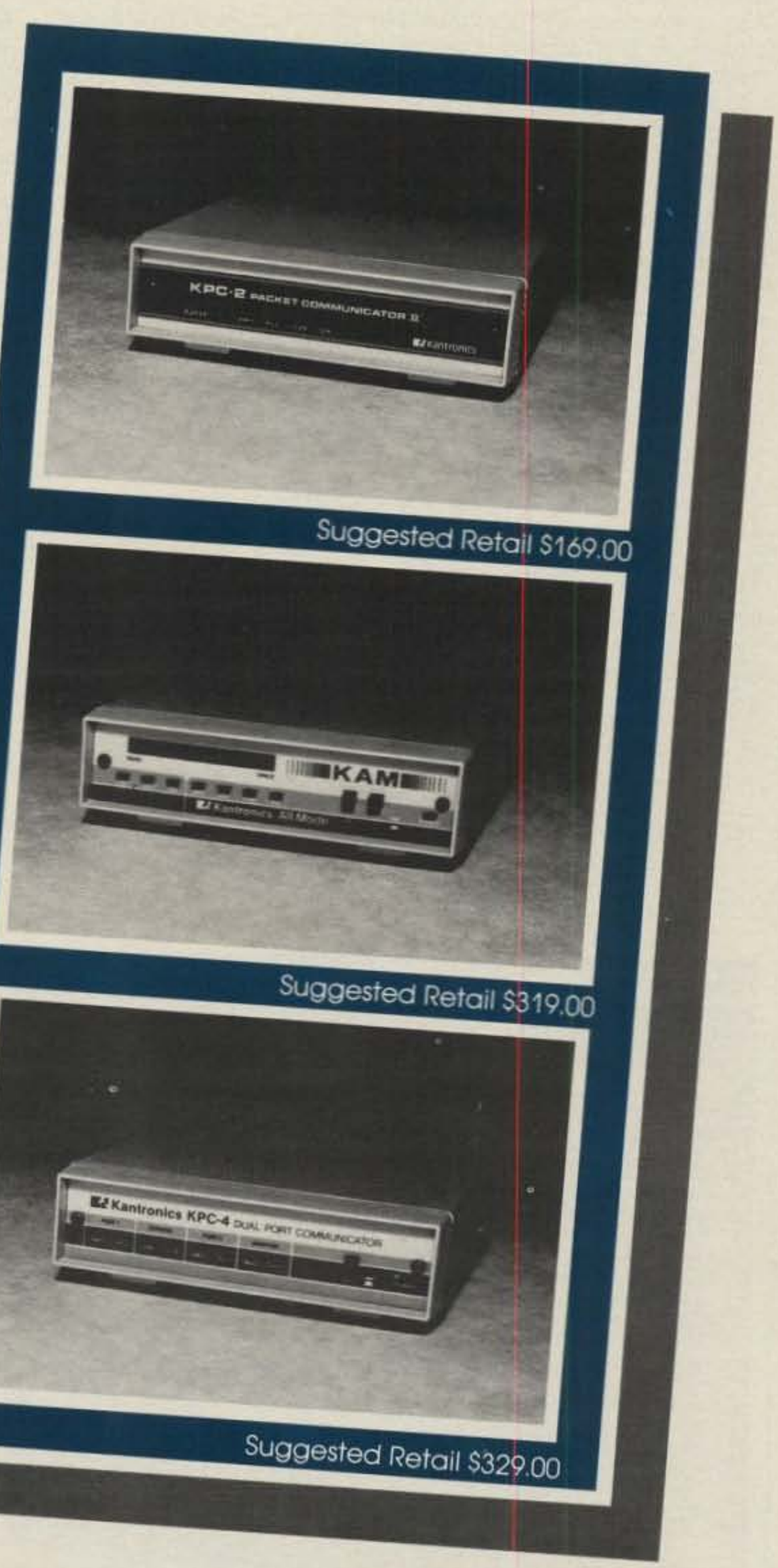

* KAM, KPC-2, KPC-4, and KPC-2400 units shipped 7-31-87 or later.
** KPC-1 (Packet Communicator), KPC-2, KPC-4, KPC-2400

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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

General-Purpose Software

This time W8FX focuses his attention on some useful general-purpose software for the hamshack. If you use your PC for purposes other than amateur computing, you should enjoy this discussion of two very capable software products. —K2EEK

This month we will expand our hamshack horizons, so to speak, by examining two general-purpose software products for the IBM-PC—ones which, while not designed specifically for the hamshack, should be of interest to almost anyone who uses a computer. One of these programs is the widely advertised Intuit IS-2000 integrated package, and the other is an unusual database, SquareNote. We've found good use for both of them, and we'd like to share our findings with you. Following that we'll take note of some new antenna products. First let's look at two intriguing products for the IBM-PC.

Two for the IBM-PC

Intuit IS-2000. After obtaining an IBM-compatible computer about a year ago (a CorData PC-400) to complement my Commodore 64 and 128 for hamshack, wordprocessing, and other business and home applications, and accumulating a good deal of IBM-type software, I wondered what *single* piece of software I would select if I could afford but one product, in addition to amateur radio-specific software.

After obtaining a copy and putting it through its paces, I believe that my choice would be Intuit, a rather unique package by Noumenon Corporation. While it may be a slight exaggeration to agree 100% with the company's advertising that it's "for all of your business and professional work," it does come fairly close. It is a fully integrated package with a simple database, easy spreadsheet, and decent wordprocessor, with a number of other features tossed in. I found that it does, in fact, do most of the nonhamshack-type work you might need to do in the home and in a small business operation. This includes writing letters, preparing labels and envelopes, doing personal and business bookkeeping, writing reports and manuals, performing casual computations, keeping track of data of various kinds, and other light to medium tasks. The way it works is especially suitable for computer novices.

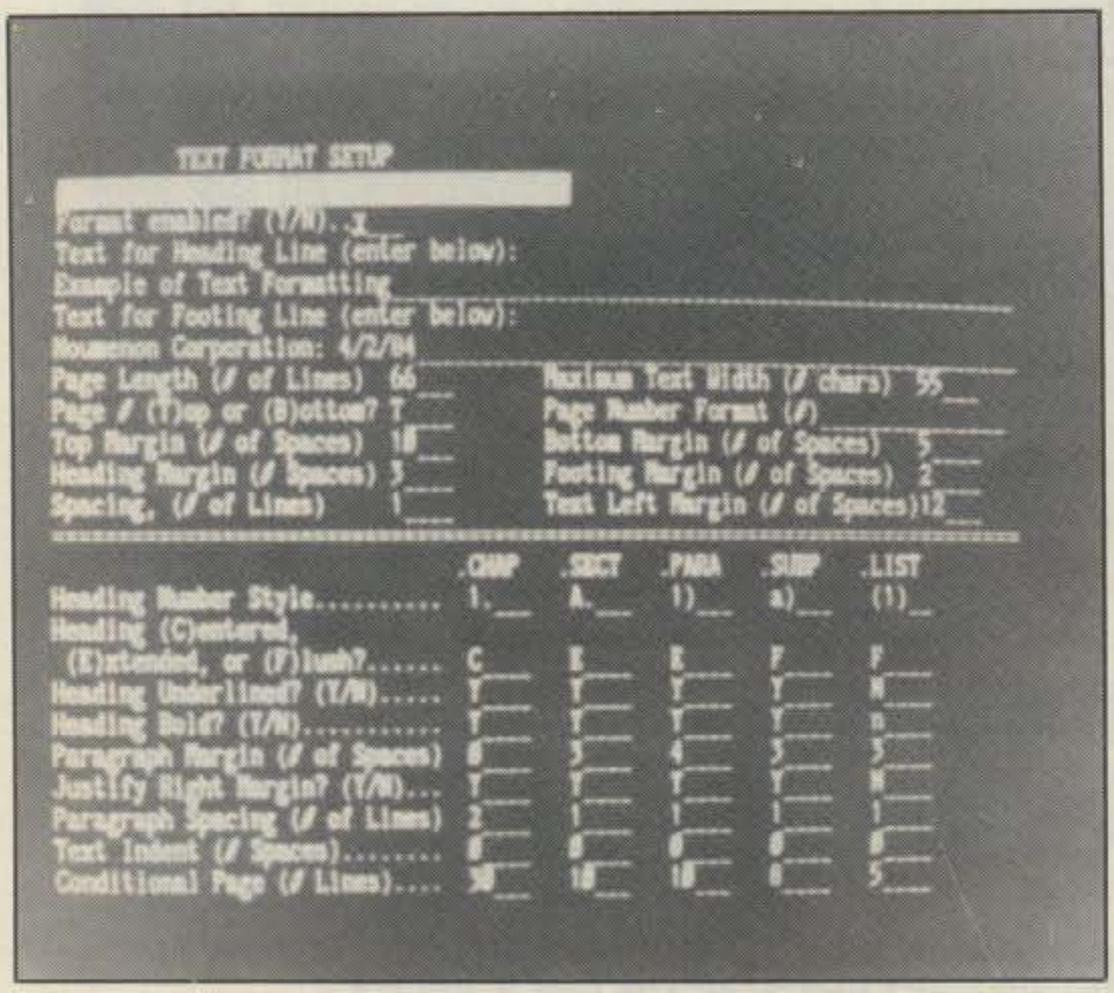
Interestingly, you don't even have to have a copy of DOS for Intuit to run; it acts as its own operating system, with or without DOS. It doesn't create individual DOS files of your various documents and projects. Rather, the entire disk on a floppy disk system, or subdirectory on a hard disk system, is treated as though it were a single file. What one normally would think of as "files" are just units of text or numeric data within these large single files.

An advantage of this system is that it allows you to name your Intuit-based files with sentences or phrases up to 67 characters in length, rather than the 11 characters to which DOS limits you. You can also flexibly arrange Intuit files into directories and subdirectories that are organized any way you wish; each directory can contain up to 4,000 file names. This kind of flexibility makes things easier to find and generally characterizes every aspect of the program's operation.

Intuit runs on most any IBM-PC or compatible with as little as 256K of RAM memory and two disk drives, or a single floppy disk and a hard disk drive. It does take 384K to run Intuit under the MS-DOS operating system, however. The program also has a built-in RAM drive (which also requires more memory) that's colorfully named ZIZRAM, useful in speeding up operations if you don't have a hard disk.

In addition to the unusually flexible directory structure and the RAM drive, as well as the wordprocessing, spreadsheet, and database functions (all of which are fully integrated and allow data to be passed freely between them), Intuit also includes several other useful features. These include a clock/calendar, calculator, line-drawing graphics capability, hard disk backup and restore utility, direct typewriter, text word counter, DOS file import and export function, and sophisticated "explain"

317 Poplar Drive, Millbrook, AL 36054



Text format setup screen for the Intuit™ integrated software package discussed in this month's column. (W8FX photo)

Photo of the Intuit™ program's root volume main directory. See text for discussion of this unusual integrated program and its characteristics. (W8FX photo)

```
    1    ROOT VOLUME: MAIN DIRECTORY
SUBJECT NAME                                                          TYPE
CHANGE TEXT FORMAT DEFAULT TO THAT OF A MARKED TEXT SUBJECT           APPLICATION
CONFIGURE A PRINTER                                                   APPLICATION
COPY THIS FLOPPY DISK VOLUME                                          APPLICATION
COUNT WORDS IN A MARKED TEXT SUBJECT                                  APPLICATION
FORMAT THE VOLUME THAT IS MARKED IN THIS ROOT DIRECTORY               APPLICATION
PRINT OUT A DIRECTORY OF THIS ENTIRE VOLUME                           APPLICATION
PRINT THE TEXT SUBJECTS MARKED IN THIS DIRECTORY                      APPLICATION
SET COLORS ON A COLOR MONITOR *IS-2000                                APPLICATION
SET MONITOR & VIDEO BOARD TYPE                                        APPLICATION
TYPEWRITER - Type directly to printer                                 APPLICATION
VOLUME FIXUP                                                          APPLICATION
DOS FILE IMPORT/EXPORT OPTIONS                                        DIRECTORY
HARD DISK APPLICATIONS                                                DIRECTORY
Intuit Demonstration                                                  DIRECTORY
KEYBOARD DRIVERS                                                      DIRECTORY
PRINTER OPTIONS                                                       DIRECTORY
RAMDRIVE, LINE GRAPHICS, CLOCK, SCROLLING & OTHER OPTIONS             DIRECTORY
Select this if you have an AT, 3.5" drives or more than 2 floppies    DIRECTORY
SYSTEM SCREENS & FILES                                                INTUIT
DISPLAY CLOCK/CALENDAR (v1.01) - REQUIRES DOS                         PROGRAM
DOS FILE IMPORT/EXPORT FROM DOS MODE                                  PROGRAM
LINE GRAPHICS PROGRAM- WITH DOUBLE LINES (1.01)                       PROGRAM
CARRIAGE RETURN SCANS ALL FIELDS IN FORMS                             PROGRAM
```

Fig. 1– Shown above is the Intuit IS-2000 program's main or root volume directory, which in this example has been sorted by subject type.

(help) command, as well as an indexed data lookup feature.

The wordprocessor is fairly plain vanilla. It doesn't include "bells and whistles" such as spell checking, thesaurus, multiple-column pages, and other features relatively few people need or want. But it is easy to use and allows you to set up predetermined printing formats. Text documents can be up to 4,000 lines (75 pages) long and can be chained together to print even longer documents. The database is more powerful, especially with robust lookup, find, sorting, and marking features. Records can contain up to 1,000 characters, and each file can contain up to 3,995 records under most conditions. It's one of the easiest to use databases I've worked with. Mailing lists, in particular, are a snap to create and maintain using Intuit.

While the spreadsheet is definitely not as sophisticated as Lotus 1-2-3™ and other pricey number crunchers, it is very useful and allows creation of tables of data up to 200 rows deep and 65 columns across. Spreadsheet tables can have 13,000 numeric cells plus 46 procedures (operations) containing the theoretical equivalent of 200,000 "formulas." Each row and column can be named; mathematical functions are performed by referring to those names, rather than cryptic cell IDs. The fact that the spreadsheet tables are English-language driven makes Intuit handle far more easily than most other spreadsheets; it's easier to do casual calculations or build complex models when working with English-like instructions. Very neat, indeed!

The bottom line is that Intuit is a very good integrated program for just about anyone but the so-called "power user." Such folks will probably require the sophistication and power that only dedicated, single-purpose packages can provide. Also, since the program operates in rather unconventional ways (remember, you don't even need DOS), it can be frustrating working with it at the outset. But at $39.95, the program is a good value that is very hard to beat. Fig. 1 shows the Intuit "root volume", main directory, while fig. 2 shows one of the many help screens, this one for the built-in four-function memory calculator.

For more information, contact Noumenon Corporation, 512 Westline Dr., Alameda, CA 94501. Oh yes: I should mention that while Intuit is a general-purpose product rather than

```
CALCULATOR:

Calculator calls up a four function memory calculator.

The special keys used by the calculator are:

M  Stores or retrieves the current memory contents
A  Stores or retrieves the accumulator contents
C  Clears the memory

The CARRIAGE RETURN enters a number and moves to the next calculator window.

The DELETE-LINE key will clear the entire calculator.

The LINE-MARK key can be used to mark any of the three result windows in
the calculator, ie. RESULT, ACCUMULATOR or MEMORY.  When used repeatedly,
the LINE-MARK key will move the mark from window to window and eventually
cancel the mark.

A marked calculator result can be copied to other places within Intuit
through use of the COPY key.

PRESS ANOTHER KEY FOR MORE EXPLANATIONS OR SPACE BAR TO RETURN...
```

Fig. 2– Shown here is one of the many of Intuit's call-up help screens, this one for its four function memory calculator.

an amateur radio software package, its author (and the company's president) is an amateur—Martel Firing, K6BXT.

SquareNote. This is a program I've come to use regularly and find that my appreciation of its capabilities and usefulness grows daily. It's a very unusual database, a flexible system used to organize *text*.

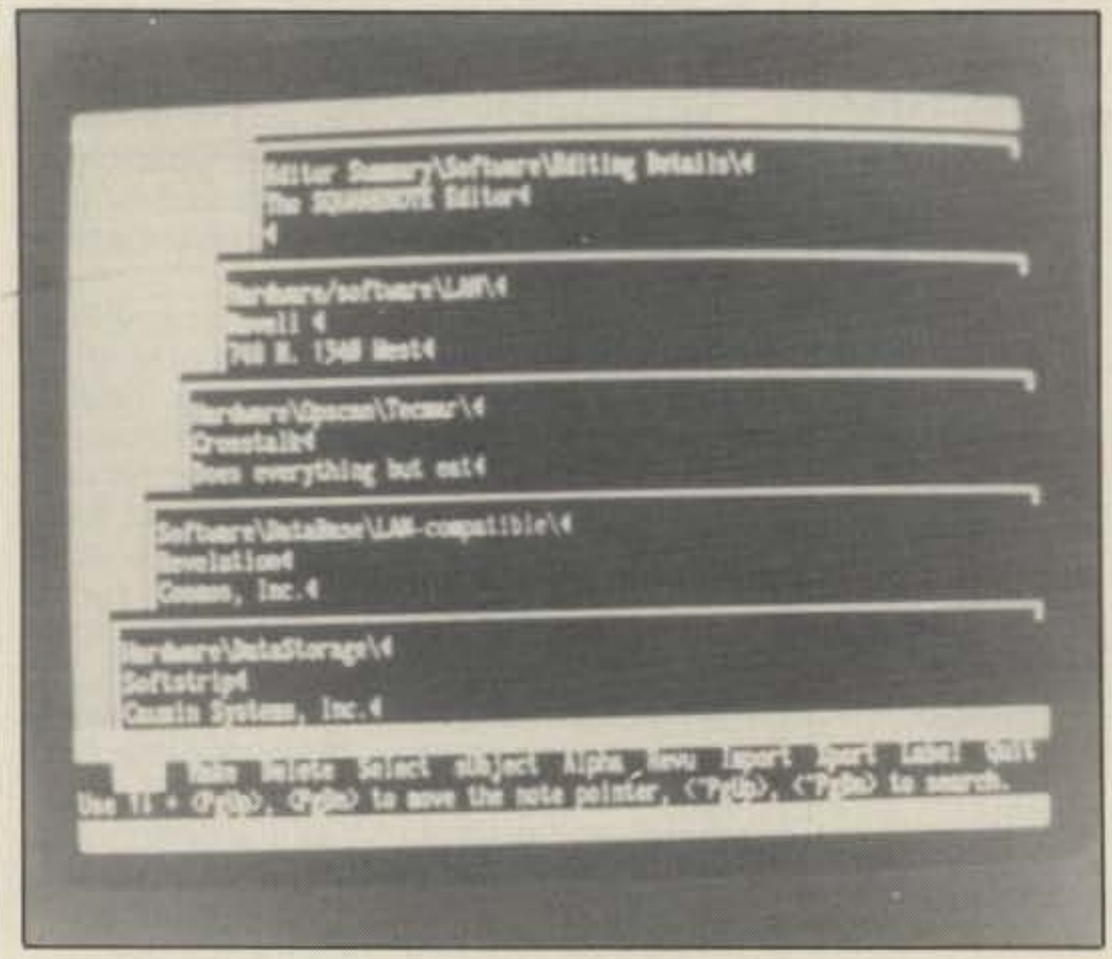
Unlike other databases, SquareNote doesn't make you predefine fields or know in advance how long your entries will be. Instead of using records, like most other databases, this one is made up of "notes." Rather than using a few keyed fields for data retrieval, it allows you to enter up to 100 keywords or subjects per note, and to subsequently find your note by any one of these subjects. A SquareNote database (a "notefile") can have as many notes and as many different subjects as you prefer, the only limit being available disk space. The program lets you write, edit, store, retrieve, and maintain notes in a similar (but more sophisticated) manner as you would work with a box of ordinary file cards.

As we've indicated, the program files the notes under subjects that you select, under up to 100 different subjects; any number of notes may be filed under a given subject. Whenever you want to examine one of the notes, you ask the program to gather those notes into a stack by subject or combination of subjects; you specify the subjects to be checked via a menu-driven selection screen. If you should request a subject that the program hasn't already learned, it advises you of other subjects with similar spellings in case you actually meant something else instead. Notes on the stack can be edited, deleted, removed from old subjects, filed under new subjects, or directed to either your printer or to a file for handling by other programs, such as a text editor or wordprocessor.

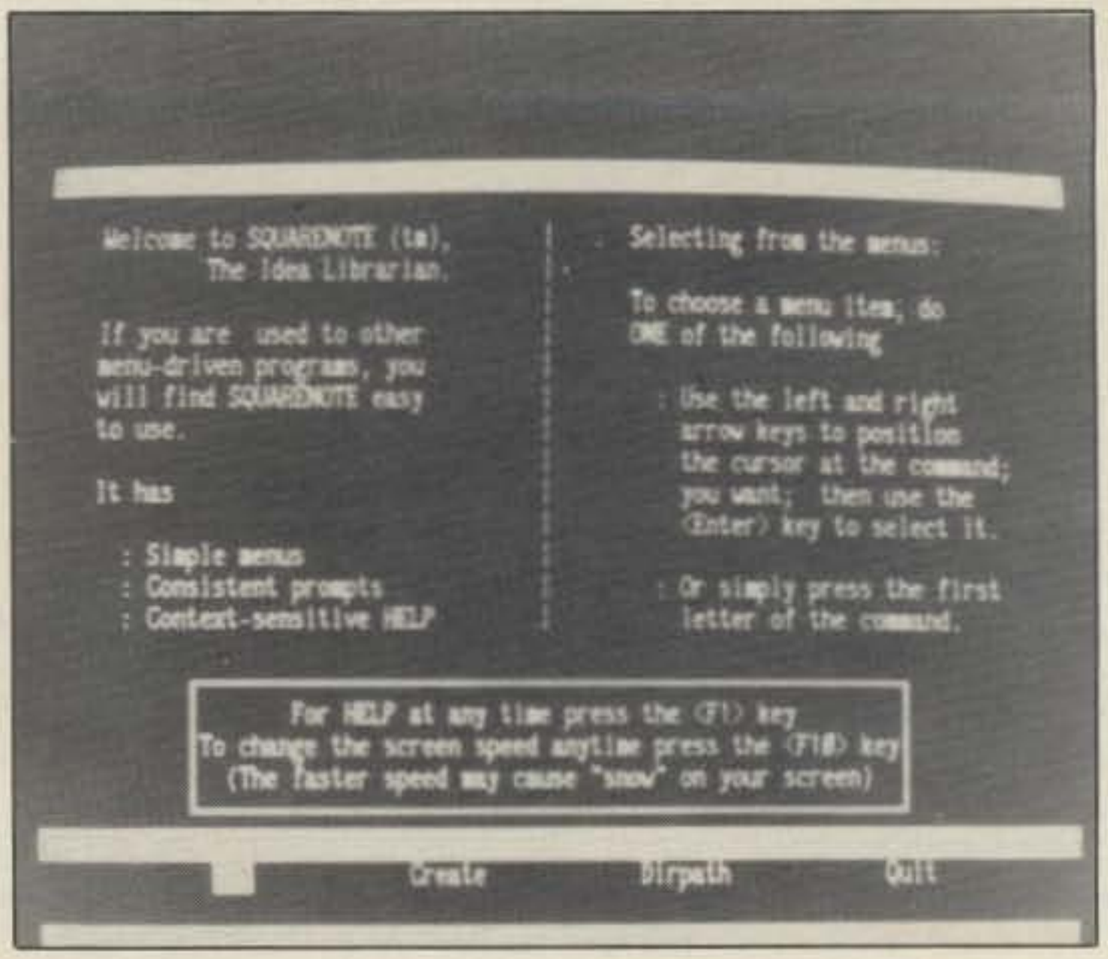
The program has an index lookup feature, so when you're entering subjects, a single function key retrieves your entire subject index for review so that you can pick a subject keyword you may have forgotten. Also, when working with a SquareNote file, you can browse through the active notes you've selected (up to 1500 of them), scrolling up and down the selected notes to browse through the whole stack. You can also sort your notes by first line or zipcode. A nice extra feature is that if you can't find the particular note you're after using keywords, the program can also search for a note containing a string (series of characters) of text that you supply. This feature could be useful in finding, say, one's call letters or name in a list you're maintaining.

Aside from being a very unusual database, I've found SquareNote to be a very useful item of hamshack software. I've started to use it to extract key information from previous Antennas & Accessories columns in order to find just when I discussed a particular subject or covered a given product in the past. By setting up about 50 keywords to cover the major subject areas we've discussed so far in the column, I create a short "note" for each month's column. Each note includes a listing of the column's major areas of discussion (the boldface entries you see in the column) and a short, one-line description of each specific feature topic, antenna product, software accessory item, name and callsign, or whatever.

Going through this procedure not only enables me to better plan future columns, but it also helps me to more easily tell readers exactly when I discussed some topic. Thus, when



The SquareNote™ database, discussed in this month's column, in action. (W8FX photo)



SquareNote™ program's welcome screen. The program is an unusual database that allows storage and retrieval of text-based data. (W8FX photo)

someone asks in which columns I covered the G5RV antenna, grounding systems, Radio Shack software, or whatever, I'm able to reply without some heavy-duty page-flipping. In any case, this system certainly beats trying to memorize more than 7½ years' worth of columns!

In addition to the uses I can see for the program by teachers, lawyers, and other writers, there seem to be a number of hamshack applications. SquareNote can be used to keep track of magazine articles by making use of the annual indexes many magazines publish at year-end; track QSL card sent/received status; organize equipment technical data and operating notes; keep track of net activity and schedules; and perform many other hamshack tasks. Very useful, to say the least!

SquareNote is designed to work with the IBM-PC and compatibles that have at least 256K of memory, with DOS 2.0 and up, or 320K of memory with DOS 3.0. It works with monochrome or color graphics adapters, the IBM EGA, or the Hercules graphics card. It is priced at $69.95 and is available from Union Squareware, P.O. Box 228, Somerville, MA 02143.

Fig. 3 shows the SquareNote Welcome Menu help screen, while fig. 4 shows a typical SquareNote application, this one a small portion of the notefile I use to keep track of this column.

Antenna Topix

Hately Dipoles. Maurice C. Hately, GM3HAT, has developed an interesting if unconventional dipole system which he terms the Capacitive Dipole Antenna (CDA). The CDA and its derivatives are the result of an effort by him to produce an efficient coaxial cable feed system for effective energy transfer when feeding a conventional half-wave balanced dipole. According to GM3HAT, he has achieved excellent results from the use of a special "capacitive balun" to achieve a good impedance transformation to 50 ohm coax.

Both single-band and multi-band CDA dipoles are available; various models cover from one to four HF bands plus 6 meters. Lengths range from about 10 feet for a 50 MHz monobander, to 139 feet for an 80/40 meter dualbander, and 256 feet for a 160 meter monobander. Power-handling capability ranges from 100 watts to 2 KW PEP, while prices vary from $63 to $105 US, including airmail shipping. A one-month, "no-quibble" money-back guarantee is provided for the antennas.

For a very interesting flyer describing the CDA principles of operation, including Smith charts describing the input impedance performance of the antennas, write to Maurice C. Hately, GM3HAT, at Hately Antenna Technology, 1 Kenfield Place, Aberdeen AB17UW, Scotland.

Rutland Yagis. Another firm has entered the fray for producing "standard of excellence" 432 MHz Yagis. This company is Rutland Arrays, 1703 Warren St., New Cumberland, PA 17070. The mainstays of their line are two Yagis: (1) the RIW-19 and (2) the FO-22 beams, both for 432 MHz.

The RIW-19 is a 19-element, K2RIW-type Yagi with a claimed gain at 432 MHz of 14.9 dBd; it has a wind load of 0.75 sq. ft., a turning radius of 7.5 ft., and a length of 13 ft. It is priced at $69.95. The FO-22 is a K1FO-type, 22-element Yagi with a 432 MHz gain of 15.8 dBd. The FO-22 has a wind load of 0.8 sq. ft., a turning radius of 8.5 ft., and a length of 14 ft. It is priced at $76.64. Phasing harness assemblies and other parts are available for both antennas.

Although I have not had the opportunity to check out these antennas personally, I was impressed by Rutland's flyer, which included a very lengthy list of detailed specifications, including measured gain figures and pattern plots. For more information, write to them for their flyer.

Creative Design Accessories. Orion Hi-Tech is

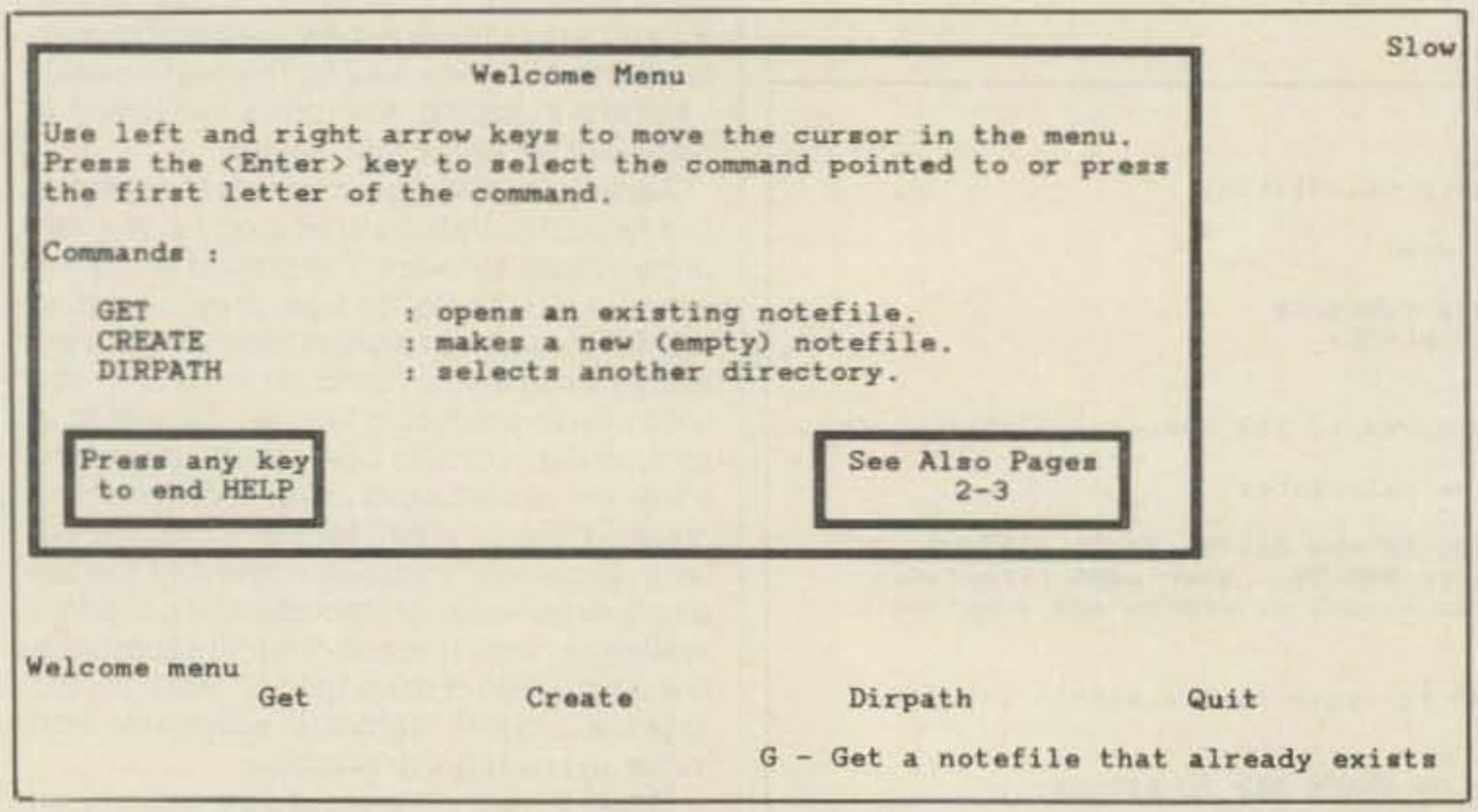


Fig. 3– Shown in this screen print is a help screen (one of many provided by SquareNote) for the program's Welcome Menu. Actually, the program operates almost intuitively, so access to the help screens and instructions is rarely required.

ICOM

IC-735

IC-751A

IC-02AT
IC-04AT

μ2-AT

IC-R7000

IC-28H
IC-38A
IC-48A

KENWOOD

TS-711
TS-811

TS-940S

TM-2550A
TM-3530A

TS-440S
TS-430S

TH-215A
TH-205A
TH-21BT
TH-31BT
TH-41BT

R-5000
R-2000

NEW!

TM-221
TM-421

TR-751A

MFJ

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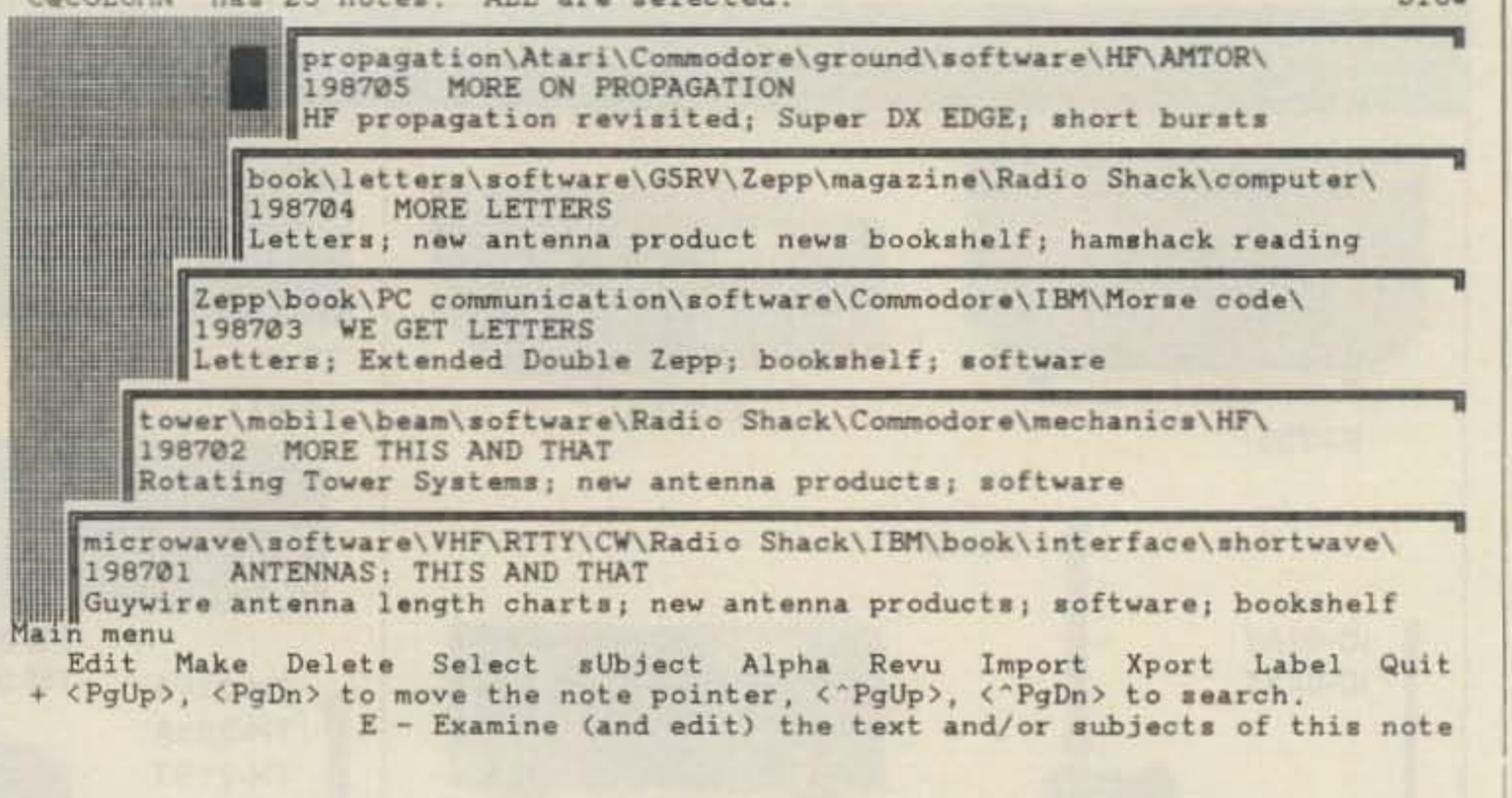

Fig. 4– Shown here is an example screen print of a SquareNote application which we're using to keep track of the monthly Antennas & Accessories column. Up to five "file cards" are visible on the screen at one time. Data may be retrieved by subject keywork (top line of card) or by text string (third line of card). I use the second line of the card to show the column's date of publication (useful for sorting) and title of that month's column.

the U.S. distributor of the Japanese-made Creative Design Co. Ltd. series of antennas, rotators, baluns, roof-mount towers, and other antenna accessories.

Their product line includes a large number of single-band and multiband beams, dipoles, and verticals covering from 3.5 to 432 MHz. These include a 2-element 3.8/7 MHz rotatable phased array, a 3.8/7 MHz dual-band vertical ground plane, and a wide-spaced 4-element trap beam for 14, 21, and 28 MHz, among others. The company also offers four rotator models for both medium- and large-size antennas, with rotation torques from 520 to 1388 lbs./in. Also available are three different aluminum and steel roof-mounting towers ranging from 5'10" to 14'9" that will handle a maximum vertical load of up to 1,322 lbs.

For a catalog, contact Orion Hi-Tech, P.O. Box 8771, Calabasas, CA 91302-8771.

Metal & Cable Corp. Aluminum Stock. David Klein, KA8ZVA, the company's chief metallurgical engineer, sent along a catalog of his firm's aluminum stock, which includes both 6061-T6 drawn seamless tubing (in 12 ft. lengths) and 6061-T6 extruded seamless tubing (in 24 ft. lengths). Their catalog quotes reasonable prices on stock from ¼ to 2½ inch diameter, which includes packing the aluminum stock in hard cardboard shipping tubes for protection during transit.

Of interest to some "plumbers' delight" aficionados among *CQ*'s readers, the flyer includes some good information on the commercial metal services side of the business. In addition to selling aluminum stock, the firm also is a full-line distributor of metals, metal services, and wire and cable products, including metallurgical engineering services and custom machining and processing.

For more information and a flyer, contact Metal & Cable Corp., Inc., 2170 E. Aurora Rd., P.O. Box 117, Twinsburg, OH 44087.

New Kenpro Rotor. Encomm has announced the availability of the Kenpro KR-1000SDX azimuth antenna rotor. The new rotor is a mid-line model that is designed to fill the gap between the already established KR-2000 and KR-600.

Some of the new rotor's features include 450 degree rotation, variable speed rotation control, preset direction control, gentle antenna handling with "soft landing" automatic slowdown before stop, and weatherproof outside connector. In addition, there is an area inside the control box to install an optional computer interface. The specs indicate that full 360 degree rotation can be accomplished in less than 43 seconds. Also available is similar KR-1000S model that does not include the preset and speed control features.

For a spec sheet, write to Encomm, Inc., 1506 Capital, Plano, TX 75074.

Wrapping It Up

This month we covered a good deal of territory. We examined two new and interesting general-purpose software products, Intuit and SquareNote. We also highlighted several new antenna products, including the Hately CDA dipoles and Rutland UHF arrays.

Overheard: What's the point of taking speed-reading courses if they don't teach you how to speed-think? Next time a look at protecting Modems. See you then.

73, Karl, W8FX

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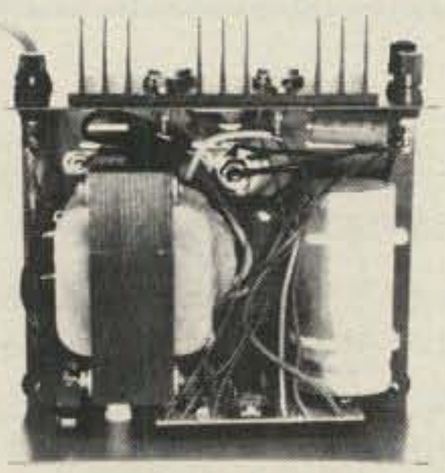

INSIDE VIEW — RS-12A

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- SOLID STATE ELECTRONICALLY REGULATED
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PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- **Also available with 220 VAC input voltage**

MODEL RS-50A

MODEL RS-50M

MODEL VS-50M

RM SERIES

MODEL RM-35M

19" × 5¼ RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50

RS-A SERIES

MODEL RS-7A

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A	2.5	3	3 × 4¾ × 5¾	4
RS-4A	3	4	3¾ × 6½ × 9	5
RS-5A	4	5	3½ × 6⅛ × 7¼	7
RS-7A	5	7	3¾ × 6½ × 9	9
RS-7B	5	7	4 × 7½ × 10¾	10
RS-10A	7.5	10	4 × 7½ × 10¾	11
RS-12A	9	12	4½ × 8 × 9	13
RS-12B	9	12	4 × 7½ × 10¾	13
RS-20A	16	20	5 × 9 × 10½	18
RS-35A	25	35	5 × 11 × 11	27
RS-50A	37	50	6 × 13¾ × 11	46

RS-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46

VS-M AND VRM-M SERIES

MODEL VS-35M

• Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES

MODEL RS-12S

• Built in speaker

MODEL	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	5	7	4 × 7½ × 10¾	10
RS-10S	7.5	10	4 × 7½ × 10¾	12
RS-12S	9	12	4½ × 8 × 9	13
RS-20S	16	20	5 × 9 × 10½	18

*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

Awards

a monthly feature by
DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for November is:

Eddie Scholes, G4KHG USA-CA All Counties #536, Mixed, 3-28-87

"I live in a small place called Newton-le-Willows, 20 miles east of Liverpool, England. (Remember the Beatles?) Well, it happened! What? No, not my marriage to Barbara. That was 25 years ago! No, not the birth of Peter. He came to us 19 years ago! No, I did not win the lottery. I did better than a lottery! I worked my last county for CQ's USA-CA All Counties. It was Real, Texas on March 14, 1987. I was delighted to hear mobile station N5DGQ, Bob Blakemore, my excellent QSL manager, acknowledge my report!

"It all began just over four years ago. One day on the air I met, as I thought, a rather unusual individual by the name of Frank Cassidy, G4HBI. He told me he only worked U.S.A. stations. I was convinced he had a real problem! Now I am delighted to say that I also soon lost my marbles! Frank and I have become very good friends through our meeting that day on 14.336, the Mobile Emergency and County Hunters' Net frequency. Since then, in addition I am privileged to have made so many good friends both in the U.S.A. and in many other countries who, like me, tune in each day to the net.

"It goes without saying that interest in the U.S.A. Counties Award sponsored by *CQ* magazine will bring the radio amateur tremendous enjoyment and lasting friendships, not to mention the really beautiful award in colour for your shack wall! You only need 500 confirmed contacts with different counties to qualify for the basic award—any band, any mode!

"I do not have a technical background at all. To pay for the growing electricity bills, I teach Latin and archaeology at Winstanley College. We have 850 students in college, young men and women, between 16 and 18 years of age. It is a very pleasant place to work, and I have taught there for 21 years now. My other subject is Classical Greek. We have a club station, G4WCR, and our shack is next to my classroom. I'm not stupid!

"From home I work the U.S.A. counties with a Kenwood 830S driving a Heathkit SB220 into a 4-element triband Yagi. When propagation is adequate, I

Eddie, G4KHG, at the source of his FB signal near Liverpool, England.

enjoy helping out as net control. We help each other on the net, and the mobile stations know there is always someone there is they need assistance in any way.

"On the afternoon of March 28, here in England, my telephone rang. It was Lorraine and Arnie Bachman, K9DCJ, in Wisconsin! 'Your USA-CA number is 536. Congratulations, Eddie!' Wow! I was soaring in the clouds! I promptly rang my QSL manager, Bob, N5DGQ, with the great news. Thank you Bob, Arnie, Lorraine, and all you other great people out there, both mobilers and fellow county hunters, some of whom have visited me over here in England. Thanks again for all your help and kindness in enabling me to work all counties in the U.S.A. A special mention is owed also to Gwen, NØCOL, and Jerry, NØCKN, who run our mobile bureau so very efficiently from Des Moines, Iowa.

"My visit to Denver, Colorado in July to attend the annual convention of MARAC (Mobile Amateur Radio Awards Club) was my first visit to the States! . . . Sorry, I have to stop writing now! I just heard a mobile in Whitman, Washington! I must work him—then only 3075 to go for second time around! BCNU! 73! Eddie, G4KHG, USA-CA 536."

333 South Lincoln Ave., Mundelein, IL 60060

Awards Issued

Ronald E. Johnson, WBØVNN, completed his quest by claiming All Counties #545, USA-CA 3000 #577, and USA-CA 2500 #650, Mixed, dated 7-20-87.

Stuart Casper, W2PDM, filed his application for All Counties #546, USA-CA 3000 #578, and USA-CA 2500 #651, Mixed, dated 7-23-87.

Howard Byers, KD4ZJ, claimed USA-CA 2500 #649, USA-CA 2000 #716, USA-CA 1500 #800, USA-CA 1000 #979, and USA-CA 500 #2191, All SSB Mobile, dated 7-7-87.

Howard E. Guenther, KA8VVE, received USA-CA 1500 #801, Mixed, dated 7-20-87.

Nelson Moyer, KUØA, added another gold seal to his certificate by claiming USA-CA 1000 #980, All SSB, dated 7-31-87.

USA-CA 500 certificate went to: Howard Byers, KD4ZJ, USA-CA 500 #2191, All SSB Mobile, 7-7-87.

USA-CA Special Honor Roll

Ronald E. Johnson, WBØVNN
All Counties #545, Mixed, 7-20-87

Stuart Casper, W2PDM
All Counties #546, Mixed, 7-23-87

Awards Available

***CQ*'s Novice Century Club.** *CQ* is pleased to announce the formation of the *CQ* Novice Century Club, a new award program intended to encourage activity on the Novice bands. The rules couldn't be much simpler: Novice operators need only work and exchange QSL cards with 100 different stations on any or all of the Novice bands using any mode. Simply prepare a list of your claimed QSOs on a *CQ* Novice Century Club Award application form (available from *CQ*; send a self-addressed stamped envelope marked "Novice CC"). Have the listed QSLs verified by two Technician class or higher licensees, and send the application to the *CQ* Novice Century Club Manager, c/o *CQ* Magazine, 76 North Broadway,

USA-CA Honor Roll

3000		1500	
WBØVNN	577	KD4ZJ	800
W2PDM	578	KA8VVE	801
2500		**1000**	
KD4ZJ	649	KD4ZJ	979
WBØVNN	650	KUØA	980
W2PDM	651		
2000		**500**	
KD4ZJ	716	KD4ZJ	2191

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.

Hicksville, NY 11801. There is no application fee. That's all there is to it. You'll receive a handsome, numbered certificate attesting to your activity on the Novice bands. It's our way of saying "Welcome, my friend, to the wonderful world of Amateur Radio Operating!"

***CQ*'s WNZ Award—A Special DX Award for Novices and Techs!** The handsome parchment-paper hand-lettered award attests to the achievement of making and confirming "two-way communic;ations using the U.S. Novice bands and privileges with Amateur Radio stations in at least 25 of the 40 *CQ* Zones." And an achievement it is! It's far from being an impossible challenge, however.

The editors of *CQ* are proud to announce the newest achievement award in a wide array of world-class awards, the WNZ award. WNZ stands for "Worked Novice Zones" and is available *only* to holders of a U.S. Novice or Technician class license for proof of contact with at least 25 of the 40 *CQ* as defined by the WAZ Rules. All contacts must be made using the Novice 80, 40, 15, or 10 meter bands, using modes authorized for those bands, and using transmitter power authorized for the Novice and Technician license. All contacts must be made as a Novice or Technician, although at the time of submitting the actual application for the WNZ award, the licensee may have upgraded to a higher class of license. Contacts must be made prior to passing the higher grade examination and receiving authorization to operate with General or higher class privileges.

The WNZ award is available as a mixed mode, CW only, or SSB only award. Rules for WNZ are essentially identical to the standard *CQ* WAZ rules. Thus, the WNZ award may be used to fulfill part of the application requirement for the WAZ award when the operator is finally able to confirm the remaining 15 Zones.

Welcome to the world of *CQ* Zone-chasing, all you Novices and Techs! Take that first step toward the "big league" awards by writing today for your application and Zone map. Join the fun of DXing while competing against your peers.

America Radio Club DX Award. The America Radio Club DX Award is issued in commemoration of the 10th anniversary of the ARC. The rules are as follows:

1. Each station may be counted once.
2. Contacts made on and after January 1, 1987 are valid. There is no time limit.
3. This award is available to licensed radio amateurs and shortwave listeners (SWL).
4. There are no band or mode restrictions (phone, CW, RTTY, VHF, UHF, etc.).
5. To help defray costs and postage send $2.00 USA or 6 IRCs with application.
6. QSL cards or log may be submitted. (If applicants send QSL cards, official operators will QSL.)

Award offered by the America Radio Club DX Group.

7. Applicants must make 10 or more contacts with station members of the ARC.

Applications should be sent to America Radio Club DX Contest, P.O. Box 3576, Hialeah, FL 33013.

Canadian Liberation March Award (ON4CLM). In the autumn of 1944 Canadian troops fought a long and exhausting battle in the Belgian coast area. On November 1, 1944 the town of Knokke was finally liberated, but at great cost in Canadian lives. Each year the Canadians are remembered with ceremonies, festivities, and a "Canadian Liberation March" which covers a distance of 37 kilometers. Many Belgian and Canadian veterans, radio amateurs, and VIPs take part in the events.

Special event station ON4CLM (Canadian Liberation Movement) will once again be on the air from the "Radioshack Eastcoast" in Knokke starting Monday, October 26 and continuing until November 3, 1987.

A magnificent, six-color printed award is available for all contacts with ON4CLM. This year's award features the badge of the "Queen's own rifles of Canada." Each successive year will honor one of the nine Canadian regiments that participated in the liberation of Knokke.

Cost of the award is 2 pounds or 5 dollars or 10 IRCs, or the equivalent, with all proceeds going towards a welfare fund. The money is used to maintain memorials, displays, etc.

Listen for ON4CLM from October 26 to November 3, 1987 on the following frequencies: 3.685, 7.045, 14.145, 21.245, 28.545, and 144.250 on SSB; 3.515, 7.012, 14.020, 21.020, 28.020, and 144.020 on CW; and 145.475 FM.

To enable amateurs to collect the entire series, there are still available limited quantities of '83, '84, '85, and '86 awards honoring the "Stormont Dundas and Glengarry Highlanders," the "Regina Rifle Regiment," the "Canadian Scottish Regiment," and the "Royal Winnipeg Rifles."

For QSLs, SWLs, or additional information, please write to Radio ON4CLM, P.O. Box 140, 8300 Knokke, Belgium.

Osijek Award. The radio clubs of the city of Osijek, Yugoslavia, offer the OSIJEK Award in commemorationof the 35th anniversary of amateur radio operating in their city.

The award is issued in two classes, HF and VHF. Contacts in any of the modes CW, SSB, or FM on and after January 1,

Canadian Liberation March Award, Commemorating the liberation of Knokke, Belgium.

Cuba Award by Federacion de Radioaficionados de Cuba.

America Award offered by Federacion de Radioaficionados de Cuba.

Caribbean Award available from Federacion de Radioaficionados de Cuba.

Cuba DX Group Award offered by the Federacion de Radioaficionados de Cuba.

1980 are valid. Qualifying numbers of contacts are as follows:

EU Stations: HF—Contacts with five different stations in the Osijek area. VHF—Contacts with three different stations in the Osijek area.

DX Stations: HF—Contacts with three different stations in the Osijek area.

SWL Stations: Same as for EU and DX stations as specified above, on a heard basis.

Contacts with amateur stations in the city of Osijek and in the nearby towns of Cepin, Dalj, Laslovo, and Josipovac may be claimed for this award.

Send GCR list along with 6 IRCs or $2.00 to cover costs to Kruno Ferlic, YU2OM, Vij. B. Kidrica 102/12, 54000 Osijek, Yugoslavia.

Award Program—Federacion de Radioaficionados de Duba (FRC). The following four awards are offered by the Federacion de Radioaficionados de Cuba (FRC), P.O. Box 1, Habana 1, Cuba. The awards are all printed in four colors and are available to amateur radio operators worldwide.

General Rules. Any mode, any band may be used. The fee is 10 IRCs or $2.00 U.S.A. If any country changes prefix, both the old and the new will be valid. The awards are free of charge to "Cuba DX Group" members, radio club, or other amateur organizations.

Cuba Award. Work the eight Cuban districts, CM-CO1 through CM-CO8. Contact with a radio club station (three-letter suffix) can be substituted for any district missed, but substitution can be made for NO MORE THAN THREE districts. Do not send QSL cards. Send only log data with contacts certified by an official of a radio club or by two active amateurs.

America Award. Work 45, 50, or more than 50 countries and islands in America Continent; 45 is Class III, 50 is Class II, more than 50 is Class I. Cuba must be one of the countries worked. Contacts with KG4 stations (Guantanamo Bay) are not valid for this award. Do not send QSL cards. Send only log data certified by an official of a Radio Club or by two active amateurs.

Caribbean Award. Work 20 or more of the 32 countries and islands in the Caribbean, including XE, VP1, TG, HR, HT, TI, HP, HK, and YV. Cuba must be one of the countries worked. Contacts with KG4 stations (Guantanamo Bay) are not valid for this award. Do not send QSL cards. Send log data with contacts certified by an official of a Radio Club or by two active amateurs.

Cuba DX Group Award. Work four members of the group, including foreign members. Contacts after September 1, 1980 are valid. Do not send QSL cards. Send only a list of the four contacts. They will be checked there.

New Addresses!

The new address for the B & B Shop is P.O. Box 850652, Mobile, Alabama 36685-0652. As well as mobile reply cards and other aids to county hunting, the B & B Shop publishes the *County Hunter Handbook* ($4.50 to North America and $5.25 elsewhere) and the *County Hunter Directory* ($10.00 with three quarterly supplements). These two publications are revised each year, and the 1987 issues are now available.

The new address for the Mobile QSL Bureau is P.O. Box 6436, Florence, SC 29502.

Notes

Once again the end of the year is in sight and we begin to wonder whether we have completed everything we wanted to do in 1987. I hope everything is going well where you are.

73, Dorothy, WB9RCY

Now You Can Have the Best of Both . . .

Radio Data Communications and PC-Compatibility!

DS-3200

Now you can have the BEST in a radio data communications terminal with the NEW DS-3200.

Recognizing the chief weakness of previously available computer-based terminals is RFI generation and susceptibility, HAL has designed the fully-shielded DS-3200 for operation in the radio data communications environment. No longer do you have to QRT when that rare DX station's signal dips near the noise level!

The DS-3200 is provided with an extensive RTTY software package which emulates the operation of our MPT3100/DSK3100 combination for message processing and handling. Continuous save to disk of all received text, direct transmission of selected files from disk, and full editing capability are just a few of the features of this "user-friendly" software package. Plus, we have included the latest release of MS-DOS with GW BASIC!

The built-in RS-232C serial port allows the use of the DS-3200 with an external demodulator such as the HAL ST-5000, ST-6000, or ST-8000. Or, add the HAL PCI-2000 for a completely self-contained RTTY/CW terminal and demodulator. Also, with the use of a second RS-232C serial port the DS-3200 can be used with your favorite TNC on Packet!

The DS-3200 with its IBM PC XT-style architecture gives you virtually unlimited flexibility for future expansion. Here is a list of just some of its hardware features: 8088 CPU, 640KB RAM, RS-232C Serial Port, Parallel Printer Port, Clock/Calendar with Battery Back-Up, Two 360KB Floppy Disk Drives OR One 360KB Floppy and One 20MB Hard Disk Drive, HERCULES-compatible Monochrome Graphics Adapter with High-Resolution 12 Inch Monochrome Video Monitor.

The DS-3200 is THE choice for modern radio data communications.

Write or call for complete specifications on the NEW DS-3200.

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CIRCLE 131 ON READER SERVICE CARD

Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Military Equipment Designations

When World War II ended, the best source of low-cost radio equipment was military surplus. I am one of the many amateurs who got back on the air using military surplus radio equipment and accessories. Over the years commercially manufactured amateur radio gear has replaced most of the military surplus items that previously were used by amateurs. However, military surplus remains an excellent source of low-cost, modern communications equipment. The information in this article is intended to enable you to easily determine basic purposes of military surplus equipment by decoding their designations. Old designations are included because you probably will encounter them on old military surplus items. You need to know the meanings of all designations, including those which are no longer used on new items. Military surplus dealers run advertisements in amateur radio publications.

The Joint Electronics Type Designation System (JETDS) superseded the Joint Army-Navy Nomenclature System (AN System) and the Joint Communications-Electronics Nomenclature System. These documents established procedures for standardizing identification of electronic material within the Department of Defense. JETDS designations apply to United States Air Force, Army, Coast Guard, Marine, and Navy electrical/electronic equipment. Australia, Canada, Great Britain, and New Zealand also use the JETDS system.

The following information provides information which enables one to quickly classify electronic items bearing JETDS letter classifications. The first section, "Equipment Indicators," lists three-letter indicators of complete systems and sets. The next section, "Group Indicators," lists two-letter indicators of groups. The third section, "Unit Indicators," lists one-letter and two-letter indicators of units. The information in these tables has primarily been extracted from MIL-STD-196D, dated 19 January 1985.

2814 Empire Ave., Burbank, CA 91504

Ten-year-old Abraham Noe-Hays, KA1OVA, of Putney, Vermont shares a station with his Dad (Carl, KA1ETQ). Abraham has contacted amateurs in 20 states plus one in Canada. Their station includes an ICOM IC-745 transceiver, 10/15 meter Yagi-Uda, and a 40/80 meter dipole. Abraham also enjoys collecting stamps and building balsa-wood airplanes. He has been licensed since August of 1986.

Equipment Indicators

First Letter—Installation

- A piloted aircraft
- B underwater mobile, submarine
- C air transportable (no longer used)
- D pilotless carrier
- F fixed ground
- G general ground use
- K amphibious
- M ground mobile
- P portable
- S water
- T ground transportable
- U general utility
- V ground vehicular
- W combination underwater and water surface
- Z combination piloted and pilotless airborne vehicle

Second Letter—Equipment Type

- A invisible light, heat radiation
- B pigeon (no longer used)
- C carrier
- D radiac
- E laser
- F photographic (no longer used)
- G telegraph or teletype
- I interphone or public address
- J electromechanical or inertial wire covered
- K telemetering
- L countermeasures
- M meteorological
- N sound in air
- P radar
- Q sonar and underwater sound
- R radio
- S special—magnetic or combinations of types
- T telephone (wire)
- V visual and visible light
- W armament (not otherwise covered)
- X facsimile or television
- Y data processing

Third Letter—Purpose

- A auxiliary assembly (inoperable by itself)
- B bombing
- C communications (transmit and receive)
- D direction finder, reconnaissance and/or surveillance
- E ejection and/or release
- G fire control or searchlight directing
- H recording and/or reproducing (graphic, meteorological, or sound)
- K computing
- L searchlight control (no longer used—see G)
- M maintenance and/or test assemblies (including tools)
- N navigational aids, including altimeters, beacons, compasses, depth sounders, landing/approach, and racons
- P reproducing (no longer used)
- Q special, or combination of purposes
- R receiving—passive detection
- S active detection and/or range and bearing search
- T transmitting
- W automatic flight, or remote control
- X identification or recognition
- Y surveillance (search, detect, and multiple target tracking) and control (both fire control and air control)

Miscellaneous additional designations can be affixed to the basic three-letter indication to provide further identification. These include:

- T Training
- X
- Y changed voltage, phase, or frequency
- Z
- (P) accepts plug-ins
- (V) variable grouping
- (X) developmental

ADP-only

- 1 digital
- 2 analog
- 3 analog and digital (hybrid)
- 4 input/output device
- 5 punched card or tape
- 6 all others

As an example, AN/ARC-142 indicates that the equipment is originally designed for use aboard piloted aircraft (A), is a radio (R), and is used to transmit and receive (C). The 142 is simply a sequentially issued number.

Group Indicators

- OA miscellaneous (no other indicator applies)
- OB multiplexer and/or demultiplexer, or combination thereof
- OD indicator
- OE antenna
- OF adapter
- OG amplifier
- OH simulator
- OJ console
- OK control
- OL data analysis/processing
- OM modulator and/or demodulator, or combination thereof
- ON interconnection
- OP power supply (nonrotating)
- OQ test set
- OR receiver
- OT transmitter
- OU converter
- OV generator (excluding power generators)

OW terminal (telegraph, telephone, radio, etc.)
OX coder, decoder, interrogator, transponder
OY radar (use appropriate specific indicators if possible)
OZ radio (use appropriate specific indicators if possible)

An example is the OR-90/ARN-99; it is the receiver-converter group of the airborne (piloted aircraft-A) radio (R) navigational aid (N), which is an Omega Navigation System.

Unit Indicators

AB antenna support
AM amplifier
AS antenna (simple or complex)
AT antenna-simple (no longer used)
BA primary battery
BB secondary battery
BZ alarm
C control
CA commutator (no longer used for this purpose)
CA computer auxiliary
CB capacitor bank (no longer used)
CC RF cable
CD crystal kit (no longer used)
CD control device (complex)
CM comparator (two or more inputs)
CN compensator (electrical and/or mechanical)
CP computer (electronic and/or mechanical)
CR crystal (no longer used)
CU coupler (impedance, directional, etc.)
CV converter (electronic)
CW radome
CX cable (non-RF and combinations of RF and non-RF)
CY case/cabinet
D dispenser (chaff)
DA dummy load (RF and non-RF)
DT detecting head
DY dynamotor (no longer used)
E hoist (no longer used)
F filter
FN furniture (no longer used)
FR frequency measurement
G power generator
GO goniometer
GP ground rod (no longer used)
H headset, handset, chest set
HC crystal holder (no longer used)
HD environmental (heating, cooling, etc.)
ID non-CRT indicator (dial, meter, etc.)
IL insulator (no longer used)
IM intensity measurement (noise, SWR, etc.)
IP CRT indicator
J interface (junction box, etc.)
KY keying (mechanical, electrical, electronic, etc.)
LC line construction tool (no longer used)
LS loudspeaker
M microphone
MA magazine (no longer used)
MD modulator, demodulator, discriminator
ME meter
MF magnet or magnetic field generator (no longer used)
MK miscellaneous kit (modification, maintenance, etc.)
ML meteorological
MT mount (including frames, racks, stands, etc.)

This is 27-year-old Richard Puchalski, YV1ELM, of Punto Fijo, Venezuela. He is married to Xiomara, YV1ELL. His brother is Cedric, YV1CP, who is married to Ana Maria, YV1EJU. Richard has been licensed since March 1987. He works American Novices on 15 meters. He has contacted amateurs in 25 states and 25 countries. His station includes a Drake TR-3 transceiver, a 5-band vertical, and an 80 meter dipole.

MX miscellaneous (nothing else applies)
MU memory unit
O oscillator (excluding test oscillators)
OC oceanic (bathythermograph, etc.)
OS test oscilloscope
PD prime driver (no longer used)
PF pole fitting (no longer used)
PG pigeon (no longer used)
PH photographic (no longer used)
PL plug-in (not otherwise classified)
PP power supply (nonrotating)
PT plotting/mapping (electronic)
PU power (rotating)
R receiver (excluding telephone)
RC reel (no longer used)
RD recorder-reproducer
RE relay
RF radio frequency component (no longer used)
RG RF cable-bulk (no longer used)
RL reel machine (wire, cable, etc.)
RO recorder (only)
RP reproducer (only)
RR reflector (excluding antenna reflectors)
RT receiver-transmitter (combination)
S shelter
SA switching unit
SB switchboard
SG signal generator (test, noise, etc.)
SM simulator (flight, target, signal, etc.)
SN synchronizer
ST strap (no longer used)
SU optical (sights, night vision, scopes, etc.)
T transmitter (excluding telephone)
TA telephone apparatus
TB towed body
TC towed cable (no longer used)
TD timing device
TF transformer (used separately)
TG positioning device
TH telegraph apparatus
TK tool kits (special)
TL tool (no longer used)
TN tuner (antenna, receiver, transmitter, etc.)
TR transducer
TS test set (not otherwise categorized)
TT teletypewriter or facsimile
TV tube tester (no longer used)

TW	tape
U	audio/power connector (no longer used)
UG	RF connector (no longer used)
V	vehicle (peculiar to electronic equipment)
VS	visual signaling (no longer used)
WD	two-conductor cable (no longer used)
WF	four-conductor cable (no longer used)
WM	multiple-conductor cable (no longer used)
WS	single-conductor cable (no longer used)
WT	three-conductor cable (no longer used)
ZM	impedance measuring (L, C, R, Q, etc.)

As examples, the AM-6114/ARC-142, C-7789/ARC-142, and RT-931/ARC-142 are an RF amplifier, control, and receiver-transmitter. All three are parts of the ARC-142 high-frequency radio communications set designed for use aboard piloted aircraft.

Novice Century Club Award

The *CQ* Novice Century Club Award Program is in operation. It is intended to provide an additional incentive to encourage Novices to operate and to exchange QSL cards.

Contacts may be all on one band, or on any combination of the Novice bands. Similarly, all modes may be used. Contacts do not have to be just with other Novices. Contacts with Technician, General, Advanced, and Extra class U.S.A. amateurs count towards this award, plus contacts with DX (foreign) amateurs.

After collecting QSL cards that confirm the 100 contacts you made on the Novice bands, make a list of the received cards. Have your list verified and signed by two higher class licensees (Technician or above) and mail your award application to *CQ* Novice Century Club Manager, c/o *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801. No application fee applies.

Within a reasonable period of time you will receive an impressive numbered certificate that is suitable for framing and display in your shack.

Award applications forms can be obtained by sending a self-addressed stamped envelope (SASE) to Novice CC c/o CQ or to Bill Welsh, W6DDB, 2814 Empire Ave., Burbank, CA 91504-3297. If your request is sent to W6DDB, you will also receive a data sheet on the Ten American Districts (TAD) Award, which is another excellent award that has long been popular with Novices.

Gezzi Quirino, IK6FFL, of Ascoli Piceno, Italy has been a licensed amateur since 1984. His station includes a Kenwood TS-430S transceiver, a Hy-Gain DB 10–15 meter 3-element Yagi-Uda, and a 40 meter dipole. Gezzi has achieved the Worked All Continents award, and he almost qualifies for the Worked All States award. American Novices can listen for him on 10 and 15 meters—code or voice (on 10 meters).

Photographs Wanted

Photographs of Novices in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year *CQ* subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs.

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Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Now that the Canadians have received permission to use the 18 MHz and 24 MHz bands, VE7IG suggested that the WARC bands should be used for contest operation. I can give a number of reasons why they should *not* be used. I know of no organization that has attempted to use the WARC bands for competitive operation. Be assured that *CQ* has no intention of breaking that tradition.

Two contests that are usually scheduled—CARTG RTTY in October, and the EA CW DX in December—have been officially cancelled for 1987. I have listed the OK DX and the TOPS 80 Meter Contests even though no announcement has been received. They were both listed on those dates in an advanced yearly schedule sent last year. However, it was rumored that there might be some modifications in the OK DX rules.

If you are an avid contester, I am sure you will find the *National Contest Journal* an interesting publication. Published six times yearly, it is full of competitive contest information and interesting commentary by many of the better-known contest operators. A note to the *National Contest Journal*, P.O. Box 11439, Pittsburgh, PA 15238, Att: Randy Thompson, K5ZD/3, Editor, will get you a sample copy.

I was saddened to hear that an old friend and well-known South American DXer became a Silent Key a few months ago. Tony Gomez, YV5AGD, was a member of the Radio Club Venezolano and one of the operators who made the first Aves Island Expedition back in 1962. He was the winner of many contest awards, several of them in the *CQ* World-Wide. His latest and probably most rewarding award was the USA-CA All Counties #534, the first in Latin America. *(See Dorothy Johnson, WB9RCY's Awards Column in the August CQ—ed.)* Rest in peace, old friend.

Deadline for the February issue is November 15th and December 15th for the March issue.

73 for this time, Frank, W1WY

Calendar of Events

*	**Oct.**	**24-25**	**CQ WW DX SSB Contest**
*	Oct.	28-30	YLRL Anniv. SSB QSO Party
*	Ot.30	- Nv.1	Maryland/D.C. QSO Party
	Nov.	7-9	ARRL CW Sweepstakes
	Nov.	14	ALARA YL-OM Contest
	Nov.	14-15	European RTTY Contest
†	Nov.	14-15	Czechoslovakian DX Contest
	Nov.	21-23	ARRL Phone Sweepstakes
	Nov.	22	INORC Maritime Contest
	Nov.	22	MARAC Maritime Contest
	Nov.	**28-29**	**CQ WW DX CW Contest**
	Dec.	4-6	ARRL 160 Meter Contest
†	Dec.	5-6	TOPS 3.5 MHz CW Contest
	Dec.	5-7	Telco Pioneers QSO Party
	Dec.	12-13	ARRL 10 Meter Contest
	Dec.	13	ARCI QRP CW Sprint
	Dec.	27	Canada Day Contest
	Jan.	2-3	"73" 10 Meter SSB Champ.
	Jan.	9 & 10	"73" 15&20 M SSB Champ.
	Jan.	16-17	"73" 160 M SSB Champ.
	Jan.	16-17	Hungarian DX Contest
	Jan.	23&24	"73" 40&75 M SSB Champ.
	Jan.	23-25	ARRL VHF Sweepstakes
	Jan.	**29-31**	**CQ WW 160 M CW Contest**
	Jan.	30-31	YL-ISSB CW QSO Party
	Feb.	13-14	QCWA CW QSO Party
	Feb.	13-15	YLRL YL-OM Phone Contest
	Feb.	20-21	ARRL DX CW Contest
	Feb.	**26-28**	**CQ WW 160 M SSB Contest**
	Feb.	27-29	YLRL YL-OM CW Contest
	Mar.	5-6	ARRL DX Phone Contest
	Mar.	12-13	QCWAPhone QSO Party
	Mar.	19-20	YL-ISSB Phone QSO Party
	Mar.	**26-27**	**CQ WW WPX SSB Contest**

** Covered last month.*

Erratum Trophy Winners
1986 World-Wide Contest Results

Phone

World—QRPp: Winner should be VE1CBF. WP4G was a winner in 1985, therefore not eligible.

South America—All Band: Special *CQ* Championship plaques are for World awards only. Therefore, P40E was listed in error.

U.S.A.—Multi-Operator Single Transmitter: Winner should be N2ME. KX4S was a winner in 1985, and therefore is not eligible.

CW

Japan—All band: Winner should be JF1EQA. JI1QPU was a winner in 1985, and therefore is not eligible.

Europe—Single Operator (14 MHz): Winner should be YT3AA. OH8PF was listed in error.

ARRL Sweepstakes

CW: Nov. 7–9 Phone: Nov. 21–23
Starts: 2100Z Sat. Ends: 0300Z Mon.

This is the 54th running of the Sweepstakes, making it the oldest domestic competition going, and it really stirs up a lot of activity.

Operation is limited to stations in ARRL sections, which also includes the West Indies section (KP4, KV4, etc.) and U.S. possessions in the Pacific. Operation is limited to 24 out of the 30 hour contest period. Times off may not be less than 30 minutes and must be clearly indicated in your log.

In order to minimize QRM to non-contesters it is recommended that operation be confined to certain portions of the bands. It is recommended that you check *QST* for details.

There are several other regulations, including a cross-check sheet if you make 200 or more contacts. A large SASE (39¢ in postage) will get you the "SS Package" and Operating Aid #6 with enough log and summary sheets for an average outing.

Exchange: QSO no., power class, call, last two digits of year first licensed, and your ARRL section.

Stations using 150 watts or less are classed "A" and over 150 watts "B." The same station may be worked once only regardless of the band.

Scoring: Each completed QSO is worth 2 points. The multiplier is derived from the number of ARRL sections, plus VE8, worked (maximum of 74).

Awards: The usual certificates in each class and mode for single operator stations in each section and multi-operator stations in each division.

Logs must be received no later than December 31st and go to: ARRL Communications Dept., 225 Main Street, Newington, CT 06111.

ALARA YL/OM Contest

0001Z to 2359Z Saturday, November 14

Organized by the Australian Ladies Amateur Assn., this activity is open to all YLs, OMs, and SWLs worldwide. YLs work everyone, OMs work YLs only, and SWLs log YLs only.

Use all five bands, 3.5 through 28 MHz. Each station may be worked on each band and each mode for point credit.

Exchange: RS(T), QSO no. starting with 001, and name. (ALARA members will identify.)

Scoring: Phone—ALARA contacts 5 points, non-member YL contacts 4 points, OM contacts 3 points.

CW—Double above points for CW contacts.

SWL—5 points for ALARA contacts logged, 4 points for non-member YL stations logged.

14 Sherwood Road, Stamford, CT 06905

Martti Laine, OH2BH, set a new world record for his operation from CT3BZ in the 1986 WW 160 Meter CW Contest. On the left is Dave Heil, K8MN/OH2 (American Embassy in Helsinki), presenting the Don Busick, K5AAD Plaque to Martti.

Frequencies: 3525–3590, 7100–7120, 14060–14235, 21100–21200, 21350–21370, 28100–28350.

Awards: A wide selection of certificates to YL, OM, and SWL winners in each country, continent, VK call area, and overall score. The Florence McKenzie CW Trophy, to the top-scoring VK YL Novice operator.

Logs must be received by December 31st by the ALARA Contest Manager, Mrs. Marlene Perry, VK2KFQ, 31 Cadell Street, Wentworth 2648, N.S.W. Australia.

European RTTY Contest

1200Z Sat. to 2400Z Sun., Nov. 14–15

Rules for the WAEDC RTTY contest are the same as for the CW and Phone sections held in August and September.

Exchange: RST plus a progressive QSO number.

Points: Each QSO and each QTC exchanged are worth one point.

Multiplier: For non-Europeans is determined by the number of European countries worked on each band. (See the European country list in August Calendar.)

Bonus Multiplier: Multiply your multiplier on 80 meters by 4, on 40 meters by 3, and on 10/15/20 meters by 2.

There is one main difference, however. To generate more activity in Europe and increase the QSO points, contacts between European stations are also permitted. QTC traffic, however, is only permitted between Europeans and non-Europeans, same as in the CW and Phone contests. The multiplier regulations remain the same.

The above will have no affect on the US and other non-European stations.

Check the August Calendar for all the other detailed rules and regulations.

Awards: Certificates will be awarded to the highest scorers in each class in each country with a reasonable score. Continental leaders will receive a plaque. Certificates will also be awarded to stations with at least half the score of the continental leader.

It is suggested that you use the official DARC log forms. A large SASE (IRCs) to the address below will get you a supply.

Mailing deadline for all entries is December 15th to: WAEDC Contest Committee, Postbox 1328, D-8950 Kaufbeuren, West Germany.

Czechoslovakian Contest

1200Z Sat. to 1200Z Sun., Nov. 14–15

Some changes in the format of this year's OK-DX Contest were expected. However, no word has been received. Following are the rules that were used last year. In the past it was a worldwide-type contest, so do not limit your activity to working Czechs only.

Use all six bands, 1.8 to 28 MHz. The same station may be worked once per band, either phone or CW, for QSO and multiplier credit.

Classes: Single operator, both single and all band, multi-operator all band only, and SWL. (Club stations will be considered multi- operator.

Only one transmitter and one band permitted during the same 10-minute period, no QSYing to another band.

Exchange: RS(T) and number of your ITU zone.

Scoring: One point per QSO; 3 points if it's with a Czech (OK4/mm 1 point only). Own country may be worked, but for multiplier credit only.

Multiplier: Sum of different ITU zones worked on each band.

Final Score: Total QSO points from all bands times the sum of the zone multipliers from each band.

A penalty of three additional contacts of the same point value will be deducted for each duplicate QSO or multiplier removed by the committee. Taking credit for excessive duplicates and other violations (regulations, unsportsmanlike conduct, etc.) will be deemed cause for disqualification.

Awards: Certificates in each class to the top-scoring station in each country. Additional awards will be made if returns justify. The "100 OK," "OK SSB," "Slovensko," and other Czech awards will be issued for contacts in the contest if a written application is submitted with your log.

Use a separate log for each band, indicate the zone multiplier only the first time it is worked on each band, and include a cross-check list for each band with 200 or more QSO's.

A summary sheet showing the scoring and the usual signed declaration that all rules have been observed is also requested.

All entries must be postmarked no later than December 15th and go to: Central Radio Club, P.O. Box 69, 113 27 PRAHA 1, Czechoslovakia.

INORC Maritime Contest

0700Z to 1500Z Sun., Nov. 22

Organized by the Italian Naval Old Rhythmers Club, this contest is open to everyone, but seems to be geared to European and Maritime club activity—MARAC of the Netherlands, MF in Germany, RNARS in Great Britain, etc.

Exchange: RS(T) plus club membership number. Non-members will use RS(T) and QSO number.

Scoring: Contacts with INORC and members of other clubs are worth 10 points. Contacts with other stations 1 point. Contacts between non-club members do not count.

Multiply total by number of different club members contacted (counted once only).

Frequencies: Phone—0700 to 0900Z on 7040–7100 and 14150–14180 kHz. CW—0900 to 1200Z on 7010–7030 kHz. 1200 to 1500Z on 14040–14070 and 7010–7030 kHz.

Awards: There are several awards for club members and non-members and for SWLs. SWLs use same scoring system.

There is a special award for contacting INORC members. Italian stations need 10 QSOs, Europeans 7 QSOs, and DX station 4 QSOs. Inquire for details when you submit your log.

Logs go to: Enzo Pannuzzi, I2BVS, Via Ponte Nuovo, 109/4 I, 20128 Milano, Italy.

SWL logs go to: Massimo Di Marco, I2DMK, Via Pascoli, 60, 20133 Milano, Italy.

MARAC Maritime Contest

0900Z to 1600Z Sun., Nov. 22

The Royal Netherland Navy also has a maritime activity going on 80 meters only which is also geared for European competition. (There is also a 2 meter contest on the 21st, 1300–1600Z on 145–146 MHz, which is definitely for Europeans only.)

Exchange: RS(T) and QSO number. MARAC will include their membership number.

Scoring: Two points for non-MARAC QSOs, 5 points if with a member, 10 points if with station PI4MRC. Same station may be worked on CW and SSB, but separate logs are requested for each mode.

Frequencies: CW—0900 to 1200Z on 3520–3570 kHz. SSB—1300 to 1600Z on 3600–3700 kHz.

Awards: Non mentioned, but there is a special award if you work 25 or more MARAC members. Include a large SAE and 3 IRCs with your entry.

There is an SWL class with same rules as above.

Mailing deadline is December 15th to: E. van de Velde, PA2REH, Queridolaan 21, 2343 KH Oegstgeest, Netherlands.

CQ WW DX CW Contest

0000Z Sat. to 2400Z Sun., Nov. 28–29

Just a reminder, as if you needed one, that the CW section of our WW DX Contest is coming up the last weekend of this month. The phone section of course is past history. Complete rules were published in the September issue. There are no changes from those used in previous years, as they are well established worldwide. The contest trophies list has been updated and well covered in the rules.

All logs, both Phone and CW, must be sent to the *CQ* office: *CQ* World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801 USA.

Deadline for logs for the Phone section is December 1st, and January 15th for the CW section coming up. Be sure to indicate Phone or CW on your envelope. This will avoid your log from being entered in the wrong section.

ARRL 160 Meter CW Contest

2200Z Fri. to 1600Z Sun, Dec. 4–6

This is the 18th year for this "Top Band" activity. Exchange is between US stateside, VE, and DX stations. DX to DX not permitted for contest credit.

Classes: Single operator, and multi-operator single transmitter.

Exchange: RST and ARRL section for W/VE. RST only for DX stations; ITU Region for maritime and aeronautical mobiles.

Scoring: Contacts between stations in ARRL sections count 2 points, with DX stations 5 points.

Multiplier: Determined by number of ARRL sections plus VE8/VY1 (maximum of 74) and DX countries worked (for W/VE). (DX use ARRL sections only.)

Final Score: Total QSO points times the ARRL section and DX country multiplier.

Awards: Certificates to the top-scoring single operator station in each ARRL section and DXCC country. And to top-scoring multi-operator station in each ARRL Division and continent.

The ARRL 160 band plan requires that the 1830 to 1850 segment of the band be used for intercontinental QSOs only.

Indicate the multiplier in a separate column only the first time is it worked. Entries with 200 or more QSOs are required to include a dupe sheet. Official log forms are recommendced and are available from the ARRL. A large SASE and 39¢ postage or 2 IRCs will get you a supply for more than 300 contacts.

The usual grounds for disqualification—violation of established rules, excessive duplicate contacts, etc.—will prevail.

Mailing deadline for logs is January 6th to: ARRL Communications Dept., 160 Contest, 225 Main Street, Newington, CT 06111.

TOPS Activity Contest 3.5 MHz CW

1800Z Sat. ot 1800Z Sun., Dec. 5–6

TOPS is an international club for CW enthusiasts founded in Great Britain in 1946. Their objective is to encourage CW operation on the top bands.

Classes: Single operator, multi-operator, and QRP (5 watts or less input).

Single operator stations must take one break of 7 hours during the contest period; multi-operators can operate the full 24 hours.

Exchange: RST plus a three-figure QSO number starting with 001. TOPS members will also include their membership number.

Scoring: QSO's within own country, 1 point, in own continent 2 points, with other continents 6 points. Work a TOPS member and get 2 bonus points (members get 3 points).

Each call area in W, Ve, VK, PY, U, and JA will count as a separate country for scoring. The multiplier is determined by prefixes worked (same as *CQ* WPX Contest).

Final Score: Total QSO points times the total number of prefixes worked.

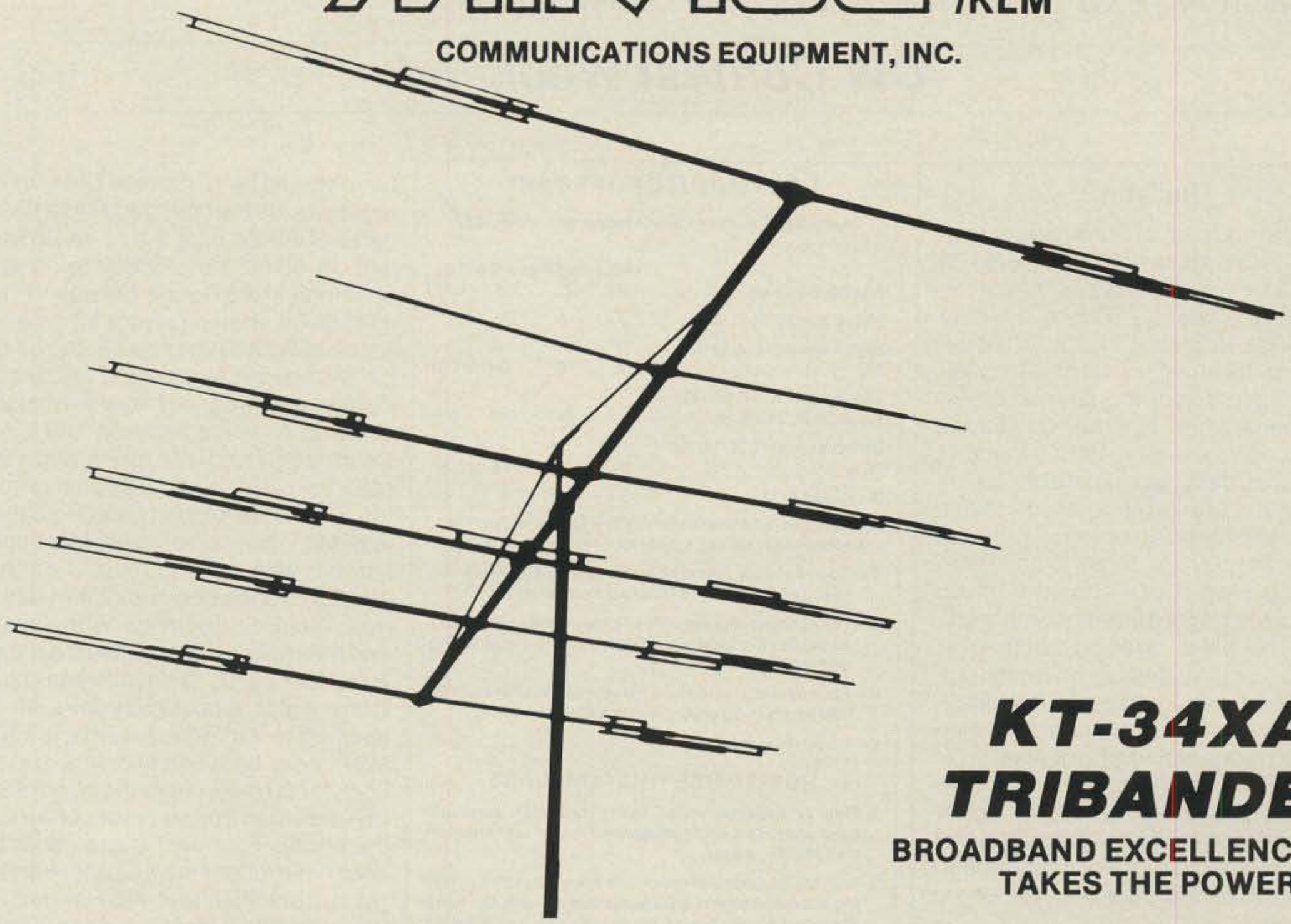
Frequencies: Operation will be between 3500–3585 MHz, with the lowest 12 kHz reserved for out-of-continent DX contacts only. (When sending CQ send TAC, not Test).

Awards: At least 15 certificates will be awarded based on the top scores in each class.

Logs must be received no later than January 31st and go to: Bertil Arting, SM3VE, Bergesvegen 26, S-823 00 Kilafors, Sweden.

MIRAGE /KLM

COMMUNICATIONS EQUIPMENT, INC.



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	**GAIN:**	8.5-9dB
	21.0-21.50 MHz		9-9.5dB
	28-29 MHz		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.
W. Scott

MIRAGE /KLM

COMMUNICATIONS EQUIPMENT, INC.

P.O. Box 1000 • Morgan Hill, CA 95037
(408) 779-7363

CIRCLE 159 ON READER SERVICE CARD

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

CW Contest Weekend

Bulletin

Since this issue of *CQ* is expected to reach most subscribers, at least in North America, prior ot the start of the *CQ* World-Wide DX Phone Contest weekend of October 24-25, here is an updated forecast of general conditions expected for the contest weekend made at press time. Conditions continue to look good. With a month's additional data now available all indices point to High Normal conditions for October 24th, dropping slightly if at all on Sunday, October 25th. Band opening predictions should hold up much as predicted in last month's column. The initial forecast for the CW Contest weekend is not so encouraging at this time. There is a strong possibility that a radio storm could develop during the weekend of November 28-29, resulting in unstable h.f. propagation conditions. I'm calling for conditions to vary between Low Normal and Below Normal, and we will have a fine-tuned updated forecast as a bulletin in next month's column.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for November 1987

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 9, 11, 25	**A**	**A**	**B**	**C**
High Normal: 1-2, 8, 12-13, 22	**A**	**B**	**C**	**C-D**
Low Normal: 3, 6-7, 10, 14, 17-18, 20-21, 24, 26-28	**A-B**	**B-C**	**C-D**	**D-E**
Below Normal: 4, 15, 19, 23, 29-30	**B-C**	**C-D**	**D-E**	**E**
Disturbed: 5, 16	**C-E**	**D-E**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on November 1 and 2, good-to-fair (B-C) on the 3rd, fair-to-poor on the 4th, poor (D-E) on the 5th, etc. During the *CQ* World-Wide DX Contest CW weekend good-to-fair (B-C) conditions are expected on November 28, dropping to fair-to-poor (C-D) onthe 29th.

The *CQ* World-Wide DX CW Contest weekend is November 28-29. Last month's column contained comprehensive h.f. band opening predictions to all areas of the world from North America, for use during *both* the Phone and CW Contest weekends. As mentioned in the above bulletin, there is a good likelyhood that a radio storm may develop during the CW Contest weekend. Check the *Last Minute Forecast* appearing in this month's column for day-to-day conditions expected throughout the entire month of November.

This year's World-Wide DX Contest will be held during a period of *rising* solar activity. It appears certain now that a new sunspot cycle, Cycle 22, began during September, 1986 with a smoothed sunspot level of 12.

The Royal Observatory of Belgium, the world's official keeper of solar records, reports a monthly mean sunspot number of 33 for July, 1987, with a daily count reaching as high as 102 on July 23rd. The Algonguin Radio Observatory in Ottawa, Canada reports a mean 10.7 cm solar flux level of 84.2 for July. It peaked on July 23rd with a count of 112. It should only happen during the Contest weekends!

The mean sunspot count for July results in a smoothed sunspot number of 17, centered on January, 1987, as the new cycle slowly increased.

A smoothed sunspot number in the low-to-mid 30s is presently forecast for the 1987 Contest periods. This is double the count observed during last year's Contest, and it heralds improving DX conditions on the h.f. bands.

Contest Tips

Here are some tips that could be helpful in working DX during November, particularly during the CW section of the Contest, as long as conditions are at least Low Normal: **Midnight to Sunrise:**—Best band should be *40* meters. Look for openings towards Europe, the Middle East and parts of Africa until 3 a.m. in EST and 2 a.m. in CST zones. Check for long-path openings in PST zone between 6 and 8 a.m. Good openings from all time zones towards South America should be possible, with signals strongest to Caribbean, Central America and northern countries of South America between Midnight and 5 a.m. in EST and CST zones, and 4 a.m. in MST and PST zones. Openings toward the South Pacific look good from the PST and MST zones between Midnight and sunrise, with openings possible from CST and EST zones between 2 a.m. and sunrise. Weakish openings to the Far East and Asia should be possible from the PST zone between Midnight and sunrise. There's also a possibility for a *40* meter opening to Antarctica from the PST and MST zones between Midnight and 5 a.m. Look for *80* meter openings from EST and CST zones to Europe, parts of Africa and the Middle East until 2 a.m., possibly an hour or so longer in EST zone. Band looks good from PST and MST zones to the South Pacific from Midnight to just before sunrise, and from the CST and EST zones from 3 a.m. to about sunrise. Check for good *80* meter openings to the Caribbean, Central America and the northern tier countries of South America between Midnight and 5 a.m., and until 3 a.m. for deeper openings into South America. The band could also open to the Far East and Asia from the PST zone between 1 and 3 a.m. Openings on *160* meters should be possible to Europe between Midnight and 2 a.m. from the EST and CST zones. In PST zone check band for openings towards the South Pacific between 2 a.m. and sunrise. Openings towards the Caribbean, Central America and northern countries of South America should be possible from all time zones from about 2 to 4 a.m. Not much DX expected on other bands during this time period, but check *20* meters for occasional openings towards South Pacific, deep South America and Antarctica.

Sunrise to Sunset:—Check for *10* meter openings to Europe between 9 and 11 a.m. in EST and CST zones. Openings to Africa look possible between 10 a.m. and Noon from all zones, and may extend for an hour or two longer in EST and CST zones. Good *10* meter openings into South America should be possible between 9 a.m. and 4 p.m., with a peak be-

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tween 10 a.m. and 2 p.m. Check for openings towards the South Pacific between 10 a.m. and 5 p.m., with a signal peak expected between 1 and 4 p.m. Look for openings to the Far East and Asia from PST zone between 2 and 4 p.m., and to Antartica between 1 and 3 p.m. DX conditions on *15* meters should hold up well during the entire daylight period. Check for openings towards South America as early as 8 a.m., with the band peaking in this direction between Noon and 4 p.m. Openings to Africa should be best from the EST and CST zones between 10 a.m. and 2 p.m., and until Noon in MST and PST zones. *Fifteen* meters should open to Europe between 8 a.m. and Noon from EST and CST zones, and until 10 a.m. in MST and PST zones. Check for openings towards South Pacific between 2 and 6 p.m., with the band open an hour or so longer in PST zone. Band may also open towards the Far East and Asia between 4 p.m. and sunset. *Twenty* meters should open to just about all areas of the world just after sunrise, and remain open to

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *standard* time is used at the *path midpoint*. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between N.Y. and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones *add* 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA *subtract* 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Chart
November & December 1987
Local Standard Time
At Path Mid-Point (24-Hour Time)

Band (Meters)	Distance between stations (Miles) 50-250	250-750	750-1300	1300-2300
10	*Nil*	*Nil*	08-11 (0-1) 11-17 (0-2) 15-17 (0-1)	08-09 (1) 09-11 (1-2) 11-15 (2) 15-17 (1) 17-19 (0-1)
15	*Nil*	09-11 (0-1) 11-15 (0-2) 15-18 (0-1)	07-08 (0-1) 08-09 (0-2) 09-11 (1-3) 11-15 (2-4) 15-16 (1-3) 16-18 (1-2) 18-19 (0-1)	07-08 (1) 08-09 (2) 09-11 (3) 11-15 (4) 15-16 (3) 16-18 (2-3) 18-19 (1-2) 19-21 (0-1)
20	10-12 (0-1) 12-14 (0-2) 14-16 (0-1)	06-07 (0-1) 07-10 (0-2) 10-12 (1-3) 12-14 (2-4) 14-16 (1-4) 16-17 (0-3) 17-19 (0-2) 19-22 (0-1)	06-07 (1) 07-09 (2-3) 09-10 (2-4) 10-12 (3-4) 12-16 (4) 16-17 (3-4) 17-19 (2-3) 19-22 (1-2) 22-00 (0-1)	06-07 (1-2) 07-09 (3) 09-15 (4-3) 15-17 (4) 17-19 (3-4) 19-21 (2-3) 21-22 (2) 22-23 (1-2) 23-00 (1) 00-06 (0-1)
40	07-08 (0-2) 08-09 (1-3) 09-17 (3-4) 17-19 (2-3) 19-21 (1) 21-00 (0-1)	06-07 (0-2) 07-08 (2-3) 08-09 (3) 09-15 (4-3) 15-17 (4) 17-19 (3-4) 19-21 (1-3) 21-00 (1-2) 00-03 (0-2) 03-06 (0-1)	06-07 (2-3) 07-08 (3) 08-09 (3-2) 09-15 (3-1) 15-17 (4-2) 17-19 (4) 19-21 (3-4) 21-03 (2-4) 03-06 (1-3)	06-08 (3-2) 08-09 (2-1) 09-15 (1-0) 15-17 (2-0) 17-19 (4-3) 19-03 (4) 03-06 (3)
80	08-21 (4) 21-01 (3-4) 01-04 (2-3) 04-07 (1-2) 07-08 (3)	08-09 (4-2) 09-16 (4-1) 16-18 (4-3) 18-01 (4) 01-04 (3-4) 04-07 (2-3) 07-08 (3)	08-09 (2-1) 09-16 (1-0) 16-18 (3-1) 18-20 (4-3) 20-04 (4) 04-06 (3-4) 06-07 (3) 07-08 (3-1)	08-09 (1-0) 09-16 (0) 16-18 (1-0) 18-20 (3-2) 20-04 (4) 04-06 (4-2) 06-07 (3-1) 07-08 (1)
160	07-09 (3-2) 09-11 (2-0) 11-17 (1-0) 17-19 (3-2) 19-07 (4)	07-09 (2-1) 09-17 (0) 17-19 (2-1) 19-04 (4) 04-07 (4-2)	07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-21 (4-2) 21-04 (4) 04-06 (2) 06-07 (2-1)	07-19 (0) 19-21 (2-1) 21-04 (4-2) 04-06 (2-1) 06-07 (1-0)

HAWAII
November & December 1987
Openings Given in
Hawaiian Standard Time

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Eastern USA	08-10 (1) 10-12 (2) 12-14 (1)	07-08 (1) 08-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	06-08 (2) 08-13 (1) 13-14 (2) 14-17 (3) 17-20 (2) 20-00 (1)	16-18 (1) 18-02 (3) 02-04 (1) 18-20 (1)* 20-01 (2) 01-03 (1)*
Central USA	08-10 (1) 10-14 (2) 14-16 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (2) 07-08 (3) 08-13 (2) 13-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-00 (1)	17-19 (1) 19-20 (2) 20-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-02 (2)* 02-04 (1)*
Western USA	08-10 (1) 10-14 (2) 14-17 (1)	06-07 (1) 07-08 (2) 08-12 (3) 12-14 (4) 14-16 (3) 16-17 (2) 17-19 (1)	06-07 (2) 07-09 (4) 09-14 (3) 14-16 (4) 16-18 (3) 18-22 (2) 22-02 (1)	17-18 (1) 18-20 (2) 20-01 (4) 01-04 (3) 04-06 (2) 06-07 (1) 18-19 (1)* 19-21 (2)* 21-04 (3)* 04-05 (2)* 05-06 (1)*

ALASKA
Openings Given In GMT

To:	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern USA	19-22 (1)	16-18 (1) 18-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	18-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-04 (1)	06-12 (1) 07-11 (1)*
Central USA	19-23 (1)	17-18 (1) 18-21 (2) 21-00 (3) 00-01 (2) 00-01 (2) 01-02 (1)	17-20 (1) 20-23 (2) 23-02 (3) 02-03 (2) 03-05 (1)	06-14 (1) 07-12 (1)*
Western USA	19-21 (1) 21-23 (2) 23-00 (1)	17-20 (1) 20-21 (2) 21-22 (3) 22-00 (4) 00-01 (3) 01-02 (2) 02-03 (1)	14-17 (1) 17-20 (2) 20-22 (3) 22-00 (4) 00-02 (3) 02-04 (2) 04-06 (1)	02-03 (1) 03-05 (2) 05-14 (3) 14-15 (2) 15-16 (1)

about 10 a.m., with strong signals. From 10 a.m. through the early afternoon signals should weaken considerably, with the band remaining open to Europe, northern Africa, the Caribbean, Central America, and the northern countries of South America. Some openings may also be possible towards the South Pacific, particularly from the PST zone. Signals should begin to increase in strength again after 2 p.m., remaining strong towards Europe, Africa, and the Middle East to about 3 p.m. in the PST and MST time zones and as late as 5 p.m. in the EST and CST zones. Check for long-path openings to Australasia between 3 and 5 p.m. in EST and CST zones, and short-path openings from the PST zone between 4 p.m. and sunset. Look for strong signals to all areas of South America from about 4 p.m. onwards from all time zones. *Forty* meters should begin the open towards Europe and the Caribbean, Central America and the northern tier countries of South America about an hour or so before sunset.

Sunset to Midnight:—*Twenty* meters could remain open to southern Europe and parts of Africa for an hour or so after sunset in the EST and CST time zones. Check for long-path openings to Europe and Africa from PST zone beginning about 10 p.m. Band should remain open to most of South America to about 7 p.m., with some openings deep into South America and to Antarctica right up to Midnight. Twenty should remain open to South Pacific to Midnight and to the Far East and Asia until 10 p.m., perhaps an hour or so later in MST and PST zones. Check *40* meters throughout the entire time period for openings to Europe and parts of Africa, and to most of South America. In PST zone check for openings towards the South Pacific beginning about 10 p.m. *Eighty* should open towards Europe, Africa, the Caribbean, Central America and the northern countries of South America during most of this time period from all time zones. Check for *160* meter openings towards the Caribbean, Central America and into the northern tier countries of South America between 10 p.m. and Midnight, and to Europe from the EST and CST zones after 10 p.m.

Remember, The Contest Period Starts At 7 P.M. EST, Friday Night, November 28 So Be Sure To Use The Sunset To Midnight Forecast To Get Started.

Short-Skip Charts

This month's column contains Short-Skip propagation data for use between distances of approximately 50 and 2300 miles, and between the states of Alaska and Hawaii and the Continental area of the USA. Instructions for using this information is given elsewhere in this column.

VHF Ionospheric Openings

Two short, but significant meteor showers are expected during November, which should make possible some meteor-scatter type openings on the VHF bands. The *Taurids* shower, lasting for a day or two, should peak on November 4 with an expected count of about 15 meteors an hour. A second shower of about the same duration and intensity, called the *Leonids*, should peak at about 11 p.m. EST on November 16.

Some auroral-type VHF ionospheric openings are likely to occur during the month, especially when ionospheric conditions on the HF bands are below normal or disturbed. Check the Last Minute Forecast at the beginningof this column for the days that are most likely to be in these categories during November.

Solar activity is now too low to expect any regular *6* meter F-2 ionospheric openings. There is a possibility, however, although very slim, for an occasional 6 meter Trans-Equatorial (TE) scatter-type opening during November, mainly between the southern tier states and deep South America. If a TE opening is to occur at all, the most likely hours are between 8 and 11 p.m. local standard time.

Good luck on the WW DX CW Contest weekend. Be sure to let me know how these special contest propagationforecasts work out. For the past 36 years the contest forecasts have held up with an accuracy better than 90%.

73, George, W3ASK

VHF

a monthly feature by
STEVE KATZ, WB2WIK

PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

WPX Update

It appears as though our little campaign to increase the popularity of the *CQ* World-Wide VHF Contest this year was successful. As of this writing we've already received over 150 logs/entries, and there's weeks to go before our deadline. We can already tell there was an increase in portable operations for this year's contest, as most of the leading scores are from such stations. I'm very happy to see this trend, as one of our goals in establishing the new contest was to help popularize the "expedition" concept of VHF/UHF operations. Using lightweight, low-powered, portable equipment, any reasonably able-bodied person can set up a competitive station atop the local mountain or other prime spot and have a ball. The use of a rare prefix or operation from a rare grid makes such work even more enjoyable; it's wonderful being thanked for every QSO!

Speaking of rare prefixes and portable operations, the group at 4U1UN, operating from atop the United Nations building in New York City, really outdid themselves. Their claimed score of over 335K points is the highest received thus far and represents 959 QSOs with 270 different prefixes. And the U.N. building is not exactly a mountaintop. In fact, there are dozens of taller structures in New York City alone. Of course, their one-of-a-kind prefix, highly recognizable callsign, and "new country" status didn't hurt them a bit. The 4U1UN operation epitomizes a well thought out "portable" contest plan, and despite a few problems which will be discussed as part of the contest results writeup next June, it came together beautifully.

Another portable operation which provided a great number of those worked with a new grid was the WW4T/3 multi-op at the Rockton tower in the Monshannon Forest of western Pennsylvania. From their 2485 foot perch in rare grid FN01, WW4T, along with XYL N4ORP and friends WA4VCC and KB4CSE set up on 50, 144, and 432 MHz and had a splendid time giving a new prefix and grid to the majority of the 525 stations they contacted. As Ted Goldthorpe, WA4VCC, put it, "... Burger King hamburgers at 85 feet (above ground, in the fire tower) with a beautiful sunset for atmosphere ..." was the dinner that preceded the "pileups from Georgia to Missouri to Canada to the Atlantic seaboard. And Saturday morning was no exception—the contacts continued to come." Good work, fellows and gals!

Still another, and quite fascinating, DXpedition for the VHF WPX was reported by Hal Lund, ZS6WB, of Pretoria, South Africa. Hal, who publishes the "VHF News," a newsletter that goes out bimonthly to about 150 VHFers all over southern Africa, is one of the two most active VHF contesters in the country. His newsletter #87-15, dated July 26, contains a report of prefix/grid/country expeditions by ZS4BCR, ZS4TX, and AA2KZ, who activated two prefixes (A22 and A25) and two grid squares (KG19 and KH10) for the WPX. After making the 800 km return trip to Pretoria, they then activated ZS75SAW, a special SADF centenary callsign, and drove north to Bophututswana to put H5AYB on the air! And you think setting up from the local hilltop is a lot of work? These fellows deserve a round of applause for their superhuman efforts, which resulted in new record high scores for Africa in the *CQ* VHF WPX.

Who's that up there? This is the site of WW4T/3, FNO1, the only WW3 prefix in the July VHF WPX Contest. The gang did a bang-up job, operating from this 85 foot fire tower atop a 2400 foot mountain in western PA. The 144 and 432 MHz antennas are above the tower; the 3-element 6 meter beam was on its own 20 foot mast.

By the way, here's an interesting observation: the South African "VHF News" contains, as part of the bimonthly "VHF Operating Calendar," notes on the "W5UN EME Activity Periods," along with dates, times, and start azimuths for stations who cannot elevate their antennas. What a neat idea! In case you don't remember, Dave, W5UN, is one of our country's foremost 2 meter EME men. A story about Dave and his behemoth 544 element antenna system was featured in a former column.

VHF Conference, Amplifiers, And Antennas

The Central States VHF Conference drew nearly 250 attendees to Arlington, TX (July 23–26). I understand this is a record crowd, despite scorching temperatures at the time. Congrats to WB5LUA and WA5TKU for organizing another excellent gathering. Just recovering from the *CQ* VHF WPX Contest and being pretty well "hamfested out" by the end of July, I didn't make it, but I've seen reprints of the papers presented by the speakers at this year's Central States affair, and they're worth reading. Reprints of the proceedings are available to all from the ARRL. Next year's CSVHF Conference is scheduled for July 21–24 (once again, the weekend after the *CQ* VHF WPX) in Lincoln, NE.

The Green Lake Amateur Repeater Association is selling surplus AM6154 and AM6155 power amplifiers in an effort to raise money for their club. These hearty little amplifiers run about 500 watts input power inthe VHF region from 150 to 400 MHz (minor modifications may be required) using tubes similar to the 4CX250 series and feature internal power supplies and blowers. Hundreds have successfully modified these units for service in the amateur 2 meter, 135 cm, and 70 cm bands, and the details are readily available. Mac, N9CXX, says the amplifiers are in very good to excellent condition, and there were 14 units available as of the beginning of August. For further details, contact Ken Slate, W9ITW, 427 Hamburg, Ripon, WI 54971 (telephone 414-748-5462).

The August issue of the "2 Meter EME Bulletin" contained a useful tip for those having or planning to build power amplifiers using the 3CX1500A7/8877 tube. According to an article by Peter Sundberg, SM2CEW, a high-powered external-anode tetrode called either the QBL5/3500 or QY5-3000A makes a nice replacement for the 8877 in many VHF circuits and is readily available on the surplus market in Europe. The tube has a 4-pin base for which no socket is needed, and it is rated for 4.4 KW output power with 100–150 watts drive. Peter says the QBL5/3500 works well in the *ARRL Handbook* 144 MHz amplifier (8877) design once a few modifications are made to accommodate the screen grid. Although Peter didn't specifically say so, the QBL5/3500 may be an "instant-on" type tube, because it does have a directly-heated, high-current cathode (6.3 volts at 32.5 amps). Details on this tube and conversion details are in the "2 Meter EME Bulletin" Number 40 published by KB7Q. I'll happily supply reprints to anyone sending a request accompanied by an SASE.

John Butrovich III, W5UWB, of Kingsville, TX offers this useful hint to our readers: You can make good, weatherproof coaxial fitting seals by using two types of 3M "Scotch" tape. First, wrap connectors tightly with "Scotch" brand 130C high-voltage tape. Stretch the 130C until it is about one-half its original width, making overlapping layers to completely cover fittings and an inch or so of cable. Next, tightly wrap overlapping layers of "Scotch" brand 88 vinyl tape over the assembly, covering the 130C tape completely. Remember to

153 Rodman Court, Eatontown, NJ 07724

What most people see when K2SMN passes them in his Mustang is the 9-element F9FT "Tonna" beam for 144 MHz, complete with Alliance rotor. The car also sports several whips.

make the last few wraps **without** stretching the vinyl tape to prevent its unwrapping. W5UWB says, "I've found that the 130C will flow into the crevasses of the fittings due to pressure from the top layer of 88 (tape). It has worked for me—give it a try!" I did, John, and you're right. That 130C/88 combination is unbeatable for weatherproofing outdoor fittings. The 130C is "rubbery" and stretches a lot, filling in all the potential entrance points for moisture. The 88 assists in holding the 130C captive around the fittings and further seals the assembly. Another use for the "Scotch" brand 130C is in insulating high-voltage joints; the stuff is an excellent high-voltage dielectric, evan at elevated temperatures.

Val Comm Inc. of Albuquerque, NM has announced still another unusual antenna product for VHF/UHF enthusiasts. This time it is a 435 MHz helix antenna available in 9-turn and 16-turn versions claiming gain figures of 12.8 and 15.2 dB, respectively. The distributor says their 70 cm helices are patterned after designs by J. Miller, G3RUH, and are built with carefully selected materials (aluminum boom, copper helix, nylon spacers, stainless steel hardware) for long life. Val Comm also claims, ". . . (the 9T435), with fewer turns than (the) 16T435, still outperforms the crossed Yagi which requires accurately matched phased lines to produce circular polarization." The 9T435 is priced at $145.50 and the 16T435 at $179.50 (plus shipping). For more information, contact Val Comm Inc. at (505) 292-7509.

Inside the K2SMN mobile hamshack is a pile of transceivers and amplifiers, inverters, keyer, rotor control box, and so forth. Just what is really needed for a trip to the supermarket.

Personal Profile: Roger Amidon, K2SMN

What can be said about a man who has a 6-band VHF/UHF mobile station including a 9-element beam and rotor for 2 meters, dedicates about 400 square feet of his home to his station, erects two 100+ foot tall towers exclusively dedicated to VHF/UHF antennas, and never seems to miss a band opening above 144 MHz? "Eccentric" might come to mind, at least according to my wife, Lori, whose interest in amateur radio rivals my interest in Wagnerian opera (and that doesn't even exist). But, as I patiently explained to Lori, it is impossible to be the best, or even nearly the best, at anything without being somewhat consumed by it. Ask Ivan Lendl. Ask Martina Navratilova. Ask Mary Lou Retton. Ask Roger Amidon. It is the spirit of competition that drives many of us to the successes we achieve, and Roger Amidon, K2SMN, is a spirited competitor, not to mention a motivated achiever.

I visited Roger, whom I had met before on several occasions, on a Sunday morning in August just as he was calling the East Coast VHF net to order on 2 meters. It was a spectacular day, and the sun was glistening off the 16 or so antenna booms above the K2SMN property in Hopewell, NJ. I could see the "2 meter tower" as I was driving up the hill that leads to Roger's home, from a point where the road crests, then dips, about a half-mile or more away. It's easy to see, because the 150 feet of Rohn #45 tower stands very tall among the 60 foot or so tree line which surrounds it. Not as visible from that distance was the "everything" tower, which is only 100 feet of Rohn #25 supporting 8 rotary Yagis, and other antennas, for 4 bands.

Roger's driveway is *very* long, something for which I'm certain his neighbors are eternally grateful. Because his house is set so far back in the woods, you really can't see the house or antennas from the street (or much else), but back in those woods is a beautiful contemporary home nestled atop a 600 foot hill and surrounded by lots of vertical steel and horizontal aluminum. I am told that one can see the New York skyline, about 50 miles to the northeast, as well as all the bridges crossing the Delaware river from New Jersey to Pennsylvania, from the top of the 150 foot tower. I had my climbing belt with me the day of my visit, but as I was recovering from a late-night party, I didn't feel much like making the climb. I'll have to take Roger's word about the view.

Once atop the stairs that lead to K2SMN's "shack," it becomes immediately apparent that this guy is serious about VHF. Countless rigs, transverters, amplifiers, coaxial switches, wattmeters, and miscellaneous paraphernalia are stacked everywhere. From his swivel chair Roger can reach three FT726R's, an IC-740, FT-One, three rotor control boxes, a stereo equalizer and mixer (for the headphones), keyer, telephone, microcomputer, and an endless array of FM rigs, microphones, and coax switches. Elsewhere, slightly out of reach but within eyeshot, are KW amplifiers for 144, 220, and 432 MHz, transverters and amplifiers for 903 and 1296 MHz, a 2304 MHz sta-

An overview of the K2SMN operating position. He seems to have it all figured out: rigs ahead, rotor control boxes to the left, amplifiers more to the left, and wattmeters all over.

tion, and solid-state amps for 50#432 MHz. From the same chair one can look up above the pile of FT726's and out a small window where the reflected images of all the tower-mounted antennas can be seen. This is accomplished by the use of carefully placed trailer-type side-view mirrors attached to the side of the house and aimed toward the two towers.

Behind Roger, and pretty much all throughout the house, is an impressive array of personal computers. You name it: If it's a PC made by anybody, it's probably there. Amidon is a computer consultant, and makes his living with these things. He also has some fun with them, as evidenced by computer-generated graphics printed on signs and posters around the shack.

K2SMN is equipped for all bands from 1.8 through 2304 MHz, but is kind of a permanent fixture on 2 meters through 23 cm, as these are Roger's strongest bands. For 2 meters the rig is an FT726R driving a solid-state intermediate amplifier which in turn drives an ON5FF legal-limit amplifier (2× 32CX800A7); the antenna system is a pair of Cushcraft 4218XL "Boomers" centered about 158 feet above ground. For 135 cm the rig is a Microwave Modules transverter driving an AM6155 amplifier (8930) at about 500 watts to a single 22-element KLM long-boom Yagi at about 102 feet. The 70 cm setup includes an FT726R driving a solid-state intermediate amp and then a Henry 2004A (3CX800A7) at about 700 watts output to a pair of 30-element KLM long-boom Yagis centered at about 117 feet above ground. On 33 cm the rig includes an SSB Electronic LT33S transverter driving a Down East Microwave 30 watt solid-state amplifier to a 92-element F9FT "Tonna" array (4 × 23 el) at about 110 feet. The 23 cm rig uses an LT23S transverter driving a pair of 7289s in a water-cooled parallel cavity amplifier to about 250 watts output; the antenna is a 180-element loop Yagi array (4 × 45 el) from Down East Microwave perched 172 feet above ground. All receivers are assisted by GaAsFET preamps, tower or shack mounted. Feedlines are hardline, heliax, or Belden 9913.

The 6 meter "bug" obviously hasn't bitten Roger nearly as hard, as evidenced by his (by comparison) modest setup for the lowest VHF band: an FT726R driving a 150 watt solid-state Mirage amplifier to a single 10-element Cushcraft Yagi at about 35 feet. Just wait, Roger. When the F2 returns to 50 MHz in a few more years, I'll bet you get a KW running and the antenna up on the tower!

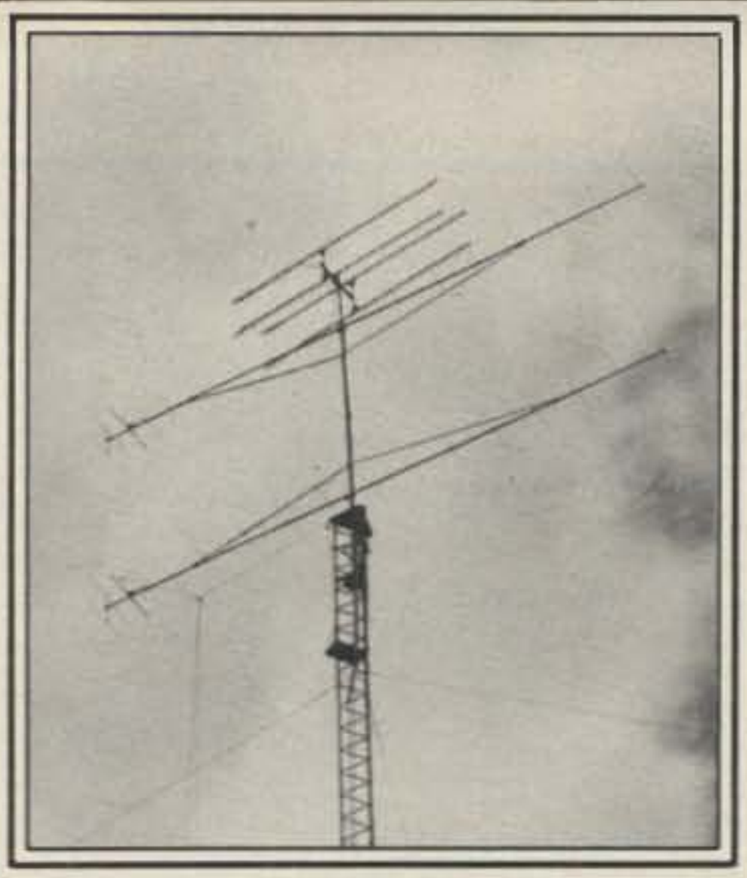
Amidon's car is another story. How many people run 200 watts output to a 9-element Yagi at 10 feet while they're motoring down the freeway? Well, now you know about at least *one*. Using a solid-state power inverter to supply the needed 117 VAC for the Alliance rotator, Roger routinely operates mobile, running 2000 watts ERP (effective radiated power) on 144 MHz. To minimize losses he even uses Belden 9913 and Andrews superflex heliax for the feedline to the beam! The FT726R and Microwave Modules all-mode 200 watt (output) amplifier have worked some terrific mobile DX. I was afraid to inquire as to Roger's farthest contact from the car station—probably New Mexico or something.

The mobile station also includes multimode capability for 50, 220, 432, and 1296 MHz. The trunk of the unique blue Mustang contains beams for the other bands, including a 55-element F9FT for 23 cm, along with lengths of 9913 feedline and other such necessities. You mean *you* don't have this stuff in *your* trunk? In addition to the beam and rotor setup, the car sports no less than five whip antennas for 28 through 1296 MHz. There are also wattmeters and an electronic keyer, complete with paddle sitting next to the gearshift stick. You wouldn't want to be caught without CW during an unexpected Aurora.

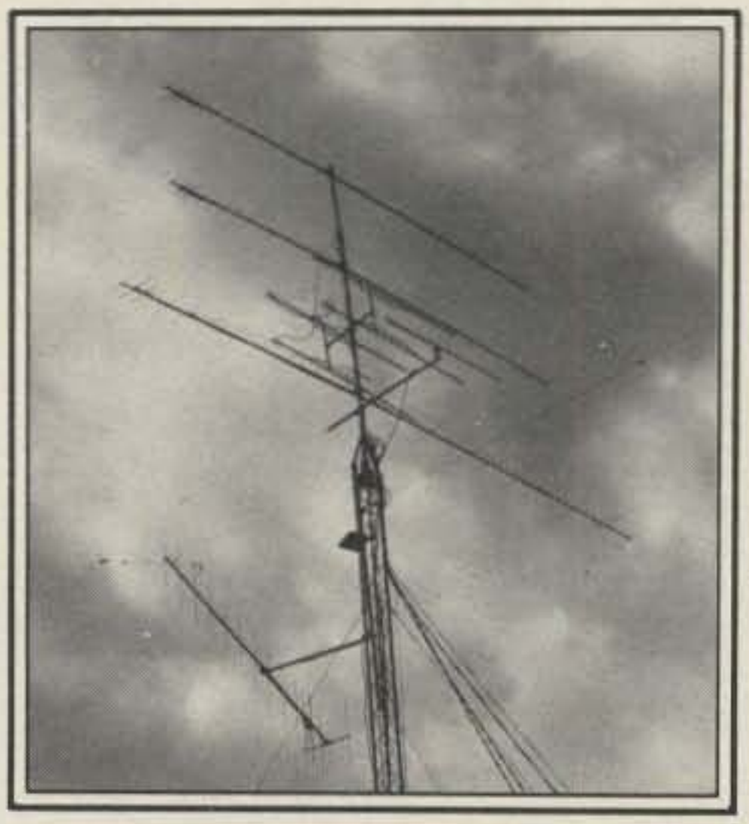
A one-time HF DXer and satellite enthusiast, K2SMN has been through the gamut of amateur radio activities. I don't know if he was as successful in past radio endeavors, but I can testify that Roger is doing very well with his current ones. When I attended the Charlotte, NC hamfest and convention back in late March, I met a number of fellow VHF/UHFers who spotted my callsign tag and said hello. While many of these folks knew me or at least had heard the call before, most of them replied, when discovering I was from New Jersey, "Oh, yeah, New Jersey. How close are you to K2SMN? We hear him all the time on ——!" (Fill in the band of your choice.)

"In the works" at K2SMN is an EME array for 144 MHz in which Roger plans to use four

A closer look at K2SMN and some of the gear. Just to Roger's left is his microprocessor-based rotor controller for 144 and 1296 MHz; this allows antenna steering by presets. The audio mixer above that box controls which rig, or combination of rigs, is piped into his headphones. This allows listening on two bands simultaneously while wearing "cans."



The 150 foot tower at K2SMN supports 36 elements for 144 MHz and 180 elements for 1296 MHz. It also supports the ends of a couple of HF slopers and a G5RV multiband dipole. The top 1296 MHz antennas are 172 feet above ground.



The 100 foot tower at K2SMN supports 22 elements for 220 MHz; 60 elements for 432 MHz; 92 elements for 902 MHz; 55 elements for 2304 MHz, all rotatable. The Cushcraft 215WB "Boomer" (vertically polarized) alongside the tower is fixed-aimed at W1AW for dedicated copy of the League bulletins.

modified KLM 16LBX Yagis in an el/az system located *atop* the tower, allowing the same array to be used for terrestrial work. And the ancient tube-type 2304 MHz rig, which, because of its high level of frequency multiplication, is CW-only, is being replaced by modern, solid-state gear already on hand at this writing.

A principal in the newly reformed East Coast VHF Society, Roger is active with that club and plans further field operations under the club callsign, WA2WEB. He also runs their Sunday morning net on 144.250 MHz, looking for participants from anywhere. Check in sometime to say hello and tell Roger I sent you.

Coming Next Month

A number of readers have inquired about tools we can utilize to reduce TVI/RFI/VCRI, especially from 6 meters. We'll go over a couple of these questions and discuss some solutions. There are also a few new equipment reviews brewing, including one on the new RF Concepts 2-317 power amplifier for 2 meters. And in either December or January we'll list the top claimed scores for the 1986 *CQ* VHF WPX Contest.

P.S.: Being a VBP (very busy person), I didn't have a lot of time to spare during the annual Perseids meteor shower this August. But I did get on Wednesday night and Thursday morning of the shower "peak" (August 12# 13). It was upsetting to hear so many stations crowding on 144.200 MHz, simultaneously calling 15-second sequenced CQ's. What a waste of time both for callers and potential listeners. To make the most of what limited time I had, I fired up on 3818 kHz Thursday morning at 1045 UTC and called a fast "CQ 2 meter meteor scatter," which brought a dozen replies.

Of 12 skeds made between 1045 UTC and 1200 UTC, I completed all 12 two-way meteor QSOs on 2 meters. Not one contact consumed more than 5 minutes to complete; most consumed 2 minutes or less (this is only four 15-second sequences for each station). All skeds were made far away from the crowd on 144.200. WA4VCC suggested 144.320, which was a splendid idea, so I stayed up there to complete most of the skeds which followed. A big *thanks* to those stations for not taking any more time than necessary. You know who you are. And *you're welcome* to those for whom I was the first NJ contact.

P.P.S.: Finally worked VE1UT on 23 cm. The night of August 31 (actually, early AM UTC on September 1) produced terrific coastal tropo 144 MHz and above. Bernie, VE1UT, was literally pinning my S-meter on 70 cm, so we gave it a go on 23. Despite Bernie's meager 8 watts output, 6 dB feedline loss, and single Yagi antenna, we completed a CW contact with about S6 signals. Glad to have finally made it. Now I can turn the antenna some other way when the tropo is in!

73, Steve, WB2WIK

DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATION AROUND THE WORLD

'Ere the darkness falls around me,
I would fain lay down and rest.
Call me early, mother darling,
For the CQ World-Wide Test . . . .

There are those areas of DX knowledge generally known to the old DXers but seldom comprehended by the younger ones. There exists an inevitable awareness of the Eternal Truths that comes as one grows older. You have to be old to really understand the Mysteries of the Ages, and the latent desire to have posterity keep your memory green will always come. It comes, but only when you are old. You then hardly have to seek the knowledge; it comes uninvited. All DXers want to be appreciated and remembered, and the older ones even more so.

We were trying to explain this to one of the younger DX types, this one a Local who had come wandering up the hill in the late days of fall. We were not doing too well in making him understand that all people want to be remembered. "Why do you think that some people put up big headstones in cemeteries, name buildings after themselves, and have big monuments erected?" we asked, and the Local just shook his head. "Never thought of it at all," was his reply. We tried even harder.

"So why do you think that they put up statues of national heroes," we continued, "the statues always showing them in their later years. Did you ever see a statue of Robert E. Lee as a young man?" The Local again shook his head.

"In truth," he siad, "I have always just thought that General Lee was born old with white hair. Where I was raised in the lower Shenandoah Valley, all the statues were of Stonewall Jackson and they were always an old man with a full beard. Were those two ever young?"

The Local might even have been talking of some of the DXers hereabouts. Maybe even some in other call areas. We had to wonder what he might think should we show him a picture of Robert E. Lee with dark hair and clean shaven but for a mustache. But this one had come seeking answers, and we had to try to help. He was worried about the decline of DXing.

"Do you really believe that those fellows are right, the ones who say that DX is over the hill and the good days of DXing

77 Coleman Drive, San Rafael, CA 94901

How do you tell a DXer? They are always happy, genial, and relaxed. And they look it. Here on the left is Terry, G4MYP, with an expected visitor, Les, 7Q7LW. They had talked on the air, Les sent some stamps to Terry's XYL, and, son of a gun, there comes Les knocking at the front door. DXers never come as strangers!

are gone forever?" It was a sincere question, and we wished to answer it sincerely. However, this one was still a young DXer, and while there will always be those things which old DXers understand instinctively, the same things will cause a young DXer to struggle for understanding. Possibly this is a partial explanation of why there are so many old DXers on the Honor Roll. But we had to try to help the Local understand.

"What have you heard this time?" we asked, and the story was out. "There are some I've run into recently," the Local said, "who say that after 50 years of the DXCC, DX is on the skids and the DX bands are about worn out. They ask what a new DXer has to look forward to when everything has already been worked and a lot that was worked back in other years can no longer be worked by such as myself. They say that the dreary years are ahead and good DX is gone forever. That's what I'm hearing."

"And the days that they knew were the Great Days of DXing," we suggested, "and they will never come again, right?" The Local was quick to nod in agreement. "You've been talking to them, too?" he asked.

Perhaps we had, as one meets a good many along the way. One can hear about the wondrous DX and things and sights and efforts that have gone before. One can meet those who were "the first to work that new country" as well as the last one to work Okino-Torishima as they were taking down the scaffolding over the wave-swept reef.

DXers have always wanted to be noted and remembered, to bask in the attention drawn to their accomplishments. There is honor in attaining the DXCC, to achieve WAZ, to be top scorer in contests. Some might even recall when just to attain 100 countries and DXCC was to be among the DX anointed ones. And should such a noble DXer happen to stumble into the Silent Key column, it was the natural thing to do to petition the FCC for his call sign as a memorial station.

We knew all of this. We knew that while there are many values to DXing, among them is always the deisre by some to excel, to be the loudest with the mostest. And when, through application and diligence over the years, they have worked everything available and triumphed most of the time in pile-ups, the accomplishment sometimes palls when there is little left to conquer. They worry that the only way they can go is down and thus believe that DXing will likewise decline with them.

"Do you enjoy DXing?" we asked, and the expected smile showed. "Sure do!" was the enthusiastic answer. "And if I work as many new ones this year as I did last year, I will be at the 200 country mark." Then the smile faded. "But what good will it do if DX is on the skids? The feeling is, after listening to those other fellows, that I am climbing a tree that is going to topple over. Am I working against the tide?"

There was a voice from behind us on the path up from the street. "No, you are not!" it said, and the Old Timer was again with us. Over the years we have tended to believe that there are no sticky problems in DX rhetoric that we cannot handle, this mostly because the Old Timer always shows at the critical moment. We were happy with his arrival. It was evident also that the Local was relieved to hear that DX was not yet dead. Perhaps not even close. When the Old Timer speaks, we listen. Heck! We were doing that long before E.F. Hutton found out that one can learn by listening.

There has always been a bit of the missionary evident in the Old Timer, and especially where DX is concerned. He hardly had to warm up to the subject. "Years back when Clint DeSoto, Bryon Goodman, and Clark Rodimon were working out of the ARRL storefront in downtown Hartford, those of us who were trying to work DX really had nothing by which to measure our effort but the fact that we were working distance—across the country, then the oceans, and finally

The WPX Program

Mixed

1290	OH6SU	1293	W4UW
1291	NI9C	1294	KF4FP
1292	NX0I		

SSB

1904	WA8SXM	1907	IV3PVD
1905	NI9C	1908	KF4FP
1906	HP8AHF		

CW

2456	WD4IIO	2461	DJ0KE
2457	GU4RUK	2462	DJ6EU
2458	NI9C	2463	OZ4CG
2459	I4YCE	2464	NU4B
2460	OZ4RS		

Endorsements

Mixed: 450 NI9C, W4UW, NX0I, KF4FP. 500 NI9C, W4UW, NX0I, KF4FP. 550 NI9C, W4UW, NX0I, KF4FP. 600 NI9C, W4UW, NX0I. 650 W4UW, NX0I, W5EW. 700 W4UW. 750 W4UW. 800 W4UW, KS3F. 850 W4UW. 900 W4UW. 950 WB8AAX, JA7FFN, W4UW, I8RFD. 1000 WB8AAX, W4UW, PY6ABZ, I8RFD, KS0Z. 1050 W4UW, I8RFD. 1100 W4UW, I8RFD. 1150 W4UW, I8RFD. 1200 W4UW, I8RFD. 1250 I8RFD. 1300 I8RFD. 1350 I8RFD. 1550 I2DMK. 1800 IN3ANE, N7TT. 2300 N4NO. 2350 N4NO. 2400 N4NO. 2450 N4NO.

S.S.B.: 400 I5ZJK, NI9C, I4LRH, IV3PVD, KF4FP. 400 DJ7MO, I5ZJK, I4LRH, IV3PVD, KF4FP. 450 DJ7MD, I5ZJK, I4LRH, KF4FP. 500 DJ7MD, I5ZJK, I4LRH, KF4FP. 550 I5ZJK, I2IAU, I4LRH, WA4PMF, KF4FP. 600 I5ZJK, I2IAU, I4LRH. 650 I5ZJK, I4LRH, I2IAU. 700 I5ZJK, I4LRH, I2IAU. 750 I5ZJK, I4LRH. 800 I5ZJK, I4LRH. 850 I5ZJK, EA3BOX, I4LRH. 900 I5ZJK, EA3BOX, I4LRH. 950 I5ZJK, I4LRH. 1000 I5ZJK, I4LRH. 1050 I2DMK, I5ZJK. 1100 I5ZJK. 1750 N4NO. 1800 N4NO. 1850 N4NO. 2350 K2POA.

CW: 350 NI9C, I4YCE, DJ6EU, PY1DEA, OZ4CG, NU4B. 400 I4YCE, DJ6EU, PY1DEA, OZ4CG, NU4B. 450 I4YCE, DJ6EU, PY1DEA, NU4B. 500 I4YCE, DJ6EU, NU4B. 550 I4YCE, NS2H. 600 I4YCE. 650 I4YCE. 700 I4YCE. 750 I4YCE. 800 WB8AAX. 1000 W9PWM. 1150 W9VEN. 1250 I2DMK. 1400 N7TT. 1900 N2AC. 2000 N4NO. 2050 N4NO. 2100 N4NO. 2150 N4NO. 2200 WA2HZR.

10 Meters:	I5ZJK
15 Meters:	I5ZJK
20 Meters:	I5ZJK, NI9C
40 Meters:	I5ZJK, W5AWT
80 Meters:	I5ZJK, W5AWT, NI9C, WN4KKN, NX0I, OZ4CG, HI8LC
160 Meters:	W5AWT, NI9C, NX0I, DJ1YH

Asia:	I5ZJK, NX0I
Africa:	I5ZJK
No. America:	I5ZJK, NI9C, I4YCE, ON4QX, NX0I
So. America:	I5ZJK, ON4QX
Europe:	I5ZJK, DJ0KE, NX0I, OZ4CG
Oceania:	I5ZJK, ON4QX, NX0I

Award of Excellence Plaque—160 Meter Endorsement . . . VE3XN.

Award of Excellence Plaque Holders: I0JX, WA1JMP, K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, AB90, FM5WD, I2DMK, W4BQY.

Award of Excellence Plaque Holders with 160 Meter Endorsement: DK5AD, W3ARK, LA7JO, W4VQ, K6JG, W4CRW, N4MM, SM0AJU, KF20, K5UR, OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY, W5UR, N4NO, W8RSW, N4KE, I2UIY, W8ILC, W1BUS, NN4Q, G4BUE, LU37L/W4, I4EAT, VE7WJ, W9NUF, N4NX, VK9NS, DE0DXM, K9BG, AB90, FM5WD, SM0DJZ.

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.

W6TI has been broadcasting weekly DX information at 0200Z every Monday. You can catch the DX word at 14002 kHz and 7015 kHz. And for almost a quarter century the same operator has been doing the DX chore. Here is Bob Vallio, W6RGG, who has grown old and hairy on the job, maybe even a bit stout. Bob has been on the Clipperton and other efforts and carries a hand-held rig on each hip. On-and-a-half or 2 meters, Bob is always tied into DX information.

around the world. But there were little or no standards then. If I were to work something out in the Pacific, the fellows on the east coast were working Europe. If I worked Asia, they worked Africa. Possibly you never thought of it, but Outer Mongolia is closer to your QTH here than is Pernambuco in Brazil or Sicily and the toe on the boot of Italy. We wanted something, if not for comparison with other DXers, then for a simple measurement of our own DX accomplishments. Fifty years ago they came up with the DXCC Award, and in my years in working DX I have come to the conclusion that this was possibly one of the most significant things ever to happen to amateur radio." The Old Timer paused, the Local was still listening, and things were going right. The Old Timer continued.

"The DXCC clarified the question of what was a DX country. It gave each DXer an individual measurement of his own achievement, and at the same time it gave him a yardstick to compare his and other DXers progress in DXing. Have you ever thought of the DXCC along these lines?"

The Local had not. While he pondered the matter, we jumped in with some nudges. "You know your own DXCC score, Don't you?" we asked. "But how many others do you know? In fact, how many calls on the Honor Roll can you name? Five, ten, maybe even more?"

We were rather sure what the answers to our question would be. DXers tend to know their own scores and have some familiarity with a handful of others, but seldom will you find many with a ready knowledge of the top scores on the Honor Roll. Nevertheless, the Honor Roll is the exalted state to which DXers strive to enter. Once there they feel that they are marked for eternity, enshrined for posterity, and best of all, an acknowledged top DXer! What could be better? The Local did know his DXCC total and had some familiarity with some of the others here in the county, but that was it.

"Over the years," the Old Timer said, again taking up the chiar of the meeting, "my feeling has been that the best time for a DXer is somewhere when he is between the 150 and 250 DXCC counters. They are at the stage where they have gained a lot of experience, they are picking up a good number of the rarer countries, and they are getting within strking distance of the top. There still is a lot of DX left for them to work, and they are riding the crest of their interest in DXing. They even have recognition, that perhaps being most important of all. Maybe you've noticed this, how a DXer changes in his outlook as his country total grows."

We had, and the Local had, for his head was nodding in agreement. "But why are they sayhing that DX is fading?" he asked. "It does not seem that way to me, but maybe they know something that I don't. Can that be?"

It could be, but probably not in this instance. The Old Timer was ready to proceed, we were ready to listen and we were sure that the answer would be in there somewhere. We were right.

"Going back a few years," the Old Timer said off-handedly, and we suspected he meant 30 or 40, "if you got into amateur radio you would find that the emphasis was on traffic work and emergency communications. It did seem that that was the cornerstone of amateur rdio and this was freely preached. DX was a side activity, perhaps interesting in itself, but hardly noticed in the shadow of the really important things like traffic and such. And a couple of decades back when I was the secretary of a DX club, I got the big idea that it would be a good thing to compile a list of DX clubs. Real DX clubs, the thinking that it might be beneficial to communicate with them on ideas and objectives for DX." The Old Timer paused, possibly remembering that time back 30 years or so, and asked, "How many DX clubs in the country do you think I came up with?" The Local thought a bit and then shrugged.

The Old Timer did not wait for him to speak. He spread a hand in front of the Local's face. "Count them," he ordered. We did.

"Five DX clubs was all I could locate" the Old Timer contined. "DX bulletins were rather sparse, and actually DX sometimes was thought an unusual thing. Here in the country there was but one other DXer, W6GPB, and that was it."

The Local was thinking. "You know something," he said, "a couple of months ago at the club meeting one of the old timers was telling me that back then

you only had about 40 club members. Now there are several hundred. Is that right and what happened?''

It was right because we could remember that ourselves. And it was also coming to us that in the 30 years or so that we have known the Old Timer there have been changes. The traffic nets have seemed to decline and emergency communications are still needed, but the proliferation of mobile radios in service and emergency vehicles has lessened the dependence on amateur radio. We also found ourselves remembering that in recent years some of the emergencies such as the Mexico City earthquake tended to depend on the long-haul equipment of the DXer rather than the local dipole set. And the county here has sprouted with DXers. We mentioned this to the Old Timer to indicate that we also remembered those other years and to the Local to try to show him how things have changed.

''You mean that DX was not always the top interest?'' he asked and we had to admit that he might be right. ''But it is now!'' he protested, and we again had to acknowledge that he was right on track. Perhaps he had not stopped before to think about it. Maybe it was difficult to

Where do you find DXers? Just about everywhere! This relaxed photo was taken at the IARU Region II meeting in Argentine last fall. On the left is Carl Smith, W0BWJ. Then David Rankin, 9V1RH, Dick Baldwin, W1RU, and L. van De Nadort, PA0LOU. You should recognize these calls.

comprehend the picture before he burst onto the scene. But DX has changed, amateur activity has changed, and it is always surprising to note the extent of the change when compared with a quarter century back.

''But what about those who say that DX is fading?'' the Local asked. ''If what you say is right, wouldn't it be correct to say that it is growing and in no way fading? Isn't that right?''

Of course it is, and the Local had come to that point where the Inevitable Truths were starting to be known to him. As the Old Timer had pointed out, DX activity these days has come a long way since the early days, and it still has a long way to go. No true-blue DXer could ever have any doubts on that, that being one of the Eternal Truths of DXing.

''Those fellows you've been talking to,'' the Old Timer counseled, ''have been around for a long time. They have worked a lot of DX, they have carved out a position in DXing. They have done well, and they take pride in their DXing. They long for, possibly even unconsciously, a remembrance by other DXers. They just want to be remembered, and in doing so they hark back to their younger days, possibly the days when the bands shook with their signals. Times change; they always do. Maybe they are hoping that their record will be such that it will endure and be remembered. You can understand that, can't you?'' The Local said that he did.

''But,'' he said, moving to show that he was not yet fully understanding, ''will they be remembered? Will other DXers remember them? I'd like to know about that.''

The Old Timer was quick to answer, quick and brief. He raised his arms, looked down the hill to the bay as though he was looking down the long years, and said, ''A real true-blue DXer will always be remembered!'' And that was it.

Later we were again by ourselves and we thought of the Old Timer's words. We did remember a lot of true-blue DXers who have gone. And we thought of the many times when the idea occurred to us that maybe we would hear them on the band of see them at the club meetings. Then we would realize again that they were gone but remembered by us. They were true-blue. And leading them all we remembered Dave Baker, W6WX, a true-blue DXer we remembered as the best.

St. Lucia

The Southwest Ohio DX Association will be blasting their signals from J6 St. Lucia for two weeks centered on the *CQ* WW CW DX Test, and they will be out en masse. Operating multi-multi, the operators will include K6GXO, N8BJQ, NC8Q, W8LIC, W8OK, W8PR, W8RKL, W8WPV, WB8ENR, WD8IXE, K9BQL, and N9AG. The activity will commence on November 23rd and run to December 6th.

You will be hearing a lot of home calls signed with /J6L. During the contest period they will sign J6DX. J6DX, N9AG, and WB8ENR go to the Treaty City Radio Club, W8UMD, Box 91, Greenville, OH 45331. All the other calls worked from this group go to their home QTH CBA. They will be on all bands working feverishly during the *CQ* CW Test. Give them a break. Work J6DX. Help the Deserving!

Novice Century Club

A new award to encourage activity on the Novice bands has been announced by *CQ* magazine. The rules are simple, and the reward is great. Novice operators need but work and confirm with QSL cards contacts with 100 amateur stations. Any Novice band, or all of them, can be used, and any authorized mode can be used.

The application for the *CQ* Novice Century Club Award can be obtained by sending an SASE marked ''Novice CC'' to the Novice Cen-

5 Band WAZ

Standings as of August 1, 1987

New recipients of 5 Band WAZ with all 200 zones worked:

151. JA1GTF
149. DL7AA
150. AA4LU

The top 10 contenders for 5 Band WAZ are:

1. N4WW, 199
2. K6YRA, 199
3. W8UVZ, 199
4. K9CEB, 199
5. DJ9ZB, 199
6. SP6JCY, 199
7. W2YY, 198
8. K7UR, 198
9. K9GX, 198
10. G4BWP, 198

426 Stations have met the 150 Zone level.

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 should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

The WAZ Program

10 Meter Phone

315	JA6RCH		

15 Meter Phone

246	OE1KW	247	JH8BOE

20 Meter Phone

612	VE2GHZ	615	DF2RG
613	W8MEP	616	YB0DPZ
614	I0CEP		

80 Meter Phone

40	TG9VT		

10 Meter CW

58	JA6RCH		

All Band WAZ
SSB

3132	OE3CBA	3133	KG6LP

Phone/CW

6127	WS5O	6137	NX0I
6128	NC5O	6138	OH6YF
6129	SP3IOE	6139	DL5EBE
6130	HB9ATA	6140	OH6LX
6131	NI2C	6141	W1VY
6132	DF9ZW	6142	K4YI
6133	OE3EVA	6143	WA1UDH
6134	OE1BKW	6144	DL7ALM
6135	K7LJ (CW)	6145	NN8R
6136	K7LJ		

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Now is the time!!!
Bring the power of the IBM compatible computer to your ham shack.

Competitive Computer Solutions, Inc. has recently designed a system exclusively for the Ham Radio Operator. Designed to reduce RFI to a minimum, these computers are supplied with all the necessary sub-assemblies you require for true performance. Included in the purchase price of the HR8810 are the 4.77/10 mhz motherboard with 640k of RAM, two floppy disk drives, Hercules monochrome graphics controller, 12" CTX high resolution monochrome TTL monitor, Multi I/O card with two serial ports, one parallel port, one game port, clock calendar and floppy disk controller and an AT enhanced style keyboard. The system is housed in an AT Jr. style case with keyboard lock, turbo switch and hardware reset and includes three specially shielded interface cables (2 serial/1 parallel), a shielded power cable and a five outlet command center providing surge, spike, EMI and RFI protection.

Interference to and from a computer is not usually due to a problem inside the case, but can be traced to the noise picked up or transmitted by the interconnecting cables. A fancy case is not the cure. Special foil and braid shielded cables are. All of our computers designed for Amateur use are equipped with these special cables. Even our power cords are shielded. Careful attention must be paid to the type and bulk of the shielding, too much acts as an RFI collector and too little as a transmitter. Make no mistake, all CPUs emit RFI noise and special casing can reduce that a little, however the difference is not truly significant.

A computer that is only FCC approved is not legal to sell. A system for sale to the general public must be FCC certified. FCC approval means that the product in question has been accepted for the certification process. Flip-top cases are especially suspect as the FCC very rarely certifies computers in this type of case. ALL of our computers and peripherals are FCC certified. How important is certification? The FCC certification is the Federal government's seal of approval for residential use. This means that the system is guaranteed to meet or exceed the maximum RFI allowable. Any computer which has not been certified has the potential to produce excessive and harmful RFI. Furthermore, if you are the owner of troublesome uncertified equipment you may be held liable for the consequences.

Because our computers are true IBM compatibles you will be able to tap into real computing power and use all MS-DOS based software available. There are literally thousands of commercial programs available for IBM compatible computers, ranging from simple games to powerful CAD systems for major industry. With a modem you have access to nationwide bulletin boards (BBSs) with countless "Public Domain" programs for every need. Contact us for information on available commercial programs and hardware expansion options.

The HR8810 system described above sells for just $900. It includes everything you need to start including MS-DOS 3.21. There are no hidden costs. Every system is built specifically according to how you want it built. Our systems are not canned. If you would like a custom configuration we will build and test it for you. Pricing is based on the hardware cost and there is no extra charge for the service. Every pre-assembled system we sell is 100% quality tested before it goes out the door, no spot checks. If you prefer we will ship your system in kit form at a reduced price. We want to make you happy.

We will make no bones about it. We are in this to sell computers. CCS, Inc. has looked hard and long at the competition and come up with a plan. Make a better computer specifically for the Amateur Radio market at a better price and make some money along the way. We believe that in today's market there are far too many companies out to mislead the buyer with fancy claims and the associated hype. It is our responsibility to make you an informed buyer. No gimmicks, just the facts. Give us a call or use the reader service card to get more information about our products. You won't be disappointed or given a runaround. We stand by our product and offer a 60 day money-back guarantee with a one year parts and labor warranty.

Competitive Computers Solutions, Inc.
5721 Bayside Rd., Suite J
Virginia Beach, VA 23455

Phone: Voice - (804) 460-XTAT
Modem - (804) 363-BAUD

CIRCLE 12 ON READER SERVICE CARD

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Total countries are now 317. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is $1.00.

CW

K4CEB	317	W6ID	311	N4KG	305	K8LJG	292	I8WY	281
N4JF	317	K4XO	311	AB4H	304	W0HZ	291	WA4DAN	281
W9DWO	316	N6AR	311	W0IZ	303	N5DX	291	K2OWE	281
W6PT	316	DL3RK	310	WA8DXA	302	WA4JTI	290	N4AH	281
ON4QX	316	SM6CST	310	YU2TW	301	W1WLW	289	K7ZR	280
K9MM	316	AA6AA	309	I3OBO	301	W4BV	289	I5XIM	280
N4PN	315	DL8CM	309	K3UA	301	N8MC	288	W2LZX	280
DL7AA	315	W9BW	309	W6SN	300	WD9IIC	288	W9NUF	280
N6AV	315	N4MM	309	WB4RUA	300	WA2HZR	286	HB9AFI	279
K6LEB	315	DL1PM	308	W0SR	300	NN4Q	286	IT9QDS	279
W3GRS	314	K1MEM	308	DL6QW	300	YU1HA	286	DL1QT	277
W8KPL	314	OK1MP	308	W7CNL	299	F6CRT	285	W9SC	277
K6JG	314	W9RY	308	K3FN	298	K4CXY	284	KA3R	276
N6CW	313	W4OEL	307	K9IW	298	W6YQ	283	W1WAI	276
K9AB	313	SM3EVR	307	EA2IA	298	G2GM	282	K4SE	275
K6EC	312	W1NG	306	DJ7CX	297	JH1VRQ	282	KQ9W	275
W4BQY	312	K9QVB	306	WD9IIX	296	K1VHS	281	K9BWQ	275
W2FXA	312	K8PYD	305	N5FW	294				

SSB

K2FL	317	N6AW	313	WA0DCQ	306	WB5TED	300	VE3DLR	290
K6WR	317	W8PCA	313	KB5FU	306	I2ZGC	300	JA5PUL	289
W6EUF	317	YU1AB	313	K8CMO	306	K2JLA	300	W9TA	289
VE3MR	317	VE7WJ	313	XE1OX	306	WA2MID	300	K8ZZU	289
DL9OH	317	K4XO	313	EA1QF	305	NW5K	300	KE4HX	288
I8AA	317	F2MO	312	NA5W	305	WB6GFJ	300	OK1AWZ	288
DJ9ZB	317	K8PYD	312	KZ8Y	305	JH1VRQ	300	I8KCI	288
N4JF	317	W0SD	312	NS7Z	305	KC8EU	300	KI3L	287
W4EEE	316	K9RF	312	K3UA	305	WA0TKJ	299	EA3KW	287
W4UG	316	K4MQG	312	I8KCI	305	I6PLN	299	AB9E	287
I0ZV	316	I8ACB	312	K8VFV	305	KA8T	299	W5LLU	287
KD8VM	316	W9SS	312	W8IMZ	304	DJ7CX	298	G3XTT	287
I0AMU	316	N2SS	312	XE1J	304	K9SM	298	XE1MDX	287
F9RM	316	LA7JO	312	VE7HP	304	I8LEL	298	N8BJQ	286
TI2HP	316	OE2EGL	312	W4UNP	304	JH4PRU	298	N3ARK	286
KS2I	316	LU3YL	312	W6NLG	304	K8ZZU	298	K9MNT	285
YV1KZ	316	DL6KG	312	NY5L	304	EA9IE	298	KB5RF	285
ZL1AGO	316	K6EC	311	CT1UA	304	XE1NI	298	KD8V	284
W9JT	316	W4SSU	311	I4EAT	304	KC8YM	298	WB3HAZ	283
VE3GMT	316	I4LCK	311	VE7DX	304	K5DUT	297	VE3MV	283
4Z4DX	316	W0SR	311	WA4DAN	304	HP1JC	297	IN3ANE	283
W4DPS	316	K9BWQ	311	WB3DNA	304	YU7KV	297	K4JLD	283
K6YRA	316	W1LQQ	311	XE1KS	303	XE1OW	297	AE5B	282
W3AZD	316	W7FP	311	W2LZX	303	WB3GPR	296	G4GED	282
ZL3NS	316	N6OC	311	KB0U	303	KQ9W	296	AI9R	282
VE1YX	316	IV3YRN	310	K0GT	303	KB3KV	296	TG9EP	282
W4NKI	316	DK2BL	310	K1MEM	302	W4BQY	296	N1ALR	282
ZS6LW	316	AA6AA	310	N5FG	302	I0SGF	296	KC2FC	282
W9DWO	315	W8JXM	310	W6FET	302	K7LAY	295	F6BFI	281
VE2WY	315	WA4JTI	310	W2FGY	302	W0IYR	295	K9TI	280
XE1AE	315	9H4G	310	K9HQM	302	KK0C	295	ZL1BOQ	280
W3GRS	315	AB9O	310	I3OBO	302	W6MFC	295	G4FAM	280
W0YDB	315	W7OM	310	K9UAA	302	KA9ABC	295	KU9Z	280
ZL1AGO	315	N4PN	309	NJ2C	302	VE3XO	295	VE6PW	280
I8YRK	315	K1UO	309	KP4EQF	302	I8ZTE	294	KS0Z	280
N6AR	315	W6DN	309	AI8M	302	WD0BNC	294	KB5DN	279
I4ZSQ	315	ZL1BIL	309	WB4UBD	302	I5BDE	294	EA6DE	279
OK1MP	315	WD9IIX	309	N5FW	302	WD8PUG	294	JH8NYK	279
I8KDB	315	SM4CTT	309	I5EFO	302	WB3CQN	294	KX5V	279
W9BW	315	VK4VC	308	W6BCQ	302	W4UW	294	K4BYK	278
K9LKA	315	YV5AIP	308	I2MQP	302	K4SE	293	N2CIC	278
N4WF	315	N6AV	308	WB4NDX	301	KC8JH	293	VE3IUE	278
K9MM	315	W2CC	308	WA3HUP	301	AI5I	293	KB8O	278
OZ5EV	315	AI8S	308	VE3FJE	301	K4LR	293	KG9N	278
N7RO	315	N4KG	308	W8ILC/QRPp	301	W9NUF	293	G4ADD	278
OZ3SK	314	K8NA	308	K4CXY	301	AG9S	293	WB6OKK	278
YV5DFI	314	WA4WTG	308	W9OKL	301	KD5ZM	293	KB7VD	278
K6JG	314	W1NG	308	YU2TW	301	WA4LOF	292	WB0UFL	277
CT1FL	314	G4CHP	308	N4CRU	301	AC0A	292	W4PTT	277
W2SUA	314	W9RY	308	KZ0C	301	VE3FEA	292	KB0SY	277
W0SFU	314	KU9I	308	N8BKF	301	VP9CP	292	I8XTX	277
OE3WWB	314	K9HDZ	308	KZ2P	301	W8LKG	292	N0AMI	276
VE3XN	314	VE3MRS	308	KE3A	301	K1VHS	292	N7ASL	276
YS1RRD	314	VE4SK	307	WT4T	301	W0ULU	292	WA6DTG	276
K8LJG	314	WB1DQC	307	NN4Q	301	SV1JG	292	WA4OPW	276
W3GG	314	I0MBX	307	YV1AJ	301	WA2FKF	292	AI9U	276
I2LLD	314	KV2S	307	I5EFO	300	VE3IPR	291	KC2RS	276
K9AB	314	WD8MGQ	307	K3LUE	301	N5AWS	291	WA9IVU	276
K5OVC	314	KB9OC	307	K9QVB	300	K2JF	291	K0HQW	276
N4MM	314	KB8DB	307	I1POR	300	W4JFE	291	KA3HXO	276
ON5KL	313	VK3JF	307	KB9KD	300	K2JLA	291	I8INW	275
PY1APS	313	K9IW	307	KB3OQ	300	DU9RG	291	WB1EAZ	275
EA2IA	313	W6SN	307	VE4AT	300	PY2DBU	291	VE7BSM	275
W8ILC	313	KR90	306	G4CHP	300	VE3CKP	290	K8NWD	275
EA4LH	313	N4KE	306	WZ4I	300	KB2HK	290	VE5FX	275
OZ8BZ	313								

Where do you find DXers and DX Honor Roll members? Just about everywhere. And that does look like a bar in the background, doesn't it. On the left are two Honor Roll members; Franz Langer, DJ9ZB, is congratulating Dr. John Allaway, G3FKM, on his election to the DX Hall of Fame. This convivial gathering at Ham Radio 1987 at Friedrichshafen shows that DXers everywhere enjoy the best of times.

tury Club Manager, *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801. All you then need do is list the QSLs, have the list verified by two Technican class or higher licensees, and you will shortly be among the anointed. No application fee, just your reward. The awards are numbered and are *CQ*'s way of warmly saying "Welcome DXer!"

DXer's Postal Service

If you have DXed long enough, you will have little difficulty in recalling the thought and effort you expended in trying to corner a needed QSL—IRCs, QSL lists, sometimes even mint stamps. If you need it, you want it, and you must have it. Now!

For those suffering from such DX stress, Ron Wolfgang, WP2ADC, in downstate Jersey has mint stamps from a long list of countries, and you get the list by sending an SASE to him at Box 8851, Trenton, NJ 08650-0851. You will not only get the list of available stamps, but also the latest newsletter giving some tips on the postal situation in some overseas countries. An added benefit is a new sheet giving the latest developments in the foreign postal departments which might affect DXers. This includes items such as Cyprus requiring a 1¢ postage. Overseas DXers should allow for two ounces, surface or air, when seeking these printouts. Things may change a bit, but the address stays solid: CQ WPX Awards, Box 1351, Torrance, CA USA 90505-0351.

As long as we are working the WPX corral, it might be noted that early signs are that the request for special commemorative call signs to mark the bicentennial of the U.S. Constitution may not have gotten very far. The plan was to substitute for the number in your call sign a number showing the rank in which your state was admitted to the Union. Delaware, for example, would be signing W0**1**XXX instead of the usual W3XXX. Delaware was the first state admitted to the Union.

But though that idea was nipped, there is a proposal that preregistered club stations be allowed to sign "200" in place of their usual call sign nu meral. This would be for a week in January under the proposal, and a club station signing W3XXX would sign W2**00**XXX.

DXAC Survey

The study of possible restructuring of the DXCC program that was ordered some time

back probably will be reported at the January gathering of the board. If you have not written to the DXAC or your director, the time is getting short.

There were the questions on the DXAC survey in the July column. You might check these for inspiration, though you need not confine your comments to those items only. Anything that you consider helpful to the future of DXing should be put on paper and forwarded.

What should you expect to come from all of this? The early indications are that most of the sentiment expressed so far is for little or no change in the DXCC program. And though there may not be anything earth-shaking, it would not hurt in the least to still write to the DXAC or your director. The broader the response, the better the understanding of what DXers are looking for in their future DXing.

There are indicators that there will be some administrative changes in the handling of the DX activities, this being in the relationship of the DXAC to headquarters committees, particularly the Awards Committee. In the past the procedure has been that the Awards Committee has the final say or "veto power" over the recommendations of the DXAC. There is anticipation that this might be changed so that if the Awards Committee does not agree with the DXAC, the matter will be returned to the DXAC for review and either change or reaffirmation. If the problem is still unresolved after review, the matter will go to the Board of Directors for their determination.

Guatemala

Jules Freundlich, W2JGR, will be operating from Guatemala from September 21st to the 28th. Jules will be covering everything in the HF bands, SSB and RTTY. QSLs go to his home QTH, 17 Nassau Blvd., Malverne, NY 11565. He will be signing TG9/W2JGR.

European DX Foundation

The EUDXF is the first all-European DX Foundation with their goal to help and support DXers and DX efforts. This is another of the DX foundations that have come on to really enhance DXing since the early seventies. You can get full information by writing to EUDXF, P.O. Box 62 02 60, 5000 Cologne 60, Federal Republic of Germany. The yearly membership is 25 DM or equivalent. The logo for EUDXF is Europa riding the white bull. You probably will note it more in the future.

YLs in attendance at a party held in honor of Kari Young, VR6KY, who was visiting the Chicago area on her way home to Pitcairn Island. Front row (l. to r.) are Keiko Morales, N9EUN, Betty Reich, WD9GQV, and Jodi Henderson, KA9W. Back row (l. to r.) are Kari Young, VR6KY, and Sue Miller, KA9UCK. (Photo by Dave Miller, K9POX)

CQ DX Awards Program

SSB

1552	FM4DN	1554	XE1L
1553	KD3AP	1555	IK8GCS

SSB Endorsements

310	W6EUF/317	310	W7OM/310
310	DL9OH/317	300	W6SN/307
310	ZS6LW/316	300	W6NLG/304
310	W4NKI/316	300	WA4DAN/3C4
310	K6YRA/316	300	WB3DNA/304
310	W3AZD/316	300	K3LUE/301
310	OZ5EV/315	275	KC8YM/298
310	K9MM/315	275	XE1L/297
310	N7RO/315	275	W4UW/294
310	N4MM/314	275	PY2DBU/291

CW Endorsements

310	N4JF/317	300	K3UA/301
310	K9MM/316	275	W0HZ/292
310	K6LEB/315	275	WA4DAN/281
300	N4MM/309	200	VE1ACK/204

Total number of active countries is 317. 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.

Zone 34

Ezzat Ramadan, SU1ER, now has antennas up for 160,80,40 meters and is ready to supply the Deserving with Zone 34 for WAZ. This did not come easily. FM6WD, Lucien Prudent, supplied the 160 antenna to help Ezzat get that band warm. SU1ER is running a TS-430S, a Drake TR7, and says he is okay for digital. His QSL route is P.O. Box 78, Heliopolis, Cairo, Egypt.

Royal Omani Radio (ROARS)

The Royal Omani Radio Society will be dancing in the streets in Muscat to celebrate the fifteenth anniversary of the club. They will have A4XXV on the air. Work the station on two modes or bands, and you will be eligible for a special award. November 5–8 are the dates to be on alert. Ten IRCs to the ROARS Award Mgr., Box 981, Muscat, Sultanate of Oman along with the record of contacts will bring you the 15th Anniversary Special Award.

Jose Ahumada, LU2DX

In late June Jose Ahumada, LU2DX, passed away after a long period of ill health. We had his photo in the May column and always considered him an outstanding DXer.

Jose was a DXer not readily recognized outside his own country for his DX efforts. He was on the first South Sandwich LU2ZY effort back in 1955 and operated again from that spot in 1977 and 1983. He operated from the South Orkneys, signing LU1ZA and LU5ZA in 1983 and AZ5A in 1984.

For many years Jose was in Washington handling purchasing for the Argentine Air Force. Then he lived in Springfield, Virginia, and his XYL, Pat, was often heard in contests signing a WB3 call. It was at the Reston ARRL Convention in 1975 that we first met Jose face to face, he not being especially tall but ruggedly brawny. It was sad to note in recent photos how his weight had fallen away.

His home was in Buenos Aires, and he was very active in the IARU Region II Conference last year. For over 30 years he served as the Argentine Radio Club liaison to the IARU. He was a dedicated DXer. Besides his activities in the Antarctic, he also operated from French Polynesia, Panama, Liechtenstein, the Canary Islands, and many more. Certainly Jose Ahumada will be a DXer whom many will remember.

Don Wallace W6AM

Possibly realization has come slowly to DXers that they have something worth remembering. In recent years there have been steps taken to ensure that the story of DXing is told and recorded, and Jan Perkins, N6AW, is currently gathering material for a series of articles and a book about Don Wallace. Jan is looking for stories, anecdotes, or any remembrance about Don. He is also looking for copies of photos of this top DXer who became a Silent Key a year or so back. Anything that will fill out the memory of Don will be welcomed. Send material to Jan D. Perkins, N6AW, 6200 East Blvd., #7, Long Beach, CA 90803.

Some Late Fall DX Notes

The Canadian *Long Skip* notes that Reginald Aubrey Fessenden, the first person to make a radio voice transmission back in 1900, was one of the four communication pioneers honored in a series of 36¢ postage stamps issued last June.

There will be more Cocos-Keeling activity the end of November with VK9YV being signed by G3AAG. A second operator will be with Vic, this being F6GVD, and there probably will be a second VK9-callsign to listen for. The planned period is in late November over the *CQ* WW CW Test and from November 25th to December 7th.

The August plans for operation from Western Sahara, this planned by the Lynx DX Group and others, ran into some roadblocks. One early-out operation in late July was turned back. THe Spanish operators scheduled for the August effort ran into problems, including the inability to get visas. While many listened on the bands for a possible new one, DXpeditions were trying to get around the various blocks to either entering the area or even getting permission to operate.

Chod Harris in the *DX Bulletin* raises still the torch of hope, noting that there is some planning going in Scandinavia for Bouvet in 1988, for Marion Island in 1988, possibly in the late summer, and for South Sandwich and South Georgia by the DXers out of Uruguay who have previously been active down that way. Actually, early 1988 is the possible time for South Sandwich/South Georgia with late January and February good possibilities.

Inside DX notes that XU1SS checks in regularly with the W2MIG net, 14165 kHz after 1200Z. C21XX should be heard in both sessions of the *CQ* WW DX Test. Ed is on Nauru for a couple of years. He likes the low frequencies but can be found on everything from 160 up. QSLs go to Box 17, Nauru, Central Pacific.

In February a group of scientists plan to cross the North Pole on skis. It will be a joint Canadian/Russian effort with the departure being made from Novaya Zemla, the long island between the Barents and Kara Seas, No-

vaya Zemla being south of Franz Josef Land. A Russian amateur will be among the members of the expedition, UA3CR, Leonid Labutin, being reported as taking a low-power transceiver.

Herman, W2MZV, became a Silent Key in mid-summer. Herman is remembered for this QSL manager efforts, including 4U1UN. The QSL chores for 4U1UN have been assumed by NA2K, Harry Westervelt, 72 Kuhlthau Avenue, Milltown, NJ 08850. W2MZV had been ill for a long time before passing away in July.

The VEs have been authorized to work the 18 and 24 MHz bands. U.S. stations are on 24 MHz and hoping for 18 MHz. Interesting, yes? And how does that affect awards and contest activities? Reg Beck, VE7IG, runs a proposal up the flagpole and stands back to see who salutes it. Reg notes that the new bands are but 100 kHz wide and would be swamped during contests if treated as separate bands. He suggests that 24/28 MHz bands be lumped together, with the 18/21 MHz also as one. Thus, for contests 12 and 10 meters would be one band, and 17 and 15 meters as another single band. If you agree, write. No, not to Reg. Write to the contest committees.

What about the sunspots? Lee Wical, KH6BZF, noted a month or so back that the f^0F_2 has been increasing this year, this being the lowest frequency a transmitted signal will pass through the ionosphere when beamed straight up. It is directly proportional to ionospheric density, and the density of the ionosphere increases as the sunspot count rises.

The Colvins recently inquired of the Burmese authorities about possible operation there the next time out. The answer was that there has been a suspension of amateur radio in Burma since January 1964. Some have asked about the September 1965 Don Miller operation which was accepted for DXCC. A good question, yes? But that was a couple of decades back, and the inclination prevailing then was to trust all DXers, believe that they were always totally honest, and accept their word and a modicum of documentation. But that was 1965 and things have changed. Where they may be doubt now, it is also necessary to produce some proof of skullduggery back then. As one companion said years back when we were atop Sunrise Mountain east of Half Dome in Yosemite, "You say that's Half Dome, but can you prove it!" It was a question of routes, and he wasn't buying the statement that the mile of sheer granite was Half Dome. And while from other years there may have been operations that now look a bit dubious, how does one prove one's suspicions? Things are a bit tighter now, and no longer are they slipping through because of trust. Now it takes a bit of proof—beforehand and not later.

In the opening of the Great Season of DXing marked by the *CQ* World-Wide DX Tests the last weekends in October and November, keep in mind always the time factor: 1200Z may be early dawn to you, but it is midday in many DX areas, the evening in others. And always look for the club activity out of the USSR, Europe, and South America. You might also remember the JAs and eastern Asia. There will be DX everywhere and Cycle 22 is headed up. Make your plan; work the DX. It is the best time of the year!

73, Cass, WA6AUDL

DX Ten Years Back

In November 1977 Bophuthatswana was coming on line and VE3FXT and crew were going to put it on the air as soon as independent.

5 Band WAZ #57

Mike Filippov, UW0MF, was the first UA station to receive this plaque, the first to be awarded to a Soviet station. If you take a look at Mike at his operating position, you can see he has major DX awards on the wall.

He was first licensed in 1969, was an SWL before then, and has been interested in amateur radio for over 20 years. He holds the Extra class license, which allows 200 watts input on all bands and all modes. Mike is a ship's radar repair engineer. His XYL's name is Ludmila and there are two children, Elen and son Denis. Mike graduated from a Radiotechnical College in 1968.

UM0MF has been the first in the Soviet Union for a number of awards. Besides being first with 5B WAZ, he was also the first for 5B DXCC, this plaque #1092, and he was also first for 5B WAS, holding 5B WAS plaque #2041. He also has 5B WAC, WAA, WAE-I, WAP, WA-VK-CA, DUF-EX, and is on the DXCC Honor Roll. He heads just four of the currently listed countries: ZA-Albania, ZZ-Burma, 3Y-Bouvet, and 70-Yemen.

Mike works SSB primarily but also does some CW operating. He has quads on 10, 15, and 20 meters, inverted-Vees on 40 and 80. All the antennas are about 45 feet high. All the gear is homebrew and this includes a 200 watt amplifier.

Mike found 80 meters the most difficult to fill out, this because of the necessity of working split into 75 meters.

No other members of the family are amateurs, though young son Denis has been showing interest. Mike is a member of the Vladivostok Radio Club, which has about 150 members. Always interested in contests, Mike tries to cover all of them. He competes in the USSR Championships and is a "Sport Master of the USSR." In downtown Vladivostok he is the custodian of the local award, the "Primorie" award. Mike usually works on his own picking up the counters but does at times check into some DX nets.

A top DXer, Mike Filippov is another proof that the 5B WAZ Award is earned by the top operators. The record shows that Mike is one of the world's best.

This is Mike Flippov, UW0MF, at the operating desk, always a place of interest to the DXer. Mike has 5BWAZ #57, the first ever awarded to a Soviet station. Mike likes to work for awards. Note the walls of his shack. He has all the major ones and now the hardest of all—the 5BWAZ!

Thor Heyerdahl was afloat in the Persian Gulf on the raft *Tigris* signing LI2B. ZD9GG was heard from Gough Island, and all DXers lost a second (in time) at the end of 1977 when WWV, WWVB, and WWVH were adjusted. N4XX was asking the FCC to ban 10 meter linear amplifiers, now that may appear to some to be a strange proposal, but back then there was something called SEEBEE that was using that gear—illegally. ZA5FB was reported active in downtown Tirana; Tirana Slim was the handle. 3C1X was on from Equatorial Guinea and VE3HRS was on from TZ-Mali. PY7BXC was headed for Fernando de and Austin Regal was aiming to sign CE0ZM from Juan Fernandez during the *CQ* CW Test, while C5AT and C5AV were expected from Gambia.

There were plans to put Walvis Bay on the air as a possible new one when Namibia became autonomous—or independent. The plans are still unused. For informational purposes only, Walvis Bay was a part of the Republic of South Africa prior to WW I; that was when RSA took over Southwest Africa (Namibia) from Germany. Perhaps that helps understanding just a bit. There was a rumour out that Southern Sudan would be a new DXCC country retroactive to May 1972. Some ZLs were winding up a Kermedec effort signing ZL1AA and ZL1YL. The Barnstable Radio Club was planning to be out on Cape Cod in January 1978 to mark the 75th anniversary of two-way radio communications across the Atlantic, this on January 18, 1903. That date has been engraved in the memory of DXers since because that was the date that Jameson's Irish Whiskey became the drink of DXers. You ask why? Because Marconi's mother was from the Jameson Distillery family down the road from Dublin; that's why!

QSL Information

Herman; W2MZV, who handled many QSL manager chores, became a Silent Key last July. QSOs for 3V8EU do not go to DJ9NM.

C30GAX to DL4BAH
C30BBB to DL4BAH
C30CSA to DL4BAH
C30DAW to G4UPS
C30DFA to DL2EBX
FT8WA to F6FNU
G3IFB to VS6UO
ID9/I2DMK to I2MQP
KG4AA to KG6XO
OA4BUL to WA2GMC
TG9/W2JGR to W2JGR
TZ4RD to EA7CNM
XE0ICS to K6ICS
ZL8OY to W4WMQ
ZM8OY to W4MWQ
4U1UN to NA2K
4K8AAD to UA3DOS
9L3WA to WD8OHU
BV6IA to Box 738, Tainan, Taiwan
BY5QA to P.O. Box 507, Buzhou, Fujian, Peoples Republic of China
C21FS to D.L. Miller, G4UCB, 6 Kinson Road, Bournemouth BH10 4AJ, England
CE0FFD to Box 4, Easter Island, Chile
FM5WD to Lucien Prudent, Box 879, Fort de France Ceded, Martinique
FO0SSJ to J.A. Sansoterra, K8JRK, 801 So. Oxford, Grosse Pointe Woods, MI 48236
FO5JR to B.P. 10127, Paea, Tahiti
H44DL to Box 6, Honiara, Solomon Islands
J6DX to Treaty City ARC, Box 91, Greenville, OH 45331
J88BH to Box 31, St. Vincent, West Indies
JW1LK to K.G. Aavik, LA1LK, Box 1010, Lyngassen, N-991, Sandnessjoen
LU4MEE to Sergio Grinberg, Box 382, 5500 Mendoza, Argentine
LU4M to Sergio Grinberg, Box 382, 5500 Mendoza, Argentine
P29VU to Box 23, Lae, Papua-New Guinea
SM2DWH/BT0 to Swedish Radio Supply, SK4NI, Box 208, S-65102, Karlstad, Sweden
SU1ER to Box 78, Heliopolis, Cairo, Egypt
T30BY to J. Jorgensen, KB7QC, 67 Pacific Place, Longview, WA 98632
TU2QQ to B.P. 3023, Abidjan 01, Ivory Coast
V85MI to Box 85, Brunei
V85WS to Box 247, Muara, Brunei
ZF2KY to J. Hubach, OH1ZAA, Kuhatie 10 C 23, SF-02170 Espoo, Finland
ZK1DD to Box 10, Aitutaki, South Cook Islands
5L2CU to Box 398, Monrovia, Liberia
5W1FT to W.D. Francis, Box 184, Apia, Western Samoa
7P8DX to Box 333, Maseru, Lesotho
8R1RPN to Box 12282, Georgetown, Guiana
9J2PM to Box 510, 386 Chipata, Zambia
9L1IS to Box 1269, Freetown, Sierra Leone
9M8HG to Box 2870, Kuching, East Malaysia

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CIRCLE 150 ON READER SERVICE CARD

1987 CQ WPX CW CONTEST
High-Claimed Scores

The following scores are early-bird high claimed scores as of 1 August 1987. These are raw scores subject to verification.

UNITED STATES
SINGLE OPERATOR
ALL BAND

KT3Y	2,575,755
I6P	2,226,860
NSØZ	1,945,044
KZ2S	1,795,794
KØRF	1,419,860
KU2C	1,397,194
AJ6V	1,246,840
K4PQL	1,224,692
AB2E	941,640
KBØG	920,368
VE2AQS/AC6	868,530
WM5G	863,100
KS1J	842,434
WA6AUE	620,860
KG5U	619,429
KS3F	601,520
W3UM	588,669
KMØL	582,250
K8HVT/1	523,250
WB3CAC	493,568
KZ5D	490,854
KE7X	477,264
W6JTI	447,924
N8BJQ	447,125
N3RS	402,868
KA5W	402,773
K2TQC	400,879
KS7T	325,720
N6EK	322,772
K3IPK	276,602

28 MHz

NU4Y	13,440
KU2Q	5,460
KD1U/4	4,480
KN8D	1,239
WA6FGV	924

21 MHz

N4VZ	81,055
N2GUV	54,540
KEØMZ	4,368
K4TKM/6	3,300
NE2W	2,280

14 MHz

K2VV	1,805,859
K1TO	1,469,820
KM9S	981,912
KI2P	782,273
NJ2L/1	772,952
N7TT	667,800
WB4TDH	588,141
K9QVB	462,266
WB7FDQ	345,083
NQ7M	234,607
W5FO	232,764

7 MHz

K1XA	1,095,210
W5WMU	991,380
NT5G	196,784
NI8L	116,224
W3BGN	99,484
KC5DX	71,060
KD2HE	60,210
K9LJN	51,876
WA4SSB	46,368
KF4CI	36,519

3.5 MHz

N3AD	90,610
NE6I	84,360
W9LT/4	12,144
W8IMZ	11,050
K7UR	3,800

1.8 MHz

K5UR	9,072
K5NA/2	5,760

QRP/p

W8VSK	A	215,136
NS6G	A	162,162
K7SS	A	144,000
AA2U	A	103,950
WBØGOB	21	936
KB9S	14	22,984
KF1H	14	13,439
KU7Y	3.5	2,604

MULTI-OPERATOR
SINGLE TRANSMITTER

N4WW	3,647,588
WC4E	3,103,230
NJ1F	2,792,448
NR5M	2,218,360
AI6V	2,041,848
KJ9D	1,822,048
N6VR	1,713,482
AG6D	1,463,820
KØHLB/4	631,300
AK6T	436,563

MULTI-OPERATOR
MULTI-TRANSMITTER

K3TUP	3,788,174
NI6W	3,409,186
WX5S	2,340,611
K5ZD/1	1,550,112

DX
SINGLE OPERATOR
ALL BAND

ZZ5EG	7,255,620
N5RM/CT3	5,244,480
VP2VCW	4,366,257
YW1D	4,034,779
K5KG/LU	3,037,840
YT3M	2,541,870
6Y6A	2,345,504
G3FXB	2,338,672
HZ1HZ	1,787,187
OH7MA	1,674,992
YBØTK	1,625,250
OH1AF	1,462,466
G3MXJ	1,444,755
JH7WKQ	1,332,873
HSØB	1,231,722
SV1RP/SV5	1,201,578
VE7UBC	1,191,652
LZ1ZA	1,013,775
C21XX	959,445
GJØ/K2TNO	789,399
SKØLM	760,362
K1BAZ/DV1	734,524
YO8DDP	724,850
VE3KP	682,696
OZ7HT	659,559
DL4BBO	627,264
OH6XA	571,725
VE6OU/3	550,656
VE7QO	531,732
OH6NIO	451,350

28 MHz

4M7A	111,389
YB4FNN	84,224
LU5UL	50,932
YU2OB	46,080
SP5DIR	37,856
YU1HA	33,320
OH6AC	30,873
SM5IMO	21,168
PY5AKW	19,635
OH1ZAA	18,096

21 MHz

ZY4OD	2,200,044
5T5CJ	1,469,314
9J2EZ	1,302,594
LU4FD	1,026,840
YU1LA	762,784
YT3L	614,460
YU2CQ	517,845
YT2B	415,632
YB4FN	396,960
YBØZAA	389,636

14 MHz

VO1QU	1,878,240
VD1ASJ	1,536,485
YU7BW	1,144,150
FO5JP	1,143,000
SPØITU	1,069,404
JA7YAA	1,005,152
NY6M/KH2	635,700
CR7DKG	378,216
JA2EU	373,360
T12OY	315,082

7 MHz

YX5A	3,067,146
CX8BBH	2,028,702
OA4ZV	1,698,552
YU1WR	1,089,396
FF1LQU	1,034,160
OK3CMZ	427,120
SM7PKK	362,082
G4UOL	293,510
VK2BQQ	237,614
PY2MKL	235,994

3.5 MHz

HK3MAE/HKØ	456,280
4N1A	382,968
OK7MM	318,716
G4FAM	266,560
OH2JA	191,166
PY2DP	137,544
OK2HI	97,440
FE5MF	84,656
G3VMY	73,216
OH2EJ	35,956

1.8 MHz

LZ2CJ	97,800
SP9DH	67,776
I1BAY	49,938
GB8DX	45,652
OK1DRO	41,170
FE6AJA	11,700
JH3CYZ	190

QRP/p

4X6IF	A	410,484
FB1LMJ	A	180,575
DL5FBL	A	167,233
G3KDB	A	163,240
SP4GFG	A	157,180
EA3EGV	28	7,866
YO2AQB	28	2,214
PA2REH	21	39,825
YC2UDH	21	22,036
SM5CCT	14	44,936
OH3GD	14	34,500
JH7XGN	7	7,742
JF2LTH	7	2,838

MULTI-OPERATOR
SINGLE TRANSMITTER

V31A	8,608,572
HK1QQ	5,794,443
LZ9A	5,691,436
YU3MM	3,290,235
AL7IB	3,165,147
OH8SR	2,473,075
YT3T	2,439,288
FV7NDX	2,212,350
I1ZEU	2,211,304
SK4EA	2,100,196
JA3YKC	2,033,262
JA3YBF	2,000,862
VS6DO	2,000,070
TV6MYT	1,999,888
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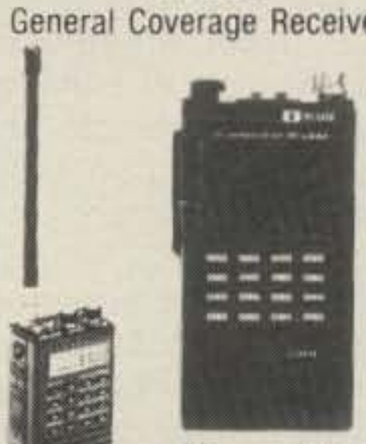

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A LOOK AT THE WORLD AROUND US

Amateur Satellite Update

Our recent *CQ* columns highlighting ideas of interest to Novices and classic keys popular among old timers really kindled a flurry of favorable responses. Thanks! We're presently putting together more information and updates for both of these areas (including copies of American Morse, operation of sounders on today's bands, suggestions regarding code testing changes, etc.). Those tales are slated for forthcoming months, so stick with us and we'll keep things interesting.

I also have encouraging advice for the many Novices who report planning or setting up their stations but are hesitant about actually transmitting. Please take advice from this young old timer: listening or watching someone else on the air can't in any way compare to "doing it yourself." Viewing the actions of others may seem intriguing, but it's flat and dull compared to actually being the one behind the mike operating your own setup. It's only natural to experience awkward moments, but they're merely amateur radio's sign of growth and progress, especially during 1987. Remember also that *CQ* magazine has an impressive Novice Century Club award awaiting you after 100 successful QSOs, and a Worked All Zones/25 of 40 after you're "hooked on DXing. Go for it! If you're hesitant or shy about that first voice QSO, drop me a note when you'll be listening. I'll call you, and we'll exchange "stage-fright stories."

Meanwhile, this month's column slightly shifts direction to review some of the fascinating happenings in our world of OSCAR satellites. There's something of interest for everyone this time—Novices, satellite newcomers/onlookers, packet enthusiasts, and aged satellite operators. The "birds are again flying high," and even more excitement is being formulated on the near horizon. What a blast!

Satellite Overview

Fuji OSCAR 12, the Japanese satellite with "flying mailbox" packet capabilities, is now operating quite favorably, and mode JD/digital modems are available from TAPR. The satellite is in a classic "Phase II-type orbit" (that means it makes two or three low-altitude, 15 to 20 minute long passes over the U.S. each afternoon/evening). Uplink is via 2 meters, downlink is via 70cm, and operating schedules shift between SSB/CW relaying and digital store-and-forward activities. Additional details are shown in fig. 1. If you're ready to try your hand at super packeting, OSCAR 12 is the way to go. Contact the Tucson Amateur Packet Radio group in Tucson, Arizona for information on data interfacings, and AMSAT (P.O. Box 27, Washington, DC 20044) for information and programs on satellite tracking.

Uplink	Downlink (±8 KC Doppler)
145.900 MHz	435.900 MHz
145.910 MHz	435.890 MHz
145.920 MHz	435.880 MHz
145.930 MHz	435.870 MHz
145.940 MHz	435.860 MHz
145.950 MHz	435.850 MHz
145.960 MHz	435.840 MHz
145.970 MHz	435.830 MHz
145.980 MHz	435.820 MHz
145.990 MHz	435.810 MHz
146.000 MHz	435.800 MHz
	435.795 Beacon

Fig. 1– Frequency relation chart for Fuji OSCAR 12. Uplink requires 50 to 100 watts into a linearly polarized 2 meter antenna. Downlink signals are left-hand circular polarized.

The USSR recently launched into orbit a very interesting amateur satellite known as RS-10. The fascinating part of Radio Sputnik 10's story is its 15 meter to 10 meter linear transponder. As shown in fig. 2, RS-10 (also known as Cosmos 1861) receives signals between roughly 21.210 and 21.250 MHz and retransmits them between 29.410 and 29.450 MHz. If you've previously wondered what it's like being relayed via satellite or if you've wanted to join the action but lacked VHF/UHF multimode gear, here's your chance at the fun! Several amateurs have also noted that RS-10's transponder "extends down" to 21.180 or 21.190 MHz, allowing U.S. Novices to be satellite-relayed to 10 meters! Some folks enjoy involvement with sailboats and sport cars, but how many people can enjoy using an orbiting Russian satellite? Amateur radio is indeed a super hobby!

The easiest way to operate RS-10 involves using two HF transceivers (consider borrowing a friend's mobile transceiver or temporarily combining stations). Set one rig to transmit on 15 meters and one to receive on 10 meters. Use your best antenna (and an HF preamp, if possible) for receiving. Fifty watts to a dipole or vertical is sufficient for transmitting. DO NOT use high power. You'll overload the transponder. If you only have one HF transceiver, set one of its VFOs on 10 and the other on 15 meters. You will not be able to copy your own signal and you must "zero" others by frequency relations rather than "ditting yourself on frequency" while listening on 10 meters, but it works. I wrangled three QSOs that way the first night I tried RS-10.

As of this column's writing, exact orbital details on RS-10 are slightly sketchy. We have enough information for casual mental tracking, however, so drag out your world globe. RS-10's orbit is inclined approximately 26 degrees "to the right" of the North Pole (and 26 degrees "to the left" of the South Pole). Each full (North Pole to North Pole) orbit is roughly 105 minutes, giving a typical operating window of 15 to 20 minutes. Two or three orbits per evening are "in range" of U.S. amateurs; they occur between 6 p.m. and 8 p.m. your local time, and (after you've found them) each evening's orbits occur 22 minutes earlier every day. Just monitor 29.407 MHz until you hear the beacon and join the action. If RS-10 doesn't show, its transponder may be switched off that particular evening. Let's thus briefly review operating schedules and information sources applicable to all OSCARs.

Notes for Satellite Success

The world of amateur satellites is a continuously changing situation, and staying abreast of those changes (while maintaining a perspective on reality) is the key to successful operation. The main changes are usually "administrative" in nature—when various transponders on

Uplink	Downlink (29.407 Beacon)
21.210 MHz	29.410 MHz
21.220 MHz	29.420 MHz
21.230 MHz	29.430 MHz
21.240 MHz	29.440 MHz
21.250 MHz	29.450 MHz

Fig. 2– Frequency relation chart for RS-10's 15 to 10 meter transponder. Reports indicate passband's "lower end" extends into Novice portion of 15 meters.

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different satellites are activated for use, and what tracking aids are available. Recently, for example, there's been an obvious diversion to computerized tracking using sophisticated programs initialized from net-announced Keplerian element sets. The results are great, but they're not vital for success *if* you have some basic reasoning information (like hints from other satellite operators about when a satellite is "on" and where it's orbiting). The best way to acquire this information is by monitoring the AMSAT Net (Sundays, 1900 GMT, 14.282 MHz) and comparing notes with other satellite operators in your general area. Another worthy suggestion, especially beneficial to newcomers interested in OSCAR 10, is reviewing my previous *CQ* articles on satellites. August and September 1985 issues of *CQ* included a full two-part discussion of OSCAR 10. February 1985 featured a Ten-Tec 2510 satellite rig review, and July 1985 *CQ* carried a newcomer's guide to OSCAR 10. All of those articles are in "plain language form" and are easy to understand.

Looking Ahead

This month's discussion of presently operating satellites should have your adrenalin flowing, but there's more. Another Phase III satellite (similar to OSCAR 10) is scheduled for launch during the summer of 1988. This satellite will be placed in elliptical orbit, reaching apogee high above the North Pole. It will carry mode B and L transponders like OSCAR 10, plus a couple more special "higher band" transponders, and it will relay communications over a large part of the earth's northern hemisphere.

Slightly further down the line, a triple launch of earth-interlinkable geostationary satellites is still moving toward reality. They'll ultimately provide complete worldwide communications on a daily basis, including E-Mail operations and maybe a language translator for worldwide bulletin announcements.

We also see broadband FM-to-SSB converter systems and wideband microwave relays/remotes moving closer to reality. The combined use of all these items will allow amateurs to communicate worldwide using pocket talkies. Frequency selection into a wideband terrestrial repeater/remote/uplink will determine direction of communications. Phenomenal advancements during the 1990s will be surpassed only by the fantastic times of the 21st century.

One final note. OSCAR satellites are financed by membership dues and donations to the Amateur Satellite Corporation (AMSAT) at P.O. Box 27, Washington, DC 20044. While membership isn't mandatory for enjoying a satellite's benefits, it is assurance for a continuing amateur satellite program. Your support thus helps assure our future.

73, Dave, K4TWJ

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CCM Cable Clamps: 3/16 / ¼	0.39/0.49
Turnbuckles: 3/8" E & E/E & J	6.95/7.95
½" E & E/E & J	12.95/13.95
Thimbles: ¼" (3/16 & ¼" cable)	0.39
Earth Anchor: 4 ft. Screw-in	13.95
Preformed "Big Grips": 3/16 & ¼	2.49/2.99
Guy Insulators: 500 D/502	1.69/2.99

PHILLYSTRAN GUY SYSTEMS

HPTG-2100/-4000/-6700 Cable	0.24/.40/.67
Cable Ends: 9901LD/9902LD	7.95/9.50
Socketfast Potting Cmpd	14.50

WIRE & CABLE

BELDEN COAX

9913 low loss	$0.42/ft.	RG-8X (9258)	0.19
RG-213/U (8267)	0.40	RG-11A/U (8261)	0.37
RG-8/U (8237)	0.32	RG-58A/U (8259)	0.13
RG-8/U (8214)	0.35	RG-59/U (8241)	0.14

450 Ohm Ladder Line	0.10
450 Ohm Open Wire Line (500' Spool)	$80.00

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Solid: 12 ga. 0.10 14 ga. 0.08
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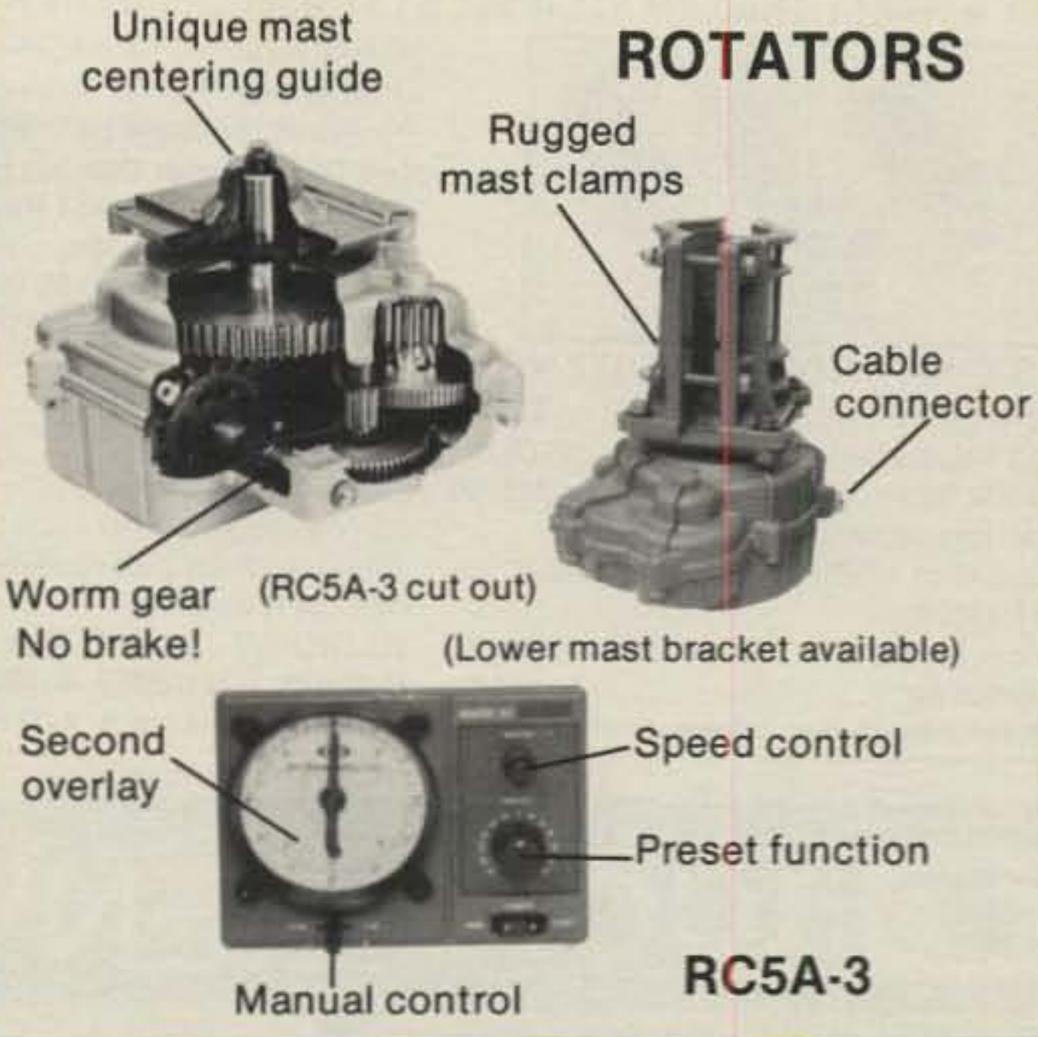
CIRCLE 145 ON READER SERVICE CARD

CLP5130-1 50-1300 MHz 25 el. 500W 6 ′ Boom $199 UPS
CLP5130-2 105-1300 MHz 20 el. 500W 4 ′6 ″ Boom $119 UPS

Operate on 6m, 2m, 1¼ m, 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.

ROTATORS



RC5-1	10 sq. ft.	**$229**
RC5-3	10 sq. ft. preset	**$299**
RC5A-2	25 sq. ft.	**$373**
RC5A-3	25 sq. ft. preset	**$436**
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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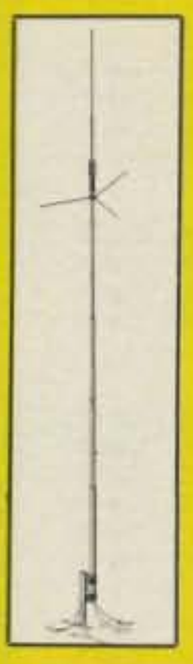
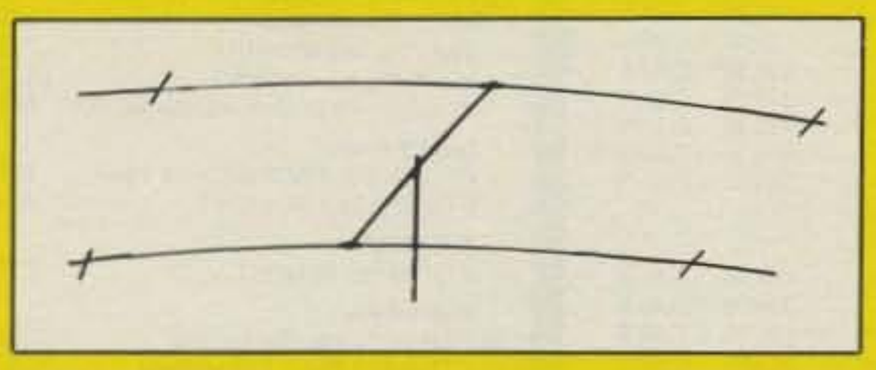
Creative Design Co., LTD.®



CV-48 is a ruggedly built 40 and 75 meter vertical. Overall length of 40 ′8 ″ means full size performance on 40m. Antenna comes with radial system. An optional adaptor for 80m is available. Handles 2KW PEP.

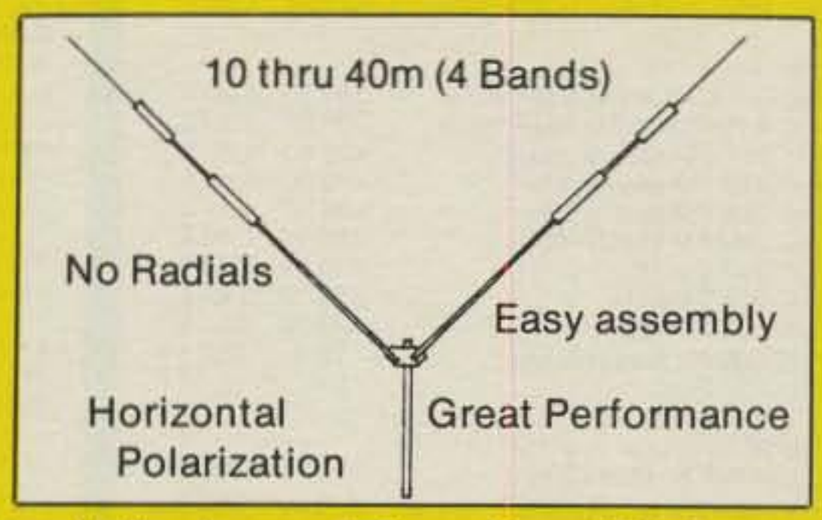
CV-48 $251 UPS AD-385 (adaptor) $63



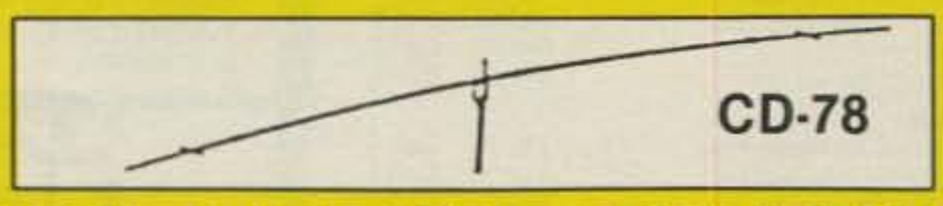
Unique 2 element phased arrays offer excellent gain and front to back ratio compared to standard parasitic antennas.

AFA75-1	**75 meters 29 ′6 ″ boom**	**$1842**
AFA40	**40 meters 16 ′8 ″ boom**	**$ 344**

730V-1



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. The V-dipole is superior to standard vertical antennas in gain, noise and efficiency. **$148 UPS**



Rotatable dipole for 3.5 MHz and 3.8 MHz is 58 feet long. Tuning unit allows operation on 3.5 MHz.

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WANTED: RF wattmeter Model WV-4, Drake L4B C/W Power Supply, C-4 Console, Must be A-1 cond. Al Sturko, VE4PW, Wasagaming, Man. R0J 2H0 Canada (204-848-7712).

WANTED: Rockwell/Collins 32S-3 with power supply. W7BIF, 107 Wyoming, Boulder City, NV 89005 (702-293-1182).

THE WORLD HAM NET DIRECTORY lists mutual interest on-air amateur radio nets by name, by time and by frequency. Latest edition available now. $9.95 plus $1 shipping ($2 foreign—US funds) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147.

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FOR SALE: Power supply, 5 VDC @ 3a regulated, overvoltage protected, new, $15. Combination field strength meter and SWR tester, new, $14. Postage extra. Lash, 19 E. 157th St., South Holland, IL 60473-1312.

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WANTED: Lafayette HA-63 RCVR. Heath HW-12, HW-32, HW-22. Manual for K1GHT T-60, DX20, DX40. WB2IVJ Callbook.

CENTURY CLUB CERTIFICATE: Big 11 × 14 certificate for working 100 countries. Issued by band—i.e., all 20 meters, 15 meters, etc. Not mixed. $10 each from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Send logs only.

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COLLINS 75S3C Receiver, winged emblem, excellent—mint condition, original box with manual, $375. Includes extra crystals for 10, 25, 30, and 31 meters. Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

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UX-39A	25W/5W	216-236MHz Rx; 220-225MHz Tx
UX-49A	25W/5W	440-450MHz
UX-59A	10W/1W	50-54MHz
UX-129A	10W/1W	1240-1300MHz

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