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Amateur Radio

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R-9000 Receiver

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THE RADIO AMATEUR'S JOURNAL

KENWO

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Kenwood – producing the finest Amateur Radio products for over three decades – introduces you to our world of affordable, high-quality, high performance products for today's active Radio Amateur. From HF to VHF, from base to mobile to HT, there's surely a Kenwood radio that will fit your needs and budget.

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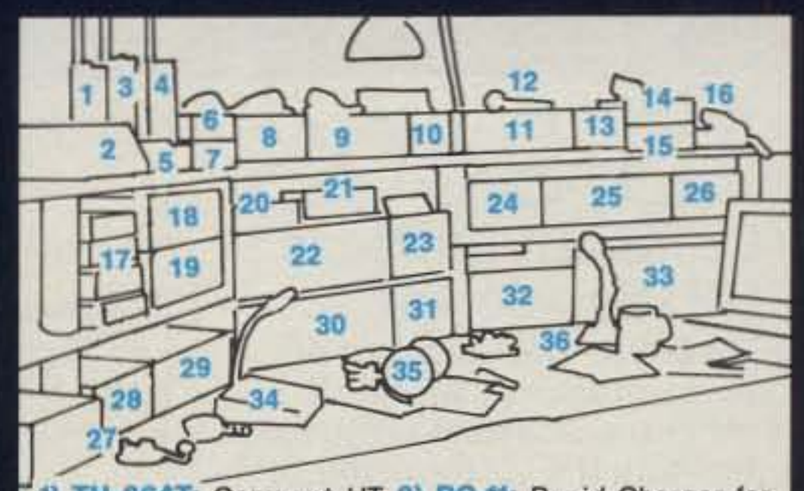
As the "pacesetter" in Amateur Radio, Kenwood continues to incorporate tomorrow's techniques and innovations into practical products today. Digital Signal Processing (DSP) in the TS-950SD is only one example. SSB Slope Tuning, the original "Dual Bander" concept, built-in antenna tuners for HF rigs, and many other techniques were all developed by Kenwood, and imitated by others. Leading edge technology, and superior field-proven performance – That's the Kenwood Experience!



1) TH-26AT: Compact HT. **2) BC-11:** Rapid Charger for TH-26AT. **3) TH-315A:** 220 Deluxe HT. **4) TH-75A:** Dual Band HT. **5) BC-10:** Compact Charger. **6) TM-631A:** 144/220 MHz Dual Bander (shown w/supplied MC-44DM). **8) PS-50:** Heavy Duty Power Supply. **9) TS-440S:** HF Transceiver w/AT-440 (shown w/supplied MC-43S). **10) SP-430:** External Speaker. **11) R-5000:** High Performance Receiver. **12) HS-6:** Small-size Headphones. **13) SP-430. 14) TM-2530A:** Deluxe 2m, 25 W FM Transceiver (w/optional MC-48B mic.). **15) TM-3530A:** Deluxe 220 MHz, 25 W FM Transceiver. **16) TM-701A:** 144/450 MHz Compact Dual Bander Mobile Transceiver. **17) TM-231A/331A/431A/531A:** 144, 220, 450, 1200 MHz Compact Mobile Transceivers. **18) TS-811A:** 70 cm, 25 W and **19)** 2m, 25 W, All Mode Base Station Transceivers. **20) PC-1A:** Phone Patch (FCC part accepted). **21) SW-2100:** SWR/Power Meter. **22) TS-940S:** Deluxe HF Transceiver w/AT-940 installed. **23) SP-940:** Matching External Speaker. **24) SP-31:** External Speaker. **25) TS-790A:** All Mode Tri-band Satellite Transceiver. **26) PS-31:** Matching Power Supply. **27) PS-430. 28) AT-250:** External Automatic Antenna Tuner. **29) TS-680S:** 160-6 m Multi-Bander. **30) TS-950SD:** HF Transceiver w/DSP. **31) SP-950:** Matching External Speaker. **32) SM-230:** Deluxe Station Monitor. **33) TL-922A:** HF Linear Amplifier. **34) MC-85:** Multi-function Desk Mic. w/3 outputs and tone controls. **35) HS-5:** Deluxe Headphones. **36) MC-60A:** Base Station Mic.

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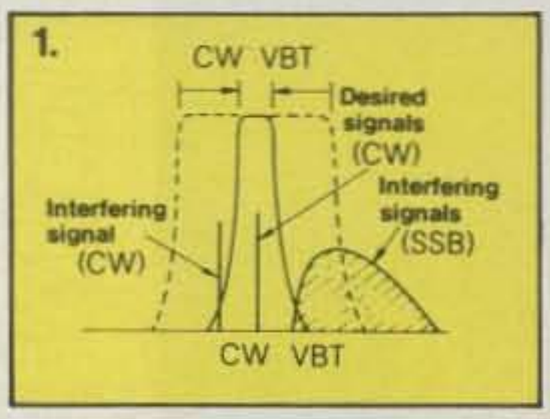
#1 Rated HF!

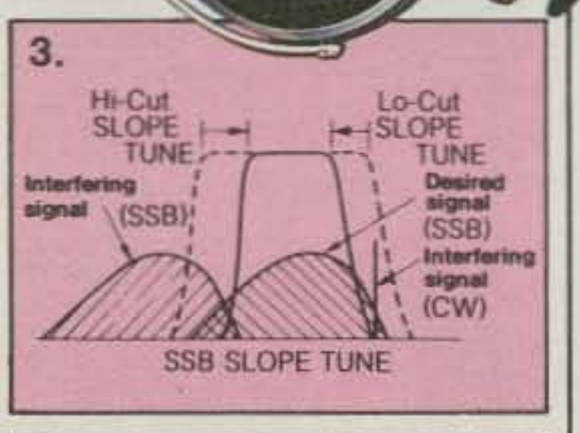
TS-940S

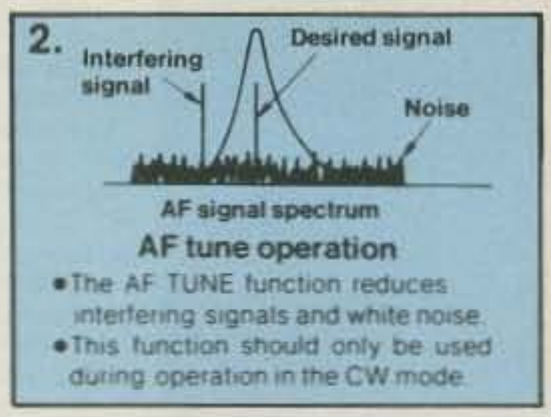
Competition class HF transceiver

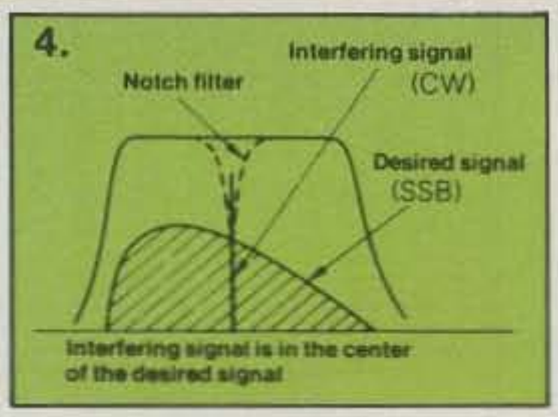
TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance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

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









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

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

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

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

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

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 • IF-232C/IF-10B computer interface.

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

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The Radio Amateur's Journal

ON THE COVER: Here's one of the rarest of US contacts . . . a real live Wyoming ham, one of only 1023 in the 1990 Callbook. That's Richard Wunder, WA7WFC in Cheyenne. (Photo by Larry Mulvehill, WB2ZPI)

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ZERO BIAS

EDITORIAL

The apparent move towards licensing fees is over. It would appear that amateur radio will be excluded from licensing fees, renewal fees, and other service fees. The ARRL has fought the good fight and has won this conciliatory move for amateur radio. On one hand it is always nice to be part of a special group that is on the receiving end of governmental largess, but on the other hand it makes it hard to continually ask for goods and services.

I think that most people would agree (in theory, that is) that some sort of fee schedule is probably okay as long as it isn't too exorbitant. The proposed $30 fees for every item was in most people's judgment too high. One letter writer suggested a biblical reference to the $30 amount as 30 pieces of silver. While we have no "covenant" with the almighty government with regard to fees, we also have to remember that we do not "own" something (i.e., spectrum) via edicts carved in stone or granted in perpetuity. It might be a bit extreme for our letter writer to feel "betrayed," to use his reference, but licensing fees are not new. They were tried before—CB licenses, etc.—and were rescinded for causing additional problems within the FCC.

As everyone knows or should know, fees, unless specifically earmarked, go into a General Fund and generally do not go towards the service they purport to administer. This means that the parent agency (for example, the FCC) does not receive additional funding, and in some cases must supply personnel to administer the fee paperwork. So in effect, the parent agency is down both personnel and funding, while the General Fund receives additional operating revenue. It's a Catch-22 situation.

Another letter writer took the offensive position saying that since the Amateur Radio Service would be paying all of these fees (which would now represent the cost of doing business), we should then be able to charge fees or exact rates for emergency communications, phone patches, or any other communications services provided by a licensed amateur. While that may conjure up images of a shack with credit-card machines and facilities for computer billing, I'm afraid that the government would stomp down on that idea in nanoseconds.

Let's face it. A lot of us were angry at the prospect of paying a minimum of $30 towards something that we have been enjoying all this time for free. Okay, so we're not ABC, CBS, or NBC. But we're almost half a million people using a national resource (meaning a valuable commodity that could be sold) for free, and at the same time demanding increased enforcement, rules changes, and special considerations for whatever pet project we may have. It makes an interesting set of problems, doesn't it?

Another interesting set of problems coming up is the government's look into bulletin and code practice stations. This situation has arisen out of the continued conflict with several maritime nets and the deluge of complaints (from various and sundry sides). Questions are being asked as to why amateurs need bulletin or code practice stations at all. Some members of government see the demise of the Morse requirement for maritime use and equate that with amateur radio. Keep in mind that this has nothing at all to do with a code-free amateur license, but merely a governmental concept of code is code. So it is a continual educational process as to differences in services and why one has this and the other has that. However, if you explain it to yourself out loud, it does indeed sound strange and hard to rationalize.

We also are facing several conflicts with religious groups, nets, and other activities utilizing amateur radio. Part of their angst—as well as the angst of all the other special-interest groups, their followers and detractors alike—is that all feel that they are right and well within their rights and that everyone else is causing the trouble. Each wants definition, restriction, and above all enforcement (preferably on the other group).

So 1989 ended with the government losing out on fees and winning the right to arbitrate on all the hassles within amateur radio (for free). Somehow after this I doubt that we can continue to sell them the concept of amateur radio as a self-policing service. However serious our goals were, we seem to have come across as petulant children asking big daddy to save the day.

It is likely, then, that this year some decisions will come down from on high that will make some of us unhappy. On the other hand, enforcement will still be a problem unless that issue is pushed too strongly. The whole idea of third-party traffic, bulletin stations, code practice stations, etc., can be decided by a quick and simple no. It can be modified, changed, eliminated, all with the stroke of a pen. Yes, we have won the battle of the fees, but we have still to pay the price.

This is not meant to promulgate "doom and gloom," but rather to look at a bit of reality. At some point down the road we will have to look at the subject of fees again only if we expect to receive services. The $30 schedule was a quick shot off the top of someone's head and could have spelled disaster for amateur radio. Newcomers who even thought about upgrading, call changes, repeater groups, and the like could have meant fees up to the kilobuck range. It's not much incentive to do anything, let alone get involved with this hobby. It was the right thing at this time to knock it down.

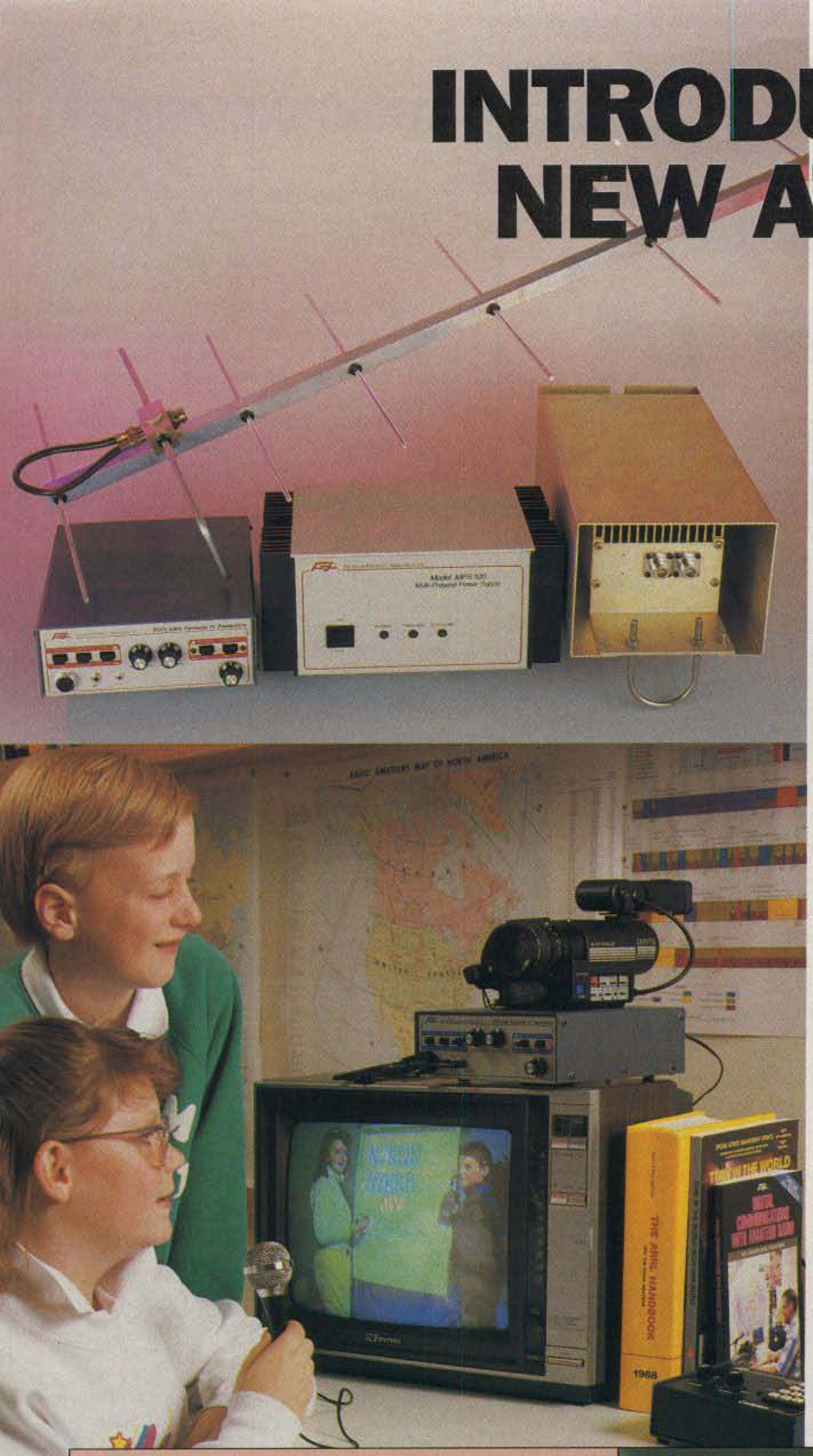
Perhaps somewhere out there in "The World of Governmental Studies" some one or group could work on some sort of realistic schedule. After all, it's only to show that some money is coming in, not to actually pay for those services. I know it doesn't make sense, but it is the government's game and their rules, so it only has to make sense to them. "Pay as you go" is only an illusionary ideal taught in basic economics classes and wasn't meant to be put into practice in the real world. It would put too many people out of work. It is also naive to believe that paying any fee in any amount will in turn pay for some expected and anticipated service.

If the fee schedule had gone through and hypothetically no one complained, it would have generated more than four times the highest annual budget Congress allocated for amateur radio. I think it's also safe to say that none of that money would probably go towards any new employees or greater enforcement or any other expanded service for amateur radio.

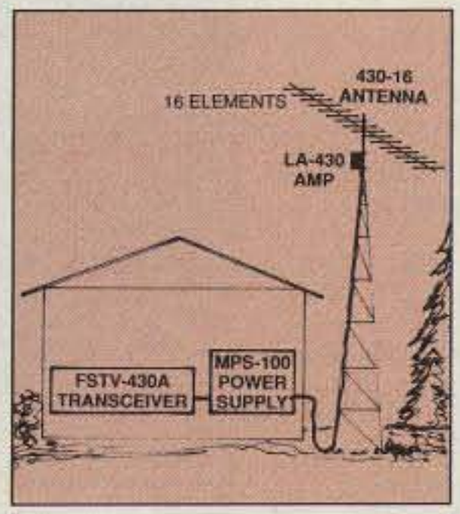
Perhaps it is time to put theory into practice and look into the concept of earmarked funding. Perhaps it is time to look into what legislation is needed to provide for such funding and under what conditions. At that point, a fee would be a fee and not another name for a tax. I think that at that point people would be willing to contribute their fair share of the cost. The last "fee" fiasco resulted in the government receiving a lot of money while at the same time drastically cutting the FCC's budget so that some agency head could take pride in and rationalize charging more for less.

So while we are saved from "fees" (taxation without representation) for the moment, its day will come. It's too good to pass up if you count the numbers and add dollar signs. However, think about it as a means of paying for what you say you want, rather than as a tax or tribute for something you already have—deregulation. 73, Alan, K2EEK

INTRODUCING AEA'S NEW ATV SYSTEM



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



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

The FSTV-430A Transceiver features a low-noise UHF GaAsFET preamp with a typical noise figure of less than 1.5dB and a crystal-controlled or variable tuning down converter. Output is available on channel 3 or 4 for signal reception AND monitoring transmissions. Two frequencies can be selected from the front panel for transmission (one crystal is included). The AEA design is also optimized for superior video and audio quality without sync buzz even with weak signals. The FSTV-430A is the only transceiver you need to work ATV and it also allows you to use the same TV set to monitor your transmitted and received pictures.

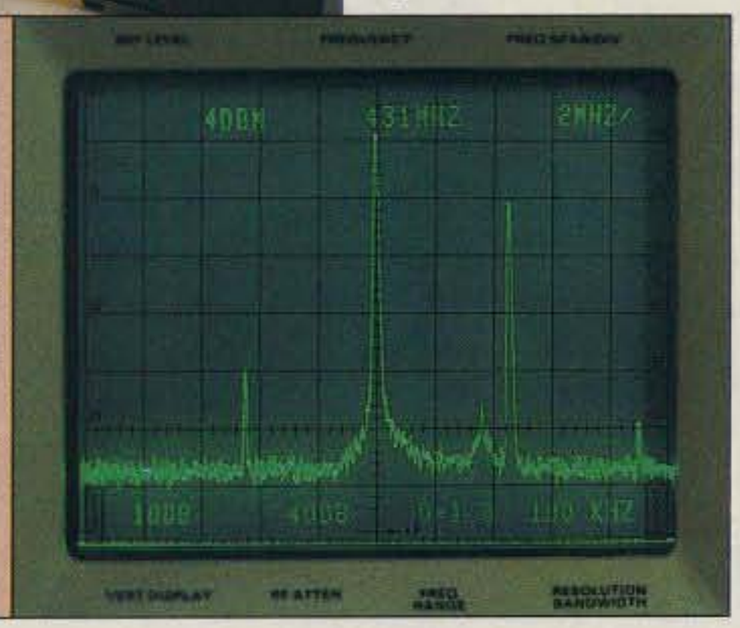
The LA-430/50 Amplifier with Power Supply gives a boost to your ATV signal. It includes a 50W P.E.P. mast-mounted Linear Amplifier (**patent pending**) covering 420 to 450 MHz and a GaAsFET preamp which utilize the antenna feedline for DC power. The mast- mount eliminates the line loss between the amplifier/preamplifier and the antenna to improve both transmission and reception, and is the equivalent of a 100W amplifier in the shack with a 3dB line loss. The amplifier is housed in a weather-resistant alodized aluminum case. The MPS-100 power supply also provides a 13.6 volt output for the FSTV-430A.

The 430-16 Antenna is a high-performance, computer-optimized yagi specifically designed for ATV operation. It features broadband frequency coverage from 420 to 440 MHz, 14.3dB gain, O-ring sealed connectors, 28 degree E plane and 32 degree H plane beam widths and 16 elements on a 10-foot boom.

See AEA's FSTV System at your local authorized AEA dealer. Put yourself in the ATV picture and join the fun!

What is the advantage of Vestigial Sideband (VSB)?

AEA's FSTV-430A Vestigial Sideband operation drastically reduces adjacent-channel interference. VSB requires much less bandwidth than existing double-sideband designs; it's the standard method of modulation required by the FCC for all U.S. broadcast TV stations. Similar in principle to SSB, VSB puts all of the audio energy and most of the video in ONE sideband instead of two. Using about half the spectrum space of competitive units, the FSTV-430A is the ONLY ATV unit that conserves spectrum space by using VSB. Even with AEA's LA-430/50 amplifier, one sideband is reduced more than 30dB. VSB presents an obvious advantage to the bandwidth-conscious ATV operator.



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ANNOUNCEMENTS

• **Southeastern Virginia Exam Schedule -** February 3, Hampton Roads Radio Assn. (W5YI exam), contact Bill Runyon, N4BDH, 487-8611. March 3, South Peninsula ARC (ARRL exam), contact Ed Brummer, W4RTZ, 898-8031. April 7, Williamsburg Area ARC (ARRL exam), contact Andrew Swanson, WJ4X, 253-2811. (More exams to follow.)

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

WA4DAN/4 & K5MK/4, from Dry Tortugas (IOTA NA-79); 2000Z Feb. 2 to 1600Z Feb. 4; phone 14260 (including the IOTA net, 1300Z Sat. and Sun.), 21260, 28560; CW 7030, 14030, 21030, 28030. QSL with SASE/IRCs/return postage to operator's Callbook address.

N5COW, from Cameron County Fair, San Benito, TX; San Benito ARC; 1800-0100Z Feb. 9-18; SSB 28.360, 21.350, 14.335, RTTY 14.090. For certificate send SASE and QSL to San Benito ARC, Brenda V. Ryan, QSL Manager, P.O. Box 1382, San Benito, TX 78586-1382.

KL7KC, from Yukon Quest International Sled Dog Race, Fairbanks, Alaska to Whitehorse, Yukon Territory; Arctic ARC; Feb. 23 to March 16 *(no frequencies given).* For QSL send SASE to Arctic ARC, P.O. Box 81389, Fairbanks, AK 99708.

WB7TJD, from Lost Dutchman Days Celebration, Apache Junction, Arizona; Superstition ARC; 1500Z-2400Z Feb. 17 and 18; CW Novice portions of 40, 15, 10 meters; phone Novice portion of 10 meters and low end of General phone portion of 40, 20, 15 meters. For certificate send 9 × 12 SASE (for unfolded, business-size for folded) with 35 cents postage and QSL with QSO number to SARC, P.O. Box 1551, Apache Junction, AZ 85220.

8-land, from Utica, MI; L'Anse Creuse ARC 25th Anniversary; 0001Z Feb. 24 to 2400Z Feb. 25; 3.545, 3.725, 3.925, 7.045, 7.125, 7.275, 14.045, 14.325, 21.045, 21.125, 21.425, 28.045, 28.125, 28.425 based on propagation. Members will call "CQ LC Jubilee" and give out facts about the LCARC. Nonmembers place the facts on the back of your QSL card and the member station giving you the fact. QSLs and certificates will be given. Send QSL and SASE to Vince Cuker, WA8BIJ, 145 Huron St., Mt. Clemens, MI 48043-1713.

8-land, from Alpena Winter Carnival, Alpena, MI; Thunder Bay ARC (look for member stations, including KE8ZC); Feb. 9-11 starting at 1500Z; 80, 40, 20, 15, and 10 meters. For certificate send SASE to TBARC, 1241 Long Rapids Rd., Alpena, MI 49707.

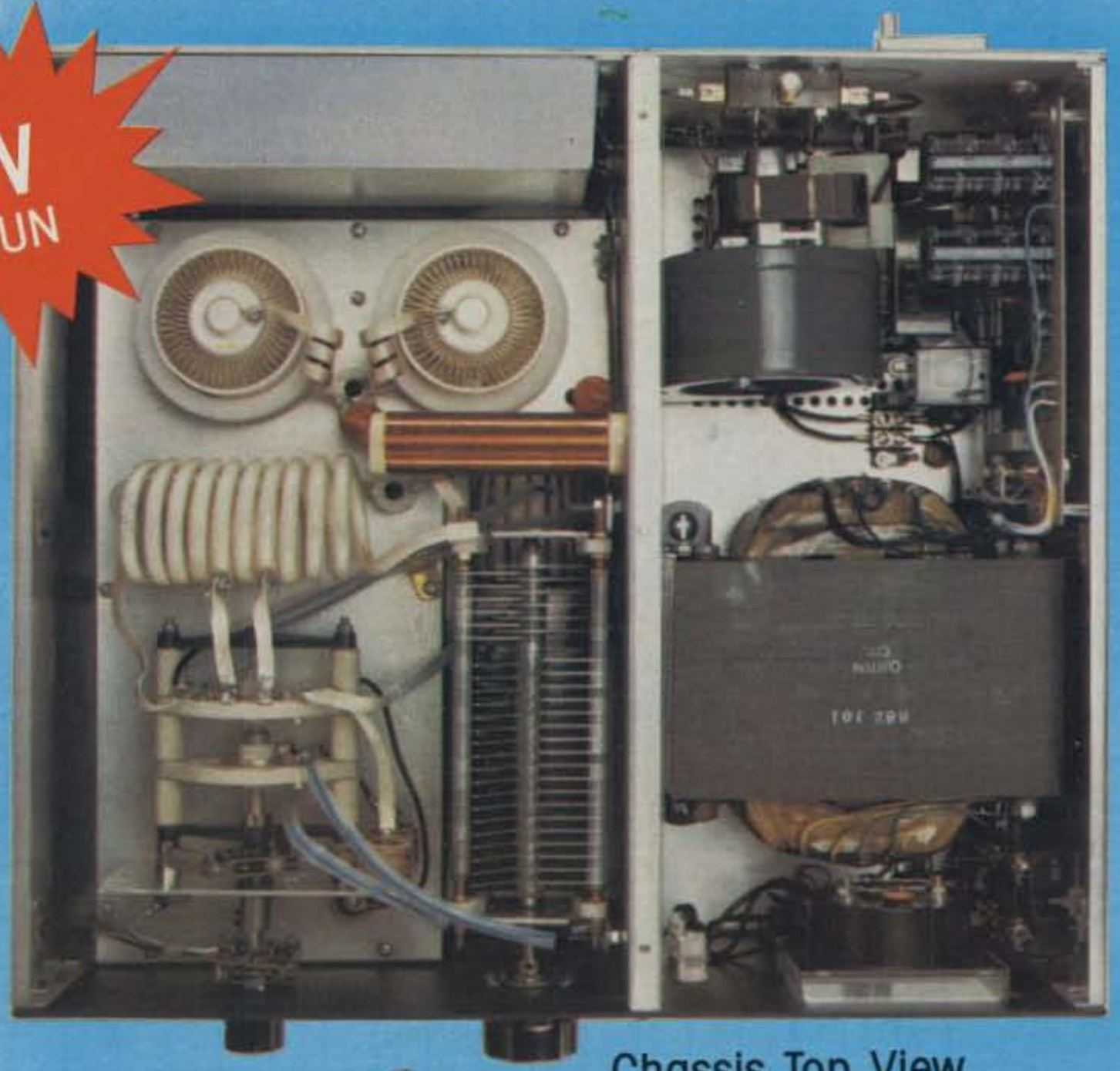
W9JZ, from "Groundhog Capital of the World," Sun Prairie, WI; Four Lakes ARC; Feb. 2 and 3, from 1400-0200Z each day; SSB lower portion on the General 40, 20, and 15 meter bands and Novice 10 meters. For certificate send QSL, contact number, and 6 × 9 SASE (for unfolded, or no. 10 for folded) to Jake Kitzinger, N9ITN, P.O. Box 277, Sun Prairie, WI 53590.

KA0VFF, from Loveland, Colorado Valentine's festivities; Loveland Repeater Assn.; 1500-0500Z Feb. 10-11 and 2500-0500Z Feb. 14; up 25 kHz from lower portion of the General phone and CW bands. QSL via Michael H. Walker, KA0VFF, 3816 Ash Ave., Loveland, CO 80538.

(continued on p. 83)

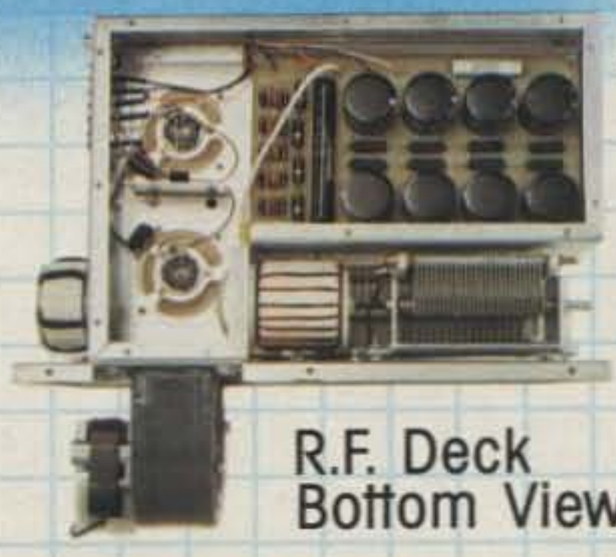
Commander™ HF-2500
Linear Amplifier

The NEW TOP GUN



Chassis Top View

R.F. Deck
Top View



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- ***HIGH POWER***
  45 watts on 2M and 35 watts on 70 cm. Approximately 5 watts low power.
- ***EXTENDED RECEIVER RANGE***
  (130-169.995 MHz) on 2M, 144-147.995 MHz transmit. 440-449.995 MHz on 70 cm. (transmit and receive)
  (Specifications guaranteed on amateur bands only. Modifiable for MARS/CAP permits required)
- ***SIMULTANEOUS***
  Receiving on both bands at the same time Scanning: intermix scan modes on both bands at the same time
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  The volume, squelch and control dial are independently adjustable on both bands. You can store the following information on both bands at the same time. Priority function, choice of 37 encoding/decoding sub-tone frequencies,call channel, scan function (program, memory channel, VFO or unique open channel scan), memory skip, bell function, + or - repeater shift.

FULL FEATURES

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  Operates odd offset operation
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- ***REPEATER REVERSE FUNCTION***
- ***CALL CHANNEL FUNCTION***
- ***BEEP FUNCTION***
- ***20 MEMORIES (10 FOR EACH BAND)***
  Each memory channel can store frequency, repeater offset, encode/decode frequency.
- ***4 SCANNING MODES***
  Program scan, memory scan, band scan and unique open channel scan (opposite to normal busy scan). Scan stops on a busy (or open channel) channel andthen resumes approximately 5 seconds after stopping even if the signal is still present.
- ***REPEATER OPERATION***
  The DR-57OT can be used as a cross band repeater.

EASY TO OPERATE FUNCTION

- ***LARGE AMBER MULTI-FUNCTION LCD DISPLAY***
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- ***MHz FUNCTION FOR BOTH BANDS***
  One MHz is increased or decreased per touch
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  One touch selection with pressing of band key
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- ***16-KEY DTMF MICROPHONE***
  With memory channel and frequency change up/down buttons.

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DJ-500T

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DJ-100T&DJ-200T

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DJ-160T&DJ-460T

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

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OUR READERS SAY

On-Ground Antennas

Editor, *CQ*:

I just finished reading Mike Crabtree's (AB0X) article in the August 1989 *CQ* entitled "The Search For The Perfect Low-Band Receiving Antenna," and I am very happy to see that additional work has been done by Mike based on my low noise coaxial link antenna which was described in *CQ*, December 1987. Congratulations to Mike for his efforts.

One of the statements he made about the poor operation of the loop when laid on the ground and his statement that the loop has already out-performed low-band specials (after raising the loop above ground) such as the "snake" got me to wondering why some people have good results with on-ground antennas and others don't. In Doug DeMauw's article "On-Ground Low-Noise Receiving Antennas" in the April 1988 issue of *QST*, Doug states "try to remove your on-ground receiving antenna from the vicinity of the buried radial system." Mike believes that his loop was useless on or near the ground because of the numerous radials in his backyard.

There may be another culprit that affects the operation of on-ground antennas, and that is ground conductivity! That is why a guy on Long Island may get better results with a "snake" than a guy in the midwest.

Take a look at a chart showing the estimated ground conductivity in the United States. To put it in perspective, sea water has a conductivity of 5000 millimhos/meter. In the United States there is a belt going from Texas north to the Canadian border that in most areas has a ground conductivity 15 to 30 millimhos/meter. Mike's location in Kansas seems to be in the 15 millimho area. Along the east coast of the United States earth conductivity ranges from 0.5 on Long Island to 8 in Florida. Most states show 2 to 4 millimhos/meter.

What I am suggesting is that on-ground antennas may perform substantially better in those areas of low earth conductivity and, of course, not over a ground radial system! Based on earth conductivity and the depth of penetration of radio waves into the ground, there probably are many locations in the U.S. where a low-frequency receiving antenna could be buried and still perform satisfactorily.

Richard A. Genaille, W4UW
Winston-Salem, NC

Bring 'Em On

Editor, *CQ*:

I've heard the arguments against no-code until I'm sick of them. It boils down to an "I've got mine, to hell with you" attitude. Well, those of us who love amateur radio enough to want to see it grow, to say nothing of keeping what we've got, have heard enough of the garbage. The code doesn't keep out the "riff-raff." If you don't believe that, just tune in 80 meters and listen to the riff-raff there bragging about their driving away all newcomers, their nose-thumbing towards courtesy, and their bragging about marital infidelity.

We badly need an infusion of youth, new ideas, and new technology. Amateur radio shouldn't be allowed to remain an exclusive club of old timers struggling to keep control of a deep, dark, and mysterious religion. There is room for all, and we must bring many more on board or lose it all.

I happen to be something of an "old fart" and enjoy contacts with my old Vibroplex, but I am also intrigued by the technology that adds computers, packet bulletin boards, and the like. To those who insist that code can get through where nothing else will, I say where there's a will, there's a way. We need those inquisitive, technologically gifted kids to find them and then show us the way.

If ham radio has the broad appeal we would like to believe it has, the taste of it will lead the no-code entrants to the code and higher privileges. But even if it doesn't, that's ok. Everything we who learned the code can do, the no-code entrant can or will soon be able to do.

I gotta ask the guys who fight no code: What's the matter with you, dont'cha like kids? I have four, and yes, they can be a royal pain in the britches. But I, and the world, am immeasurably richer for them. So, count me among the supporters of no-code. Bring 'em on!

Bill Mayers, KA2TNU
Groton, NY

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It's faster than the Pony Express, and you don't have to feed the horse. What is it? W5TOO answers that question and many more as he explains packet radio's ability to deliver the "mail."

Packet Radio's Long-Haul Mail System

BY ED JUGE*, W5TOO

There really is a lot more to packet radio than keyboard-to-keyboard connections. One of the most remarkable aspects of this fast-growing mode is the nationwide—make that worldwide—mail system.

If you have operated packet radio, you've seen the mail being sent around the country. I'd like to tell you a bit about how (and why) the mail forwarding system works as it does. I admit to being a relative newcomer to packet mail, which may just provide me with a perspective more akin to that of others even newer than I.

Packet mail allows you to send messages to other amateurs. NTS traffic is common over these circuits. There is a service called "REQQTH" in which you send a message, asking for the current QTH of any US amateur. The REQQTH server automatically sends a reply, with an address frequently more current than the latest published information. Data is taken directly from FCC microfiche listings and transferred to CD-ROM, which is then used for the REQQTH database.

"White Pages" is another service, which works much the same way from the user's standpoint. A request goes in, but this time the reply is the amateur's packet mail address. If you wanted to send a message to AA5FL but you didn't know where to address it, you would address a request to "WP @ W9ZRX" (White Pages database at W9ZRX). W9ZRX would respond that AA5FL may be reached "@ W5TOO" (at the W5TOO BBS). Several of the popular BBS programs can automatically "strip" the @bbs addresses from each message that passes through that station and send updates to W9ZRX on a periodic basis. Active packet operators also send in any changes to their listings.

There is even a QSLMGR service now which records and returns information on the QSL Managers of various DX stations.

It's safe to speculate that these services only represent the beginning of what packet radio mail can offer. It already represents much more than just messages from one amateur to another.

So how does this mail get from place to place? Next time you visit a local bulletin board, read a few forwarded messages with the "RH" command instead of "R." You'll see in the header a complete history of each message's path. You'll find the calls and locations of each intermediate relay station, along with date and time of receipt at each. Why was a message held by one station for hours . . . or days? Why did another pass through the same station twice? Why did a message from Florida to New York travel by way of Denver or Albuquerque?

Despite usual delivery times substantially faster than the postal service, it's easy to wonder about some of the delays. Was someone just lazy somewhere along the way? Did that out-of-the-way station need to raise his message count for the week? I've asked the same questions. Now I know some of the answers, and I would like to share them with you.

The vast majority of messages originate on local VHF/UHF bulletin boards. The BBS must be a forwarding bulletin board, not a local personal mailbox. Depending upon local custom and conditions, each bulletin board forwards to at least one (maybe more) other board. Forwarding takes place once each hour, or only during times when channel usage is minimal. Each BBS can control forwarding times and days individually for each station forwarded to. Forwarding can be station to station, via digipeaters, nodes, or various kinds of networks.

Traffic destined for a station many miles away eventually finds its way to a "Gateway Station," who moves it over to an HF network for cross-country or intercontinental delivery. A Gateway on the other end then reverses the process. Some Gateways also operate a local VHF or UHF bulletin board, or boards.

After running a local VHF bulletin board for a number of months, I was invited to become the Texas Gateway for the 14.111 MHz network. It was an eye-opener. Anyone who has dabbled in HF packet knows the frustrations of incredibly crowded frequencies. It's a unique set of conditions, and generally much different than you find on VHF. Collisions occur because station A can hear both station B and C, but B and C can't hear each other. So at A's location, B and C continually clobber one another. Multiply that situation by the 50 or so stations occupying any popular HF packet frequency, and the result will send you scurrying for VHF frontiers in a hurry.

HF networks have been operating under an STA (Special Temporary Authority) from the FCC. (It's been illegal to operate an unattended HF station.) These STA nets operate on several bands, but I'll talk about 20 meters, since that's where my involvement is.

These HF packet traffic nets are "closed" networks. Each station in the network restricts his contacts to authorized net members. You can eavesdrop on 7.097, 7.093, 10.149, 14.109, 14.111, and 28.109 MHz, but please don't attempt to connect. It won't work, and it just causes more QRM.

Propagation is a significant factor, but most of its problems can be overcome. Frequently in the mornings the VKs obscure stateside signals that are beginning to build. During the day propagation varies from season to season and even day to day. The only sure thing seems to

*2000 Thousand Oaks Drive, Burleson, TX 76028

be that propagation won't allow each net member to connect reliably with every other member. Each uses a beam and leaves it pointed in one direction. Remember that this is all unattended operation. Operators keep a loose watch on their stations to be sure everything is running well, but most of the time no operator is present to adjust frequency, power, beam heading, and such.

Each net member forwards once every hour, if there is traffic to be forwarded. Our net control maintains a list of members' most reliable connects—the four stations to which each has the most reliable path. Each then restricts his connections to those 4, or at most 6, out of 18 net members. That way retries are minimized and traffic moves more quickly.

This means that if W5TOO does not have a good path to Oregon, my Oregon traffic will be passed to one of my good connects who lists Oregon as one of his best. That might mean someone not in a direct path between Texas and Oregon, hence the often circuitous routing you see.

If each of us had only one route to a given destination, unfavorable band conditions could put traffic on hold for days, waiting for the path to open up. So we each have one or two alternate routes to every area. Our software attempts the favored route first. If unsuccessful, it tries route #2, then route #3. The result should be faster ultimate delivery.

Once in a while net members will have each other listed as an alternate route. For example, let's say my system couldn't make a preferred connection to Wisconsin, and forwarded it via my #2 route, Kansas City. Now Kansas City might not be able to make the Wisconsin connection either, and knowing that I usually have a good path, his system would automatically send to me as a #2 route. A little confusing, and seemingly unnecessary. Our "yo-yo" act does mean that the traffic takes advantage of the first available opening to Wisconsin, whether from Texas or Kansas City. I've seen days when no message stays on my system for more than an hour, and other days when few outgoing messages seem inclined to move.

The sender can help expedite traffic delivery of his or her traffic! All PBBS stations maintain a "forwarding file." Sending a message to "W1ABC @ N1XYZ" (to W1ABC at the N1XYZ PBBS) delivers your message to the N1XYZ PBBS to await reading by W1ABC. With amateur calls no longer an indicator of location, the software job of determining how to route each message is complex. Every BBS maintains a route file with just that information. Most of them are based on a periodic list of all known PBBS stations published by W9ZRX. If by chance N1XYZ is a new one and not yet in the list, a message addressed "@ N1XYZ" will never leave the originating station's board. However, if the sender knows his addressee is in Nevada, then he should address it "W1ABC @ N1XYZ.NV." Most bulletin-board software today can handle this "hierarchal" routing, and the traffic will scoot on its way to Nevada.

Some BBS software packages are easier to update for new BBS stations than others. Some BBS operators have more time to spend in gently prodding errant messages. It's a good idea for the sender to use those state codes. Delays of several days or more can occur waiting for the sysop to notice and add an address (hopefully up to date) from a Callbook.

You will see bulletins addessed to "ALL @ USA" or "All @ TEXAS." They often have very lengthy "headers" with many stations listed. The linked packet network has a unique way of distributing these messages. They are passed from BBS to BBS until they have spread out to every linked BBS in the USA (presently, between 700 and 800). Each BBS maintains a file of "Bulletin IDs," a unique identifier assigned to every bulletin by the originating BBS. Before accepting a bulletin from another station, the file of BIDS is checked. If the bulletin has been received previously (even if it was subsequently killed), it will not be accepted again. The automatic system has its controls! It's worth mentioning that some of the networks (like some BBSs) do not

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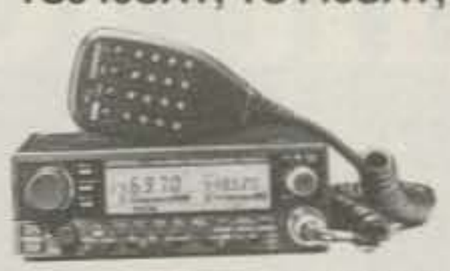

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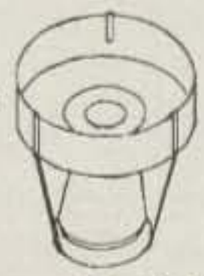

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handle bulletins—only point-to-point message—which logically should mean messages will move a little faster.

With 24-hour operation the long-haul nets take advantage of all good propagation, even band openings in the wee hours of the morning. Many of the net members can gateway traffic to other HF bands and other networks when advantageous.

Some participants in these networks use UPS (Uninterruptable Power Systems) to keep going when power fails, while some simply have their systems set to automatically resume operation when power is restored. And yes, this being a volunteer non-paid organization, you can expect things to slow down a little on *CQ* World-Wide DX Contest (and a few other) weekends. Even dedicated traffic-handlers may be even more dedicated DXers. We all have our priorities!

It's easy for a non-ham, or even a non-packet operator, to ask why we bother. Telephone or FAX or any number of other communication channels are available without the almost full-time dedication of thousands of dollars worth of computers, radio gear, and antennas to message handling. There are many good reasons (aside from the fact that it's fascinating and fun). First and foremost is that we (users and BBSs alike) are building, testing, improving, experimenting with—and maintaining the readiness of—an invaluable emergency message system. And that helps to justify the existence of the Amateur Radio Service.

Battery-powered portable packet stations represent a simple and very effective means of handling error-free traffic from a field location where there are no phone lines or power. The world-wide system of linked packet stations is also a really good way for amateurs to share information, find help or needed data, and communicate in ways that single-frequency, station-to-station QSOs could never duplicate. Downloading an ARRL bulletin at your convenience (rather than at the time W1AW broadcasts it) is nice. The latest satellite data is readily available on most full-service BBSs, as is the latest propagation information. And it would be next to impossible for these great services to be available on local VHF and UHF BBSs, if it were not for the nationwide HF packet network and emerging linked VHF/UHF systems like TEXNET.

As I was typing this article (September 20 last year, I received a long-distance call from an amateur on the East Coast. He had eleven welfare messages going to hurricane-torn Puerto Rico (Hurricane Hugo). His attempts to pass them on a voice net had been unsuccessful. Someone suggested he call Radio Shack to see about FAXing them to a Florida ham who would be closer to the action. (Don't ask. I'm not sure who would have told him that or why.) His local Radio Shack store referred him to the company headquarters here in Fort Worth, and I happened to get the call. Since I was about to fly to California, another local packet operator, Dave Wolf, WO5H, took them by phone and put them on my bulletin board that evening after work. Within minutes they were automatically on their way to W7LUS-1 in Miami, who has a VHF link to KP4OO in Puerto Rico. Need I offer a better explanation of why packet radio is worthwhile?

Packet radio is claimed to be the fastest growing phase of amateur radio. It is also in its infancy. Watching it grow is exciting. If you haven't tried packet, I hope I've spurred your interest. Understanding how the mail system works may help you better use it to your advantage. CQ

CQ REVIEWS:

The ICOM R-9000 All-Band, All-Mode Deluxe Communications Receiver

BY DAVE INGRAM*, K4TWJ

ICOM's new R-9000 all-band, all-mode receiver.

"Holy smoke, Batman, this new R-9000 monitors more action than we could find in ten Gotham cities!" "That's right, Robin, and it has more clever modes of operation than Catwoman has lives. We can even let it scan activity in one metropolitan area while we are away on another caper. It will automatically load busy frequencies in memories for our review after returning. Now monitoring everything from international shortwaves and aircraft bands to public services and mysterious spy signals is right at our fingertips. The commissioner will really like this addition to the Batcave's crimefighting equipment."

Our Caped Crusader's previous description of ICOM's new R-9000 may seem slightly theatrical, but it accurately reflects first opinions of this amazing receiver. The all-mode and ultra-wide-range R-9000 is hotter than a firecracker, it covers 100 kHz to 1999.9 MHz, and it is absolutely loaded with fantastic features.

Sporting impressive design features such as a multifunction CRT display with band spectrum scope, Direct Digital Synthesized VFO, high sensitivity, 105 dB dynamic range, etc., the new R-9000 bears a striking resemblance to ICOM's top-of-the-line IC-781 HF transceiver. Other attention-grabbing R-9000 features include very high frequency stability (like ± 25 Hz from 100 kHz to 30 MHz and .25 parts-per-million above 30 MHz), 1000 tunable memories, seven modes of scanning plus auto-programming of memories 900 to 999 with scan-spotted action, and much more. From an old-timer's viewpoint, we might easily describe it as a modern rendition of the famous Collins R-390 that was known and respected worldwide for several decades.

*2028 Brandywine Court, Birmingham, AL 35216

Overview

The R-9000 is enclosed in a dark gray cabinet measuring 5.9"H × 16.7"W × 14.4"D and weighs 44 pounds. It has a built-in AC supply that operates from 110 or 220 volts, a top-mounted speaker, bottom flip-up feet, and a center 5-inch CRT. Rack mounting handles and a rear stand for vertical mounting are also included with the receiver.

There are four antenna connectors on the rear panel: an SO-239 and an RCA jack for HF, an "N" connector for 30 to 1000 MHz, and a separate "N" connector for 1000 to 1999.9 MHz reception. The receiver also has an extensive group of bandpass filters for HF, GaAsFET RF amplifier transistors for VHF/UHF, and multiple steep-skirted IF filters for all modes. Additional technical details are shown in fig. 1.

The R-9000's CRT serves as a central monitor system with your selected frequency, mode, filter, memory channel, tuning step and a 24-hour clock in the upper area and a variety of special displays in its lower section (see fig. 2). These displays are called into operation by a group of six "function" keys built into the CRT's escutcheon. The keys select band spectrum display with horizontal spans of 25, 50, or 100 kHz (fig. 3), memory contents with scrolling and electronic notepad (fig. 4), scan mode parameters, clock and timer functions, computer interfacing variables, and an on-screen display for use with an external RTTY/packet interface. The CRT's function keys also change purpose according to their selected mode, producing the operating equivalent to over 30 keys.

One of the R-9000's particularly interesting aspects is its video interfaceability. You can connect a standard (NTSC) video monitor to the R-9000's **Video Output** jack, for example, tune a video carrier frequency like 83.25 for channel 6, and watch TV with the R-9000. Alternately, you can connect the R-9000's CRT output to the video input of your monitor for "big screen display" of the R-9000's 5-inch CRT. You can also connect the video output from a computerized RTTY or packet system to the R-9000's screen for readout of these popular printed modes. Considering the R-9000's extensive video interfacing capabilities, full reception of long- and medium-wave bands, shortwaves, marine, aircraft, public service, utility and UHF bands, plus its band spectrum display, it is one very versatile receiver!

SPECIFICATIONS

• Frequency coverage :

VERSION	FREQUENCY COVERAGE	
U.S.A., Europe,	0.10000 ~ 1999.80000	
Australia	2.00000 ~ 87.49999	108.00000 ~ 1999.80000
Germany	0.15000 ~ 26.10000 144.00000 ~ 146.00000	28.00000 ~ 29.70000 430.00000 ~ 440.00000
France	0.10000 ~ 87.49999	108.00000 ~ 1999.80000

Unit : MHz

• Mode : USB, LSB, CW, FSK, AM, FM, Wide FM

• Receive system : Superheterodyne system

• Intermediate frequencies :

FREQUENCY	0.10000 ~ 29.99999	30.00000 ~ 499.99999	500.00000 ~ 999.99999
1st IF	48.79376 ~ 48.80000	778.60001 ~ 778.70000	278.60001 ~ 278.70000
2nd IF	10.70000	10.70000	10.70000
3rd IF	0.45500	0.45500	0.45500
4th IF	10.70000	10.70000	10.70000

Frequencies above 1000 MHz use a crystal conversion system. Unit : MHz

• Sensitivity :

MODE	SSB, CW, FSK	AM	FM	Wide FM
0.10000 ~ 0.49999	0.5 μV	3.2 μV	–	–
0.50000 ~ 1.79999	1.0 μV	6.3 μV	–	–
1.80000 ~ 29.99999	0.16 μV	1.0 μV	–	–
30.00000 ~ 999.99999	0.32 μV	1.4 μV	0.5 μV	1.4 μV
1000.00000 ~ 1239.99999	0.63 μV	4.0 μV	1.0 μV	4.0 μV
1240.00000 ~ 1299.99999	0.32 μV	2.0 μV	0.5 μV	2.0 μV
1300.00000 ~ 1599.99999	0.63 μV	4.0 μV	1.0 μV	4.0 μV
1600.00000 ~ 1999.80000	1.0 μV	5.6 μV	1.4 μV	5.6 μV

10 dB S/N for SSB, CW, FSK and AM.
12 dB SINAD for FM and Wide-FM
Maximum sensitivity values are indicated in the chart above.

• Sensitivity : SSB, CW, FSK More than 2.4 kHz/–6 dB
AM More than 6 kHz/–6 dB
FM More than 15 kHz/–6 dB
Wide FM More than 150 kHz/–6 dB

• Audio output power : More than 2.5 W at 10% distortion with an 8 Ω load

• Audio impedance : 4 ~ 8 Ω

• Power supply requirement : 100 ~ 120 V AC (U.S.A. version)
220 ~ 240 V AC (Australia, Europe and France versions)
220 V (German version)

• Antenna impedance : 50 Ω (unbalanced)

• Power consumption : Less than 110 VA

• Usable temperature range : –10°C ~ +50°C (+14°F ~ +122°F)

• Frequency stability : 0.1 ~ 30 MHz ± 25 Hz
30 ~ 1999.8 MHz ± 0.25 ppm
(0°C ~ +50°C; +32°F ~ +122°F)

• Dimensions : 424(W) x 150(H) x 365(D) mm 16.7(W) x 5.9(H) x 14.4(D) in
(projections not included)

• Weight : 20.0 kg (44.1 lb)

Fig. 1 - Technical specifications of the R-9000 receiver.

A Front-Panel Tour

Since the R-9000 boasts over 70 front-panel controls plus a full-size keypad for direct frequency or memory selection, a written front-panel "tour" is ideal for describing the receiver's numerous features. Refer to the photo as we proceed. Understand also that all controls cannot be discussed without overflowing available *CQ* space. I will thus explain the most significant controls.

Six buttons located vertically between the CRT and keypad select operating modes and simultaneously activate their respective filters. Notice both narrow and wideband FM are included in those modes. The keypad's lower buttons also warrant closer discussion that is best explained with a simple example. If you press the **1** and **4** keys, then the **ENT** key, 14.000 MHz is selected (and the band can be tuned with the R-9000's main knob). If you press the **M-CH** button instead of **ENT**, however, memory 14's contents (frequency, mode, filter, and tuning speed) are called into operation. Sequentially pressing the keypad's **SLOW** and **FAST** buttons, then step through tuning rates from 10 Hz to 100 kHz. Light-detent tuning automatically switches into use with tuning steps of 5 kHz and higher. Neat!

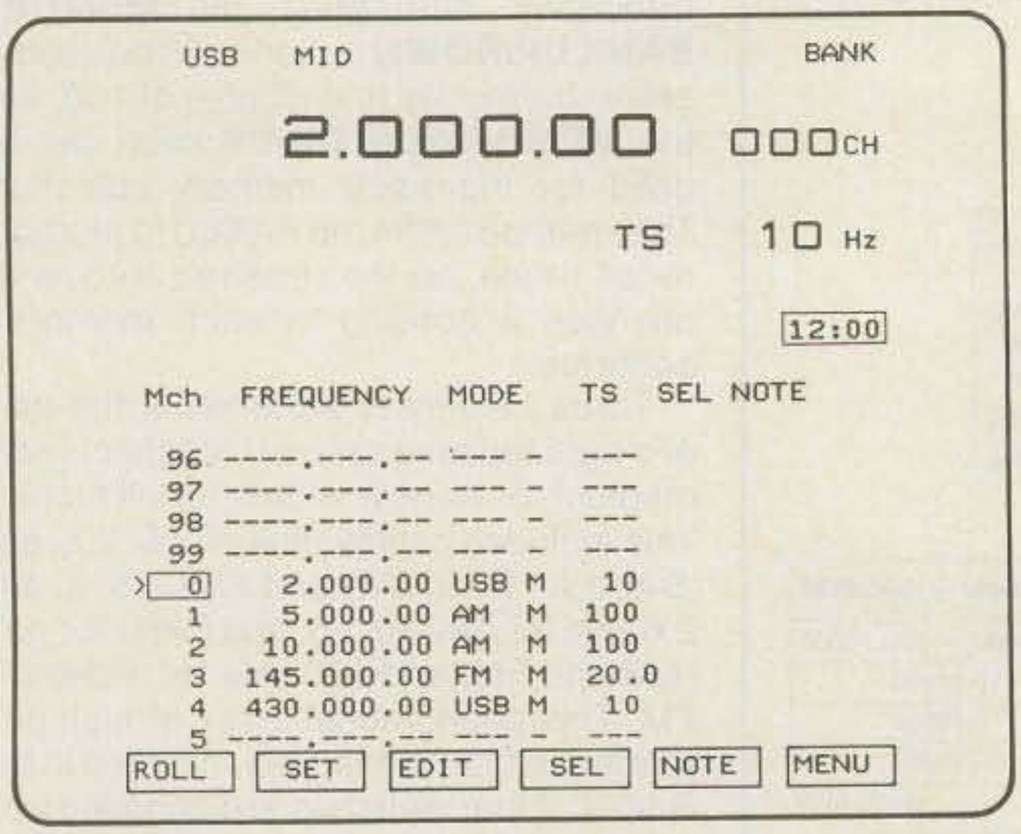
Using the keypad is handy if you know a specific memory's contents, but since keeping track of 1000 memories is quite challenging, two other R-9000 features are useful. First, you can scroll through memories by holding the CRT's **F1** button depressed while rotating the main tuning knob. This method is strictly for memory review; it does not change your receive frequency. Alternately, the **MEMORY BANK UP/DOWN** buttons can be used to select memories in multiples of 100, and the **MEMORY-CH DN/UP** knob can be used for individual memory selection. This method shifts the R-9000 to memory recall mode, so the received frequency changes according to each memory's contents.

Three LED-inset switches in the panel's right top area select IF filters of wide, medium, or narrow widths for all modes. This includes bandwidths of 2.6, 2.4, and .5 kHz for SSB, CW, and FSK; 15, 6, and 2.6 kHz for AM; 30, 15, and 6 kHz for narrowband FM; and 150 kHz for wideband FM. This phenomenal array of high-performance filters is factory installed in the R-9000. Filter switches are complemented by an IF Shift control that is lightly detented and an IF Notch adjustment, both of which work like a bandit. Using them for only a few minutes really lets you appreciate the performance advantage of a dedicated communications receiver over an HF transceiver with general coverage.

A brief discussion of the R-9000's rear panel is also logical at this point. In addition to its previously mentioned antenna, AC power, external speaker, and video in/out connections, there are sockets for an audio recorder with control for start/stop, a 13.5 volt DC input power connection, and a computer interfacing socket. The latter socket interconnects with ICOM's optional CI-V interface. That unit, in turn, plugs into your computer's RS-232 port. You then set interfacing parameters like baud rates and stop bits on the R-9000's screen, load operating software in the computer, and you have a deluxe CIA-type monitoring system. Some quite elaborate public domain software for ICOM rigs is being sold by computer dealers at various hamfests. Check them out.

A Scanner's Dream!

A total of 15 front-panel controls for deluxe scanning really puts the R-9000 in a class of its own. Seven pushbuttons located below the CRT select scan modes as follows. First the **Auto** button activates automatic programming of memories 900 to 999 with active frequencies spotted during programmable band scanning. You set those limits, and the R-9000 finds the action. This scan mode is great for finding activity such as police, fire, cellular telephones, etc., in unfamiliar locations. Another button starts **SEL**ected memory number scanning. This mode is useful when you desire overviewing a particular type of activity and program their frequencies into easily remembered numbers such as memory one of each bank. An adjacent button activates full memory scanning, and you also have a choice of **BANK** or **NO**



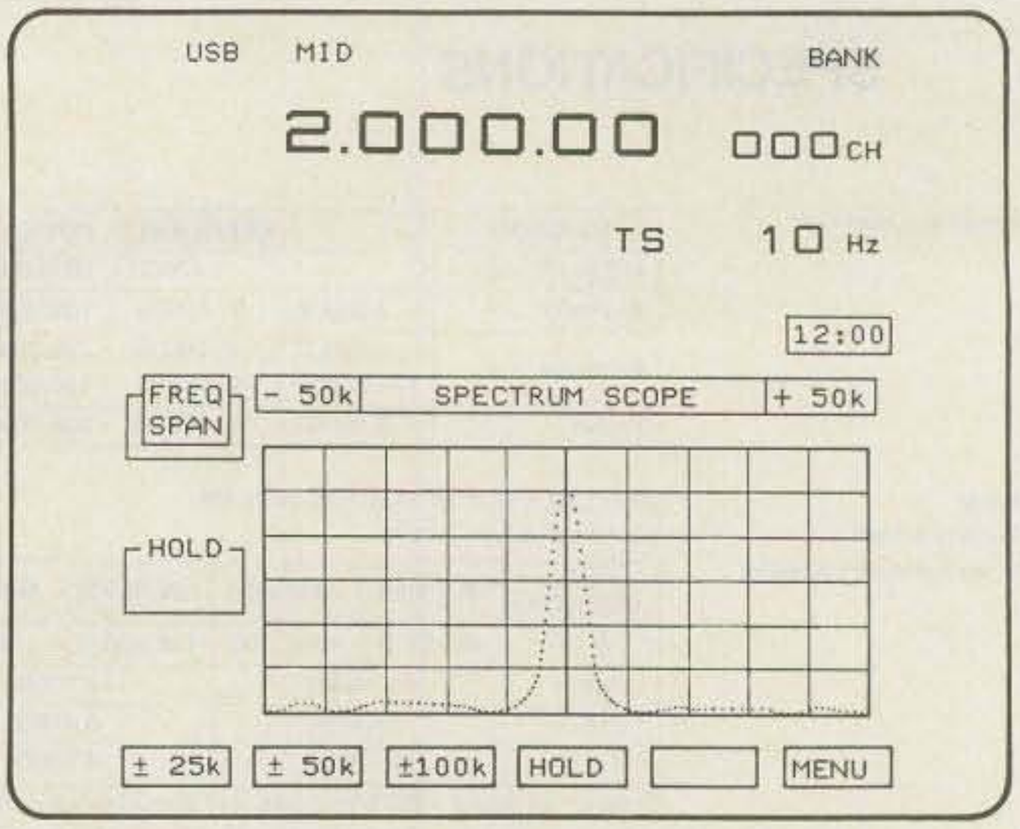
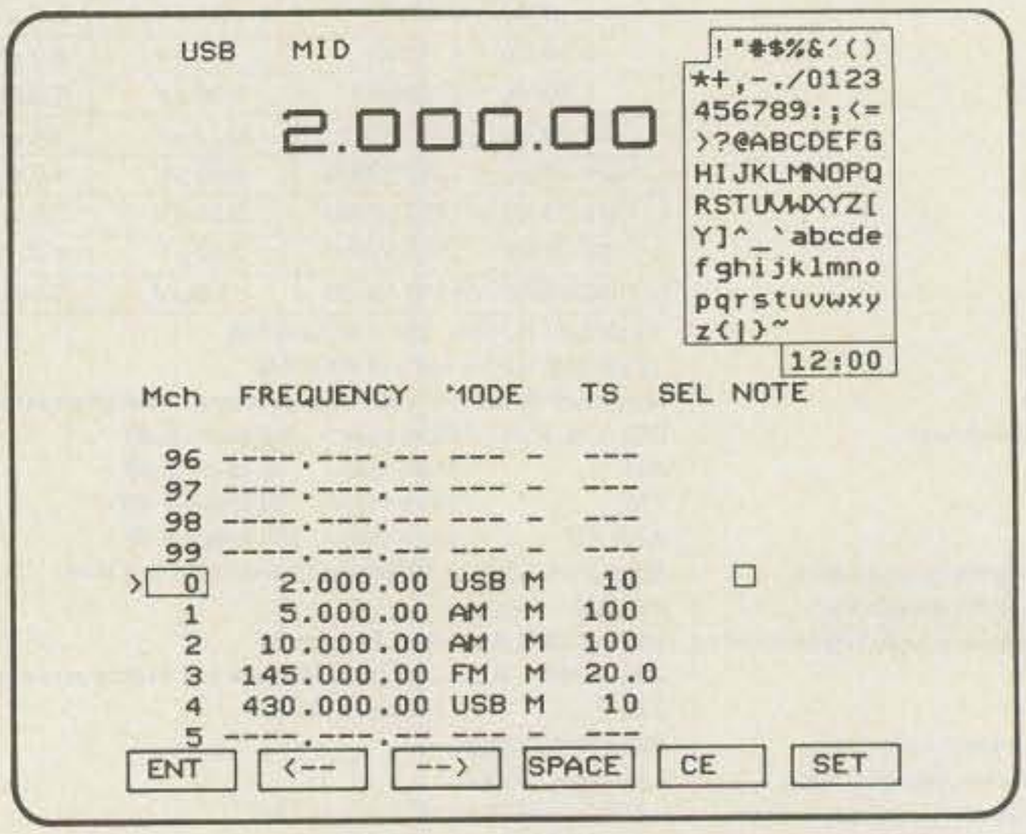


Fig. 2- (Above) Primary multifunction screen on the R-9000. Upper area shows mode, filter, frequency, tuning speed, and time. Selected lower display scrolls through memory contents.

Fig. 3- (Above right) Band Spectrum Display has been selected for lower screen area. It is calibrated vertically in signal strength and horizontally in frequency span.

Fig. 4- (Right) Upon selection, the R-9000's electronic notepad appears superimposed in the screen's upper area. You select letters with the receiver's tuning knob and write them in memory with the F1/"ENT" button.



BANK operation. Simply explained, **NO BANK** lumps all 1000 memories into one gigantic batch, while **BANK** separates them into groups of 100 each. BANKing can also be mixed and matched, so you can scan various combinations of 100 memory groups as desired. Further, all of the previous functions are front-panel-accessible.

Another fascinating scan mode with unlimited applications is activated by the R-9000's **Δ F** button. This mode scans a range of ±2.5, 5, 10, 20, or 50 kHz from your center-tuned frequency, and it is really great for checking activities such as the DX portion of 20 or 15 meters, the low end of 30, the SSB portion of 17 meters, etc. The last two buttons in this line activate programmable scanning between user-specified limits and priority scanning that switches reception between any selected memory and a tuned frequency. This mode is especially useful for monitoring one frequency while checking or tuning another band.

A combination of five more pushbuttons and two controls on the panel's left side also operate with scan modes. The buttons select stopping scan only on signals with voice, cancelling or resuming scan after receiving a signal, and pausing or resuming scan when a signal drops out. The two controls adjust scanning speed from comfortably slow to quite fast and pause/delay time from 3 to 20 seconds. Needless to say, the R-9000's versatility should please everyone!

Operation

Getting behind the controls of an R-9000 could easily be compared to sliding into the cockpit of the military's best jet plane with two noticeable differences: The R-9000 does not fly and, although it is quite sophisticated, it is surprisingly easy to operate. Everything from low bands to microwaves, all modes and filters galore are directly accessible. In fact, you can switch between monitoring underworld SSB activities in the 6 MHz range or aircraft communications in the 120 MHz AM band to almost anything with a few clicks of the memory channel knob. Receiver sensitivity and intermod immunity are fantastic.

One thousand memories are more than adequate, but they are not overkill. You can store HF "hot spots" in one bank of 100 memories, underworld and clandestine frequencies in another bank, aircraft, public services, 2 meter, 70 cm, and 1.2 GHz action in additional banks; unusual or unexplained signals in another bank; and use the remaining bank for auto-loading when scanning. This self-programming feature is really slick when you desire overviewing activities but do not know specific frequencies used in your area. Scanner devotees could also plug in a tape recorder with remote start/stop to the R-9000, add the unit's optional UT-36 voice synthesizer, and even record transmissions complete with their time scanned. What a rig!

Another impossible-to-beat feature is the R-9000's spectrum scope. This panoramic display is great for alerting you to action on nearby frequencies, and you can select display ranges from 50 to 200 kHz.

The R-9000 receiver is priced at $5459.00. For more information on the R-9000, contact ICOM America, Inc. at 2380-116th Avenue, N.E., Bellevue, WA 98004. CQ

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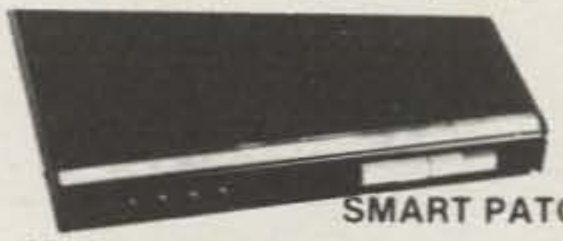

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If it isn't cold or nasty enough outside to work on your antenna, you might want to give some thought to dressing up the shack. K4FW presents his solution to a new operating position.

How To Revamp Your Operating Position

BY ALBERT KAHN*, K4FW

For a long time my operating position consisted of a table that had been in my family for years. In fact, it originally came from my grandfather's home and was made from solid walnut. This family heirloom was at least a hundred years old, and now it was stacked high with all of my gear in a rather disorderly array. The idea then for a new operating position started with a guilty conscience over the table and my daughter's desire to give that table a new and proper home (hers).

If you're starting from scratch and not adapting, you can plan out exactly what you want and need. Comfort and convenience are two big factors that will give an edge to a contest score as well as keep you in shape to go to work on Monday morning. So a lot of thought was given to a relaxed position and having all controls within easy reach. As far as materials go, you can adapt the plans to use whatever you have on hand or make it as fancy as you like.

Looking at fig. 1 and starting at the left, I have a telephone with a place for directories underneath. If I get a phone call during a QSO, I can put one or the other on QRX without getting up.

Moving right, the three cubicles or cabinets house an antenna tuner, transceiver, and final amplifier. Each is canted for direct dial reading and no-reach tuning. I put felt strips on the bottoms of the units to make it easy to slide them in and out. This makes it simple to connect or reconnect cables to the rear panels. The inside dimensions for the cubicles were omitted from the drawing, as the actual space will be determined by the gear in your station. You should, however, leave adequate space around the equipment for air circulation, especially around the final amplifier. You also might want to drill additional

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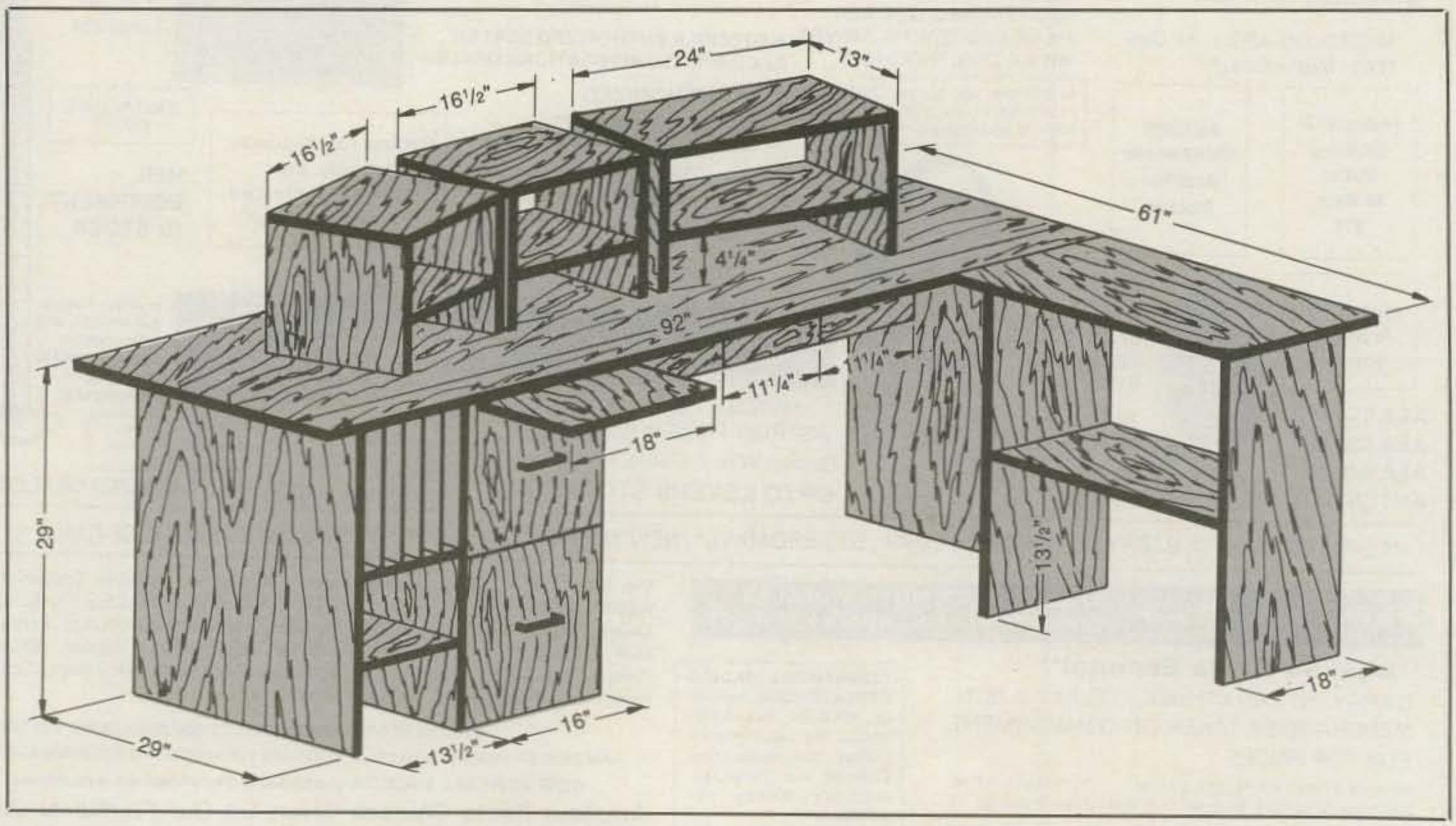

Fig. 1– Plans for the author's new operating position.

Here's the new operating position. Now if only I could figure out a way to dress up those cables behind and underneath the desk, I'd have it made.

exhaust holes in the shelves should you find that too much heat is building up.

The smaller space below the cubicle shelves houses your accessories, the most important of which for me is my keyer. I can prop up or set the key paddles at any angle which presents a very comfortable operating position. This eliminates any arm strain.

I use the top shelves of the cubicles to support power supplies, speakers, rotor control boxes, and even a 6 meter transceiver. Having the speaker up at about ear level makes copying easier when I'm not using earphones.

The three drawers extend the full depth of the bench, which gives a lot of storage space despite being shallow. A pull-out shelf located to the left of the drawers is convenient during contests for fast reference to check sheets. The "L" extension to the right can be used for auxiliary functions and gear such as a typewriter, computer, VHF rig, or even a back-up rig.

Being old-fashioned, I have always preferred to use linoleum for a writing surface on a desk top. However, along with many other things, linoleum seems to have gone the way of the spark gap, as all of the floor covering stores tried to interest me in "no wax" textured floor covering. I did find some adhesive-backed black vinyl that was probably used for covering walls. Although slightly textured, it does have a good writing surface and is not slippery, plus it resists scratches.

In keeping with the change to the operating position, I added a combination pin-up board and scratch board to the wall above the console. The pin-up board has lists of countries needed, nets which I join from time to time, some beam headings, a Celsius conversion chart, and other miscellaneous items. To complete the setup I have lists of current DXpeditions and frequencies, schedules, and some control settings posted on the scratch board.

The setup has worked out very well, and I am quite pleased with the project. Even my daughter is pleased with the project, although probably not as pleased as she is with the family table. CQ

Here's a terrific idea that can be accomplished for very little money and can turn you instantly into a big gun (in one direction, that is).

Build The Ultimate Quagi Antenna

BY MICHAEL MARDIT*, WA2VQW

Having lived in apartment buildings for most of my life and having to "make do" with random-wires and indoor antennas, the availability of a small piece of property at my parents' summer home in the Peekskill, New York area afforded me the opportunity to experiment with the Quad and Yagi antennas. High elevations and WA2VQW never seemed to coexist together, and I discovered quite quickly that at 30 feet in a heavily wooded area the Quad was the better performer. Thus, the Quad became the antenna of choice for me.

In 1982 my wife and I relocated from New York City to the suburbs. Having been relatively inactive in amateur radio for about six years, the climbing sunspot cycle, and dreams of 15 meters blossoming again (it always has been my favorite DX band) prompted me to dig out the Quad and spend some time in the pursuit of DX. The homebrew mounting hardware for the old two-element duo-band Quad was still on hand, but the spreaders had to be done.

I found from previous Quad work that bamboo poles painted with a good-quality oil-base paint, followed when thoroughly dry by a vinyl tape wrap with 50% overlap, would be weatherproof for many years. The two-element homebrew Quad is of conventional design, so it will not be detailed here. The Quad was reassembled without extensive effort and was mounted atop a 30 foot telescoping aluminum mast by Bob, N2DVQ, who is totally undaunted hanging upside down 30 feet in the air. The duo-band Quad was used for four months and it performed well. *(If you would like a relatively quick education in Quads, I would suggest that you read Bill Orr's book Cubical Quad Antennas.* It is available from CQ's Book Shop.)

A two-element Quad, however, is at best only a 7 dBd antenna, and I was not satisfied with that. What I really wanted was to have an antenna that would be extremely competitive in one direction, but capable of a fair amount of gain in all other directions. Furthermore, it must be low in cost, be capable of working well at relatively low heights, must use materials readily available, and must not be dependent on a strong tower for support.

I looked at the survey map of my lot (fig. 1) and I noticed that the distance from the back of my house, where the Quad is situated, to the farthest point on my property was at a bearing of 337° NW. A rather

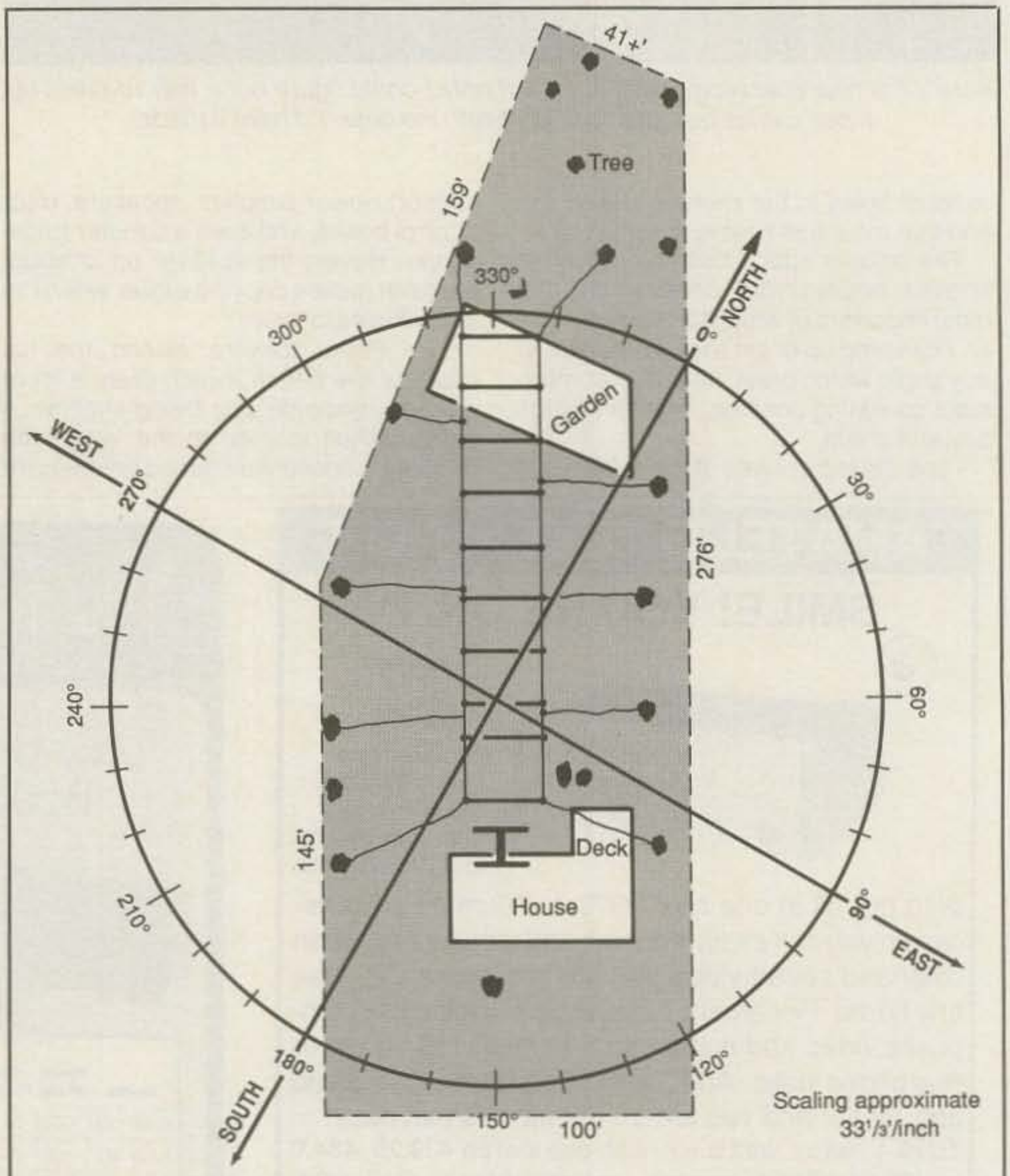

Fig. 1– Plot diagram of the author's property. The black dots represent trees.

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Director	Director Length	Optimum Director Spacing For 15 meter Monoband Quagi (F = 21.225 MHz)		
D1	20′10½″	QD—D1	8′11″	S1
D2	20′9″	DI—D2	18′5″	S2
D3	20′7¾″	D2—D3	9′10″	S3
D4	20′6½″	D3—D4	14′7″	S4
D5	20′5¼″	D4—D5	14′7″	S5
D6	20′4″	D5—D6	14′7″	S6
D7	20′2¾″	D6—D7	14′7″	S7
D8	20′1½″	D7—D8	14′7″	S8
D9	20′¼″	D8—D9	14′7″	S9
D10	19′11″	D9—D10	14′7″	S10

Table I– Overall dimensions for the 15 meter Quagi.

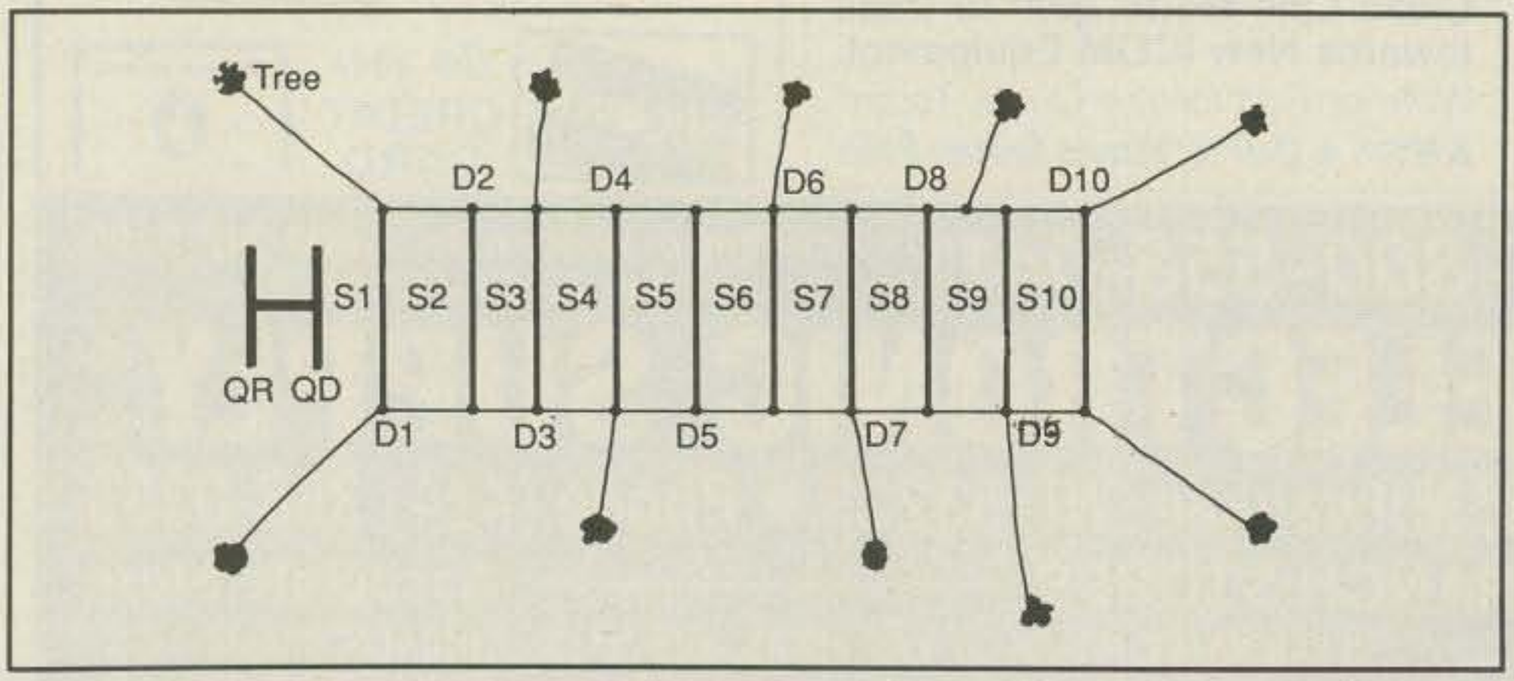

Fig. 2– The two main runner lines and side support lines are braided ¼ inch nylon solid-core rope draped over appropriately positioned tree branches as high above ground as the Quad boom is elevated.

large fixed wire beam could be erected in this direction to take full advantage of the layout of the land, but this would be a unidirectional antenna and not afford rotation. Also, what to do about the Quad?

This puzzled me for a time, but then while troubleshooting a failure in my antenna rotary switch, the idea came to me of a rotatable Quad as the "center pole" of a "rotary switch," with an "array of Quad directors" at one or more of the "peripheral poles" of the switch! It seemed an overwhelming task to try more than one set of Quad director arrays in an experimental antenna of this type, and my available time and space being somewhat limited, I decided to utilize the one direction which would be most profitable—the one at 337° NW.

Now how to implement such an idea? A walk into the backyard revealed about two dozen tall trees scattered about. They would be useful as antenna supports, but not for Quad elements. However, for supporting line ropes which in turn would support an array of Yagi directors, they would be ideal! I'd built UHF Quagis of the eight-element version for TV channels 20 and 50, and they worked admirably at relatively low heights. So suppose I positioned a number of horizontal wire elements for 15 meters in front of the 20/15 Quad and supported them with ¼ inch nylon ropes between the trees? I had room for ten directors with some space left over, so ten it would be.

Inasmuch as the directors would be made of #14 wire, the same gauge as the Quad elements (and not tubing), the lengths of the directors would have to be scaled up appropriately from the UHF design *(See "Scaling Antenna Elements," W7ITB,* Ham Radio, *July 1979, p. 58).* (See Table I.) A network of ropes between trees ensued (fig. 2), and when it was finished I had a 12-element Quagi at 30 feet supported by 10 trees bearing down on Japan, Korea, the Phillippines, and parts of China not previously frequented by the presence of my signal.

Before discussing tests, a brief discussion of element spacing is in order. When using a duo-band Quad for 20 and 15 meters, optimum spacing as calculated between the Quad driven element and first Yagi director (in a 15 meter Quagi) is not physically possible if 360° Quad rotation is desirable. In order to facilitate Quad rotation it was necessary to move the ten-element director array forward, just enough to clear the Quad's turning radius. The antenna characteristics presented here were obtained at this altered spacing.

Having completed the assembly, and the positioning of the array at the scaled distances from the Quad, the SWR of the hybrid beam was checked. The SWR changed when the Quad was rotated into the array of directors, and returned to its nominal value when the Quad was ro-

tated out of the array of directors. The calculated impedance out of the array is 60 ohms, SWR = 1.2:1; and into the array, 45 ohms, SWR = 1.6:1.

My system is set up for RG 11/u coax, with a sleeve balun for matching. The gain performance of the original two-element Quad does not appear to be degraded in other directions, but is magnificently enhanced to JA/HL and YB. The estimated gain of the 12-element Quagi approaches 14 dBd, and the SWR never exceeds 2:1 at any point on the band at my installation. This estimation was arrived at by the following. **On Transmit:** Output power and antenna data were collected from over 150 stations along the beam path of the Quagi antenna, 337° ±20° referenced on Yorktown Heights, New York. Using this data, the approximate Effective Radiated power of the transmitting station was calculated. The signal reports sent and received were compared. The difference was compared with the ERP at WA2VQW. The apparent Quagi gain along the beam path was determined. **On Receive:** Many signals that were received at S4 level on a quiet band with the Quagi were just barely discernible with my drooping ground plane the feed point of which is at 42 feet.

The total length of the antenna from the back of the Quad reflector to the most distant director is 150 feet. The beamwidth appears to be near 40° for greatest effectiveness.

One aspect of the antenna which is noticed immediately is how quiet the receiver becomes when the quad is rotated parallel (coupled into) the director array. The stateside signals, especially the high-angle signals on short skip, tend to disappear into oblivion. The front-to-side ratio is noticeably higher than the front-to-back ratio, but these parameters are difficult to measure accurately here, because one is comparing the two-element Quad part of the antenna in all other directions to the whole Quagi array. This data is subject to errors and anomalies caused by "over-the-pole" and excellent north/south propagation due to my choice of antenna orientation. An estimate using my old Swan 500 transceiver (my current station exciter) shows at times a F/S ratio of 24 dB and a F/B ratio of 20 dB, but varies considerably up and down from morning to evening—with changes in propagation. It also appears to be dependent upon the wave angle and level of absorption at the time.

It is not uncommon for me to receive calls from South America when my array is on Japan and north/south propagation is good. Patricia, LU1FIY, has called me several times with the Quagi pointing to Japan when I am calling for DX without specifying a direction. Signal strengths, however, are markedly reduced. In another situation Tad, JH1MTO, gave me 5/9 + 10 and after turning the Quad re-

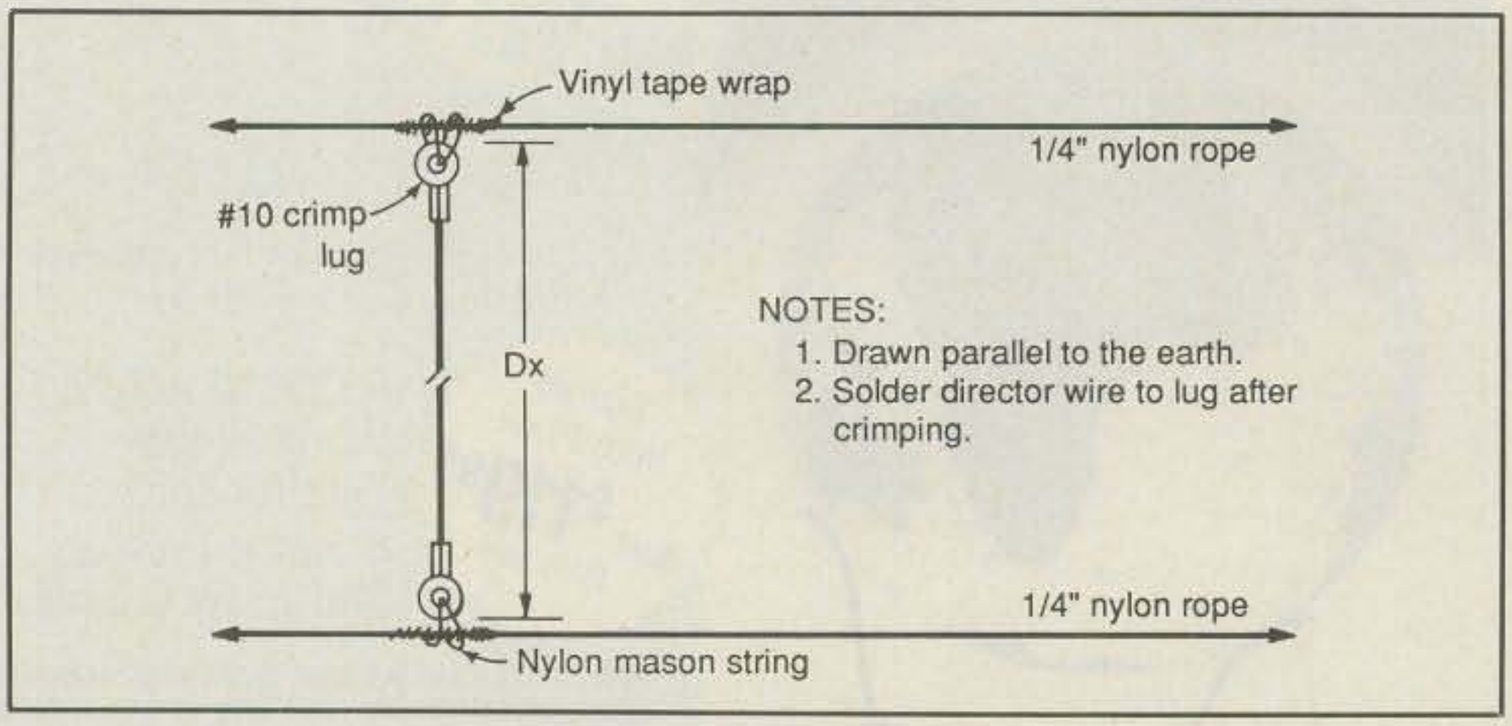

Fig. 3– The director wires are #14 stranded, insulated, the same wire as I used for the two-element Quad. The method of attachment of the directors to the ropes is as shown.

flector to him only 5 and 1.

Tests conducted with Jay, NE2Q, using his six-element mono-band Yagi at 100 feet, running the same output power, antenna pointing to Japan, show his received signal to be equal to mine with the Quagi. With Jay's mono-bander at 40 feet his signal is about one S-unit stronger. Jay's elevation above sea level is 750 feet compared to mine of 500 feet. No doubt ground reflection reinforcement of his signal at the 40 feet level is occurring here.

The on-the-air results of this hybrid antenna have been most rewarding from the very first contact. After completing the final positioning and tensioning of the ropes, it was almost time for the evening meal. I made my first CQ DX NW call hurriedly on an active 15 meter band where only Europe and South America were being heard. WB5LBJ/DU6 answered me from Iloilo in the Philippines for a new country!

A few evenings later I called again and the flood gates to Japan opened up. You'd think I was on Palmyra! It didn't stop for over two hours! Many JA's told me that they didn't know the band was open to W2 because they were not hearing East Coast signals at all!

Over the last several months I've spent about 60 hours using this antenna, and I've worked over 400 stations in Japan and over three dozen total in Indonesia, the Philippines, and Korea. Many of the rarer DX stations stop by to see who's under the pileup and drop their calls for me to answer. I've "stood by" to listen for stations outside of Japan who might be calling me and have been called by BV2FA, BY1QH, BY4SZ, many HL's, and others along the beam window. When polar propagation is really good, I've been called by rare stations outside the window such as 9N1MM and 8Q7AC. This antenna has been responsible for originating real pile-ups, and then I turn over the frequency to the DX and QSY to do it all over again. My signal reports have been running 5/7–5/9 from Japan, when conditions are good, about 2 to 2½ S-units greater than their signals are received here. The average JA station runs 100 watts output, and from 4 to 6 elements at 45 feet. My output power to the antenna is about 600 watts average.

Subsequent comparison reports with several other local stations running equivalent power to large mono-band Yagis at 50–75 feet show their signal to be equal to or weaker than the Quagi in signal strength in the JA direction—a good part of the time. The Quagi's stateside rejection when pointed to JA is markedly better than the competition on receive, though, and it has enabled me to have real QSOs of 30 to 45 minutes along the beam path. All this from a roll of #14 wire nylon rope and a basic two-element Quad at low height!

I will point out that it is not mandatory that ten directors be used. I used ten because I wished to maximize the available space, and many natural supports were also available to assist me. As few as two directors would show a worthwhile improvement over the Quad alone. Also, there is no reason why the 15 meter Quagi could not further be scaled up to 20 or even 40 meters.

The next phase of the experiment will be to place a wide mesh screen behind the Quad reflector to hopefully improve the F/B ratio.

I would be interested in hearing about your results with this configuration, but if your direction of choice is through the northeast corridor, there is no need to write to me. I'll know! See you on 15 . . . CQ DX NW beaming JA, HL, and BY.

I would like to thank all the stations too numerous to mention who assisted me by giving me data on their station's components and reports on the Quagi. Special thanks and appreciation are due Bob, N2DVQ, for his time, effort, and encouragement, without which the Quagi would still be on the ground.

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CIRCLE 75 ON READER SERVICE CARD

If you don't have the time this weekend to build a multiband state-of-the-art transceiver, then perhaps you can find the time to personalize your own station clock.

QSL The Time

BY PAUL M. DANZER*, N1II

Want to inject a little more life in the old ham club? Looking for a club project that is useful to Novices, Old Timers, 2 meter buffs, and DXers? The QSL clock may be just what you are looking for. Total assembly time is less than half an hour, and it makes an attractive item for display in your shack or on your desk.

The face of the clock is made of two pieces of plastic window "glass" cut by the local hardware store to 5½ by 5½ inches. A single 3½ by 4½ inch piece forms the base or stand.

The plastic may be pre-cut before the meeting, and the center hole pre-drilled. The actual clock works uses a shaft diameter of ⅝ of an inch. Drilling is simple if you don't hurry. Tape the two pieces of plastic together with transparent tape, and then draw lines connecting each opposite corner. Where the lines meet forms the exact center of the clock face.

Slowly, slowly, drill the center hole. Go too fast and you could cause the plastic to melt. This is easily cured, however, by cutting the extra melted plastic away with a sharp knife, but why bother? Just go slowly. A variable-speed drill press is nice, but a simple power drill with light pressure works just fine. The clock I suggest using has a threaded shaft about 1 1/16 inches long. Although the two pieces of plastic are less than 3/16 inch thick when sandwiched together, the longer shaft with two washers and two nuts allows you to space the clock hands as far away from or close to the clock face as you wish.

Assembly is straightforward as shown in the drawing. Place the QSL card in the middle of the two pieces of plastic, center it vertically, and tape the sandwich together. With an X-acto® knife or other sharp model-maker's knife cut through the QSL card in the center hole.

Place one nut on the clock shaft, then a flat washer and the rubber washer, and finally insert the clock shaft through the hole. Add one more washer, and secure with the final nut. Take off any remaining tape and you are ready to mark the position of the numbers.

Slide the hour and minute hands onto the shaft in that order. Set the clock to 12:00, and with a marking pen make a small dot at the end of the minute hand. Wind the minute hand one turn clockwise so the time now reads 1:00. Make a first dot at the end of the hour hand. Rotate the minute hand until it is over this dot and make a second dot at the end of the hour hand. This is where the numeral "1" is positioned.

*2 Dawn Road, Norwalk, CT 06851

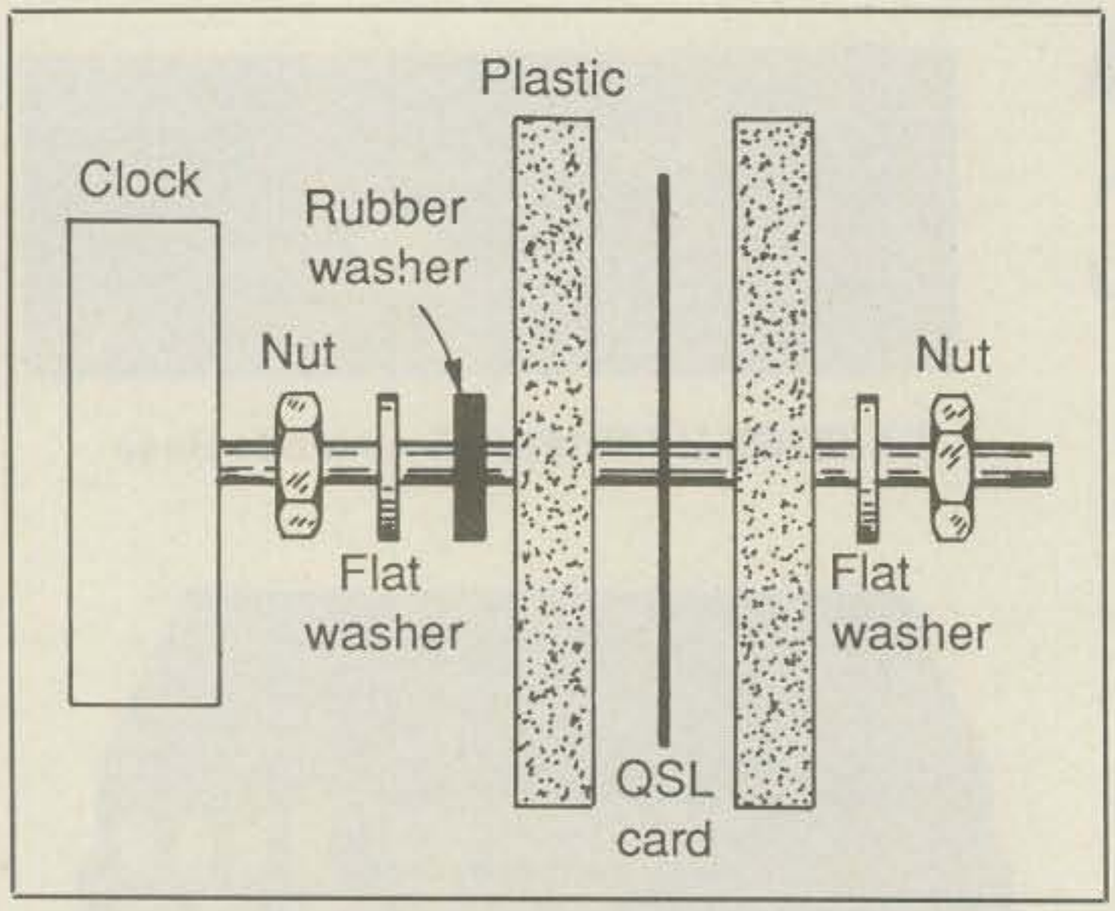
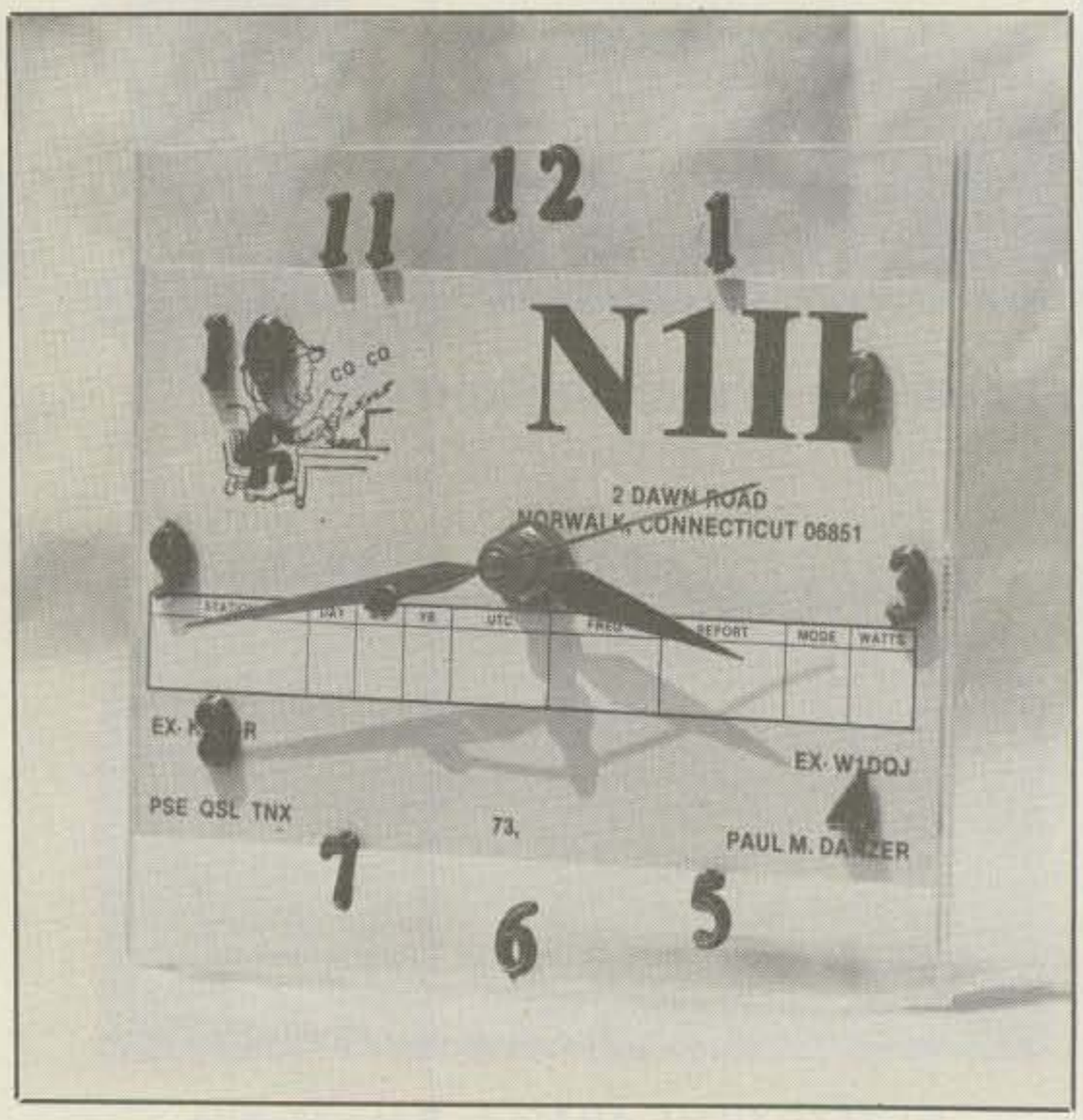


Fig. 1 - Basic mechanical assembly for the QSL clock.



The completed project can be proudly displayed in your shack.

Repeat for each successive number (2, 3, 4, . . . 11) and you will now have a set of dots corresponding to the end of the minute hand at each hour position on the clock face. I chose to place the center of each number exactly on that dot. You might like a slightly different style.

The numbers come as a set with press-on self-adhesive. For this size clock numbers ⅜ inch high seem to look just fine. The entire set of clock parts (clock, hands, and numbers) is available at many hobby shops and craft stores. I found my first clock at an outdoor rock show where the vendor was selling both clocks and sliced stone for the clock face.

Assembly is completed by placing three drops of "Super Glue" on the bottom edge of the clock face. Place this edge parallel to the 4½ inch edge of the remaining piece of plastic, and about ¼ inch back from the edge. Hold in place for 10 seconds, and you are finished. I strongly suggest practicing this last step without the Super Glue a few times. The insidious nature (and danger) of this glue cannot be overstressed.

The complete parts list includes the ordering information for the clock, hands, and numbers from a company located in New Jersey. They have a $25 minimum order, which is fine for a club project. I suggest getting their catalog ($3.00), which would allow you to vary the hand style, number size and pattern, and even use chimes if this is your taste in clocks.

A large number of variations are possible. I rather like the modern look of the clear plastic above and below the QSL card, but if you want, either white background paper or your club's logo could be inserted.

My thanks to Alvin Schub of Norwalk, Connecticut for his fine photography.

Parts List

From the hardware store: two pieces of replacement window plastic 5½ by 5½ inches, one additional piece 3½ by 4½ inches, tube of "Super Glue" or other instant glue.

Clock mechanism—runs on a single AA cell. Mounts with washer and nut (included). Model number for 11/16 inch long threaded shaft is A-11. Cost from source below is $4.50.

Additional clock parts (model numbers and cost are from the source below):

Set of ⅜ inch numbers, $.75.

Set of hands (minute hand approximately 2½ inches long; hour hand to match) model #3, cost $.50.

Second hand, model S-2, 1 13/16 inches long, cost $.50.

Extra nut, $.20.

Extra washer, $.20.

Mail-order source: Steebar Corp., P.O. Box 463, Andover, NJ 07821-0463 (201-383-1026). CQ

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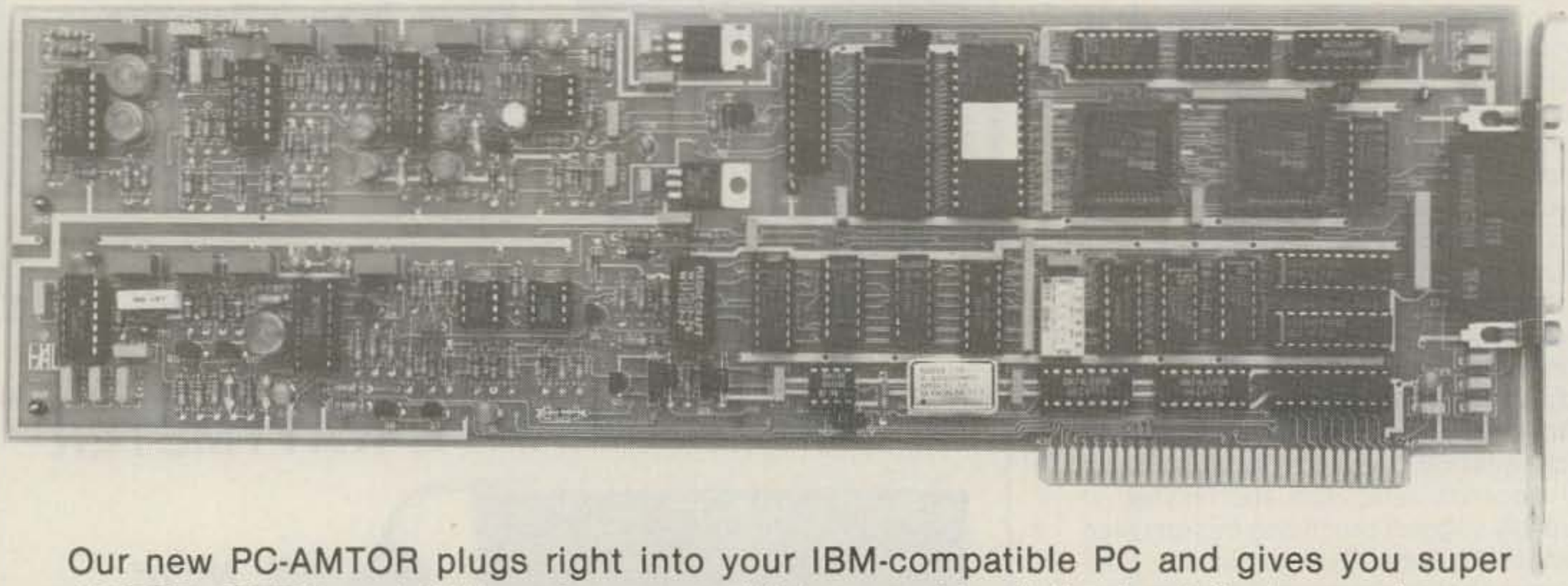

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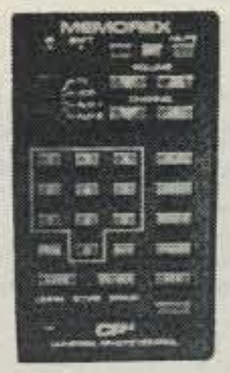

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CA-2X4SR	146 MHz 446 MHz	3.8dB 6.2dB	150W	3′4″	MOBILE
CX-901	146 MHz 446 MHz 1.2 GHz	3.0dB 6.0dB 8.4dB	150W	3′6″	BASE/REPEATER
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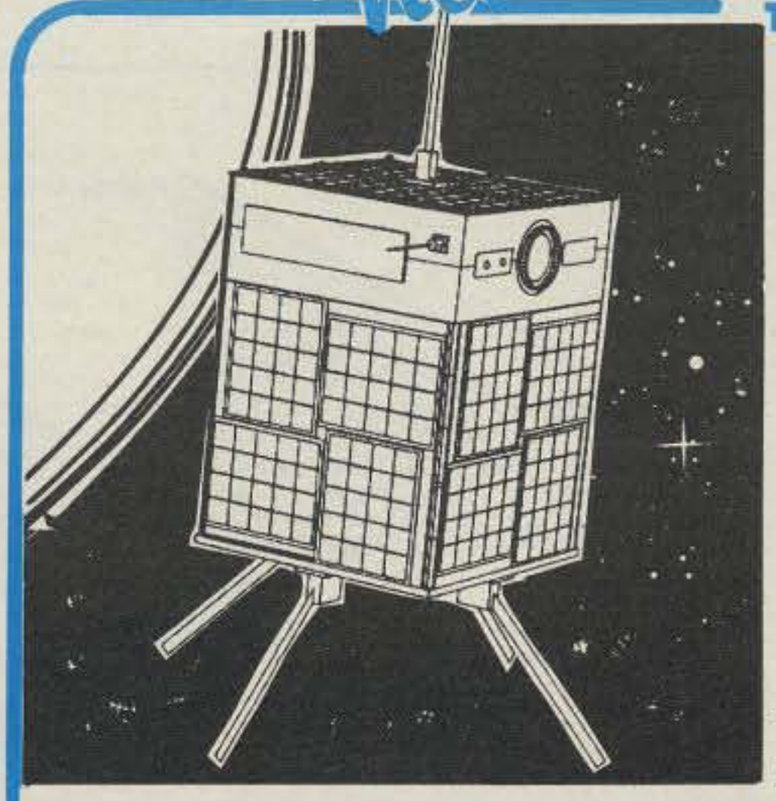

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Most amateurs could give the "Frugal Gourmet" a run for his money. KC3YB upholds our honor by presenting a really inexpensive way to build your own iambic key.

How To Build A Junk-Box Paddle Key

BY JOHN R. SOMERS*, KC3YB

I became an amateur too late to enjoy the heyday of homebrewing. I can easily remember the electronic parts distributors located in every town of any size and even worked in one of them. I received Lafayette Radio and Allied catalogs for years, often spending my hard-earned teenager's income on transistors, resistors, an occasional kit, and once a Hallicrafters shortwave receiver. But I wasn't licensed then. Now that I am, parts, when I can find them, come in blister packs and at a premium price. A few days ago I looked at an electrolytic capacitor that sold for $140. Homebrewing has become a thing of the past for the most part. In many cases appliance operators have no other choice; parts to build or repair equipment are simply not easily available.

Occasionally, though, a little ingenuity can be pressed into service when a specific part can't be found. I had always wanted an electronic keyer instead of the J-37 straight key with which I started hamming. There are a number of electronic keyer circuits using available parts (including the Curtis keyer chip), which convinced me to build my own. The only thing holding me back was that I didn't want to spend the better part of a C-note for an iambic key. (I have been accused of being somewhat tight with my money, but this is merely a vicious rumor.)

A Simple Idea

Once I had decided to build the key myself, I expended considerable effort digging through old magazines to see how others had done it. Nothing seemed to fill the bill. I didn't really know what I wanted, but I didn't want something I would be embarrassed to show somebody.

My approach to the problem was simple: I just considered the basic elements of a key and duplicated them using available parts. It was an easy task to decide on what I would use for the heart of the project. I had a scrap of 3/32" brazing rod in my shop. By holding one end tight, I found that the other would return to the center position if it was bent slightly and released. As brass is also a good conductor, I had simultaneously found both the spring and part of the electrical circuit. Brass nuts and bolts were the logical choice for the "dit" and "dah" contacts. By fastening the nuts in place, tightening the bolts would adjust the gap between the rod and the contacts.

At this point all I needed was something to hold everything in place. I decided on a barrier strip for this purpose primarily because I had one. Now all that

The completed key is housed in a metal cabinet with the keyer circuitry. Operating controls are on the rear.

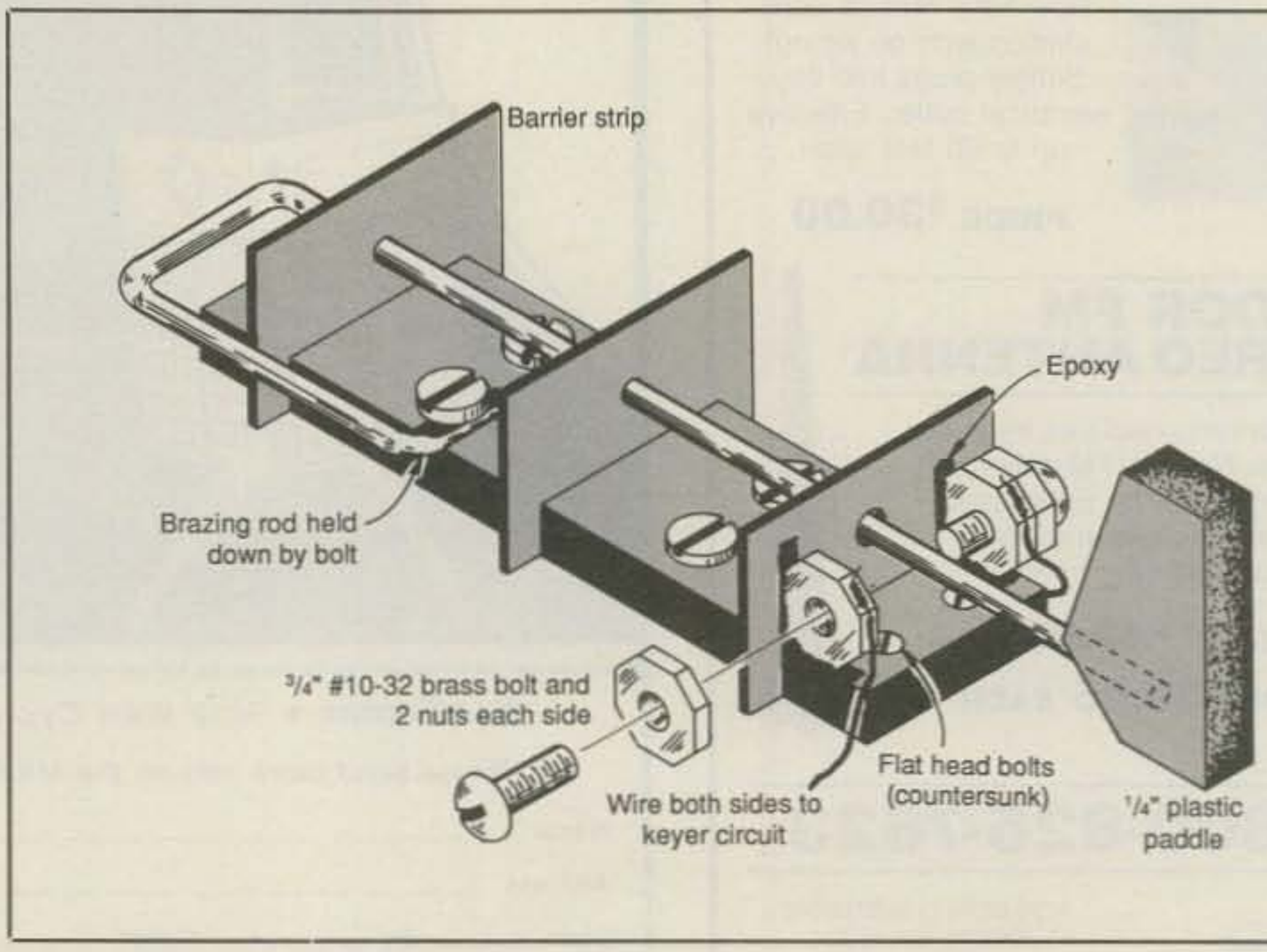

Fig. 1– Diagram of the junk-box paddle key showing construction details. Adjustment of the bolts gives micrometer precision in setting contact spacing.

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A husky 22 pound power transformer using a high silicone steel core, computer grade filter capacitors totaling 26 ufd, heavy duty bleeders and ten 3 amp, 1000 V power rectifiers give a stiff 2700 volts fully loaded.

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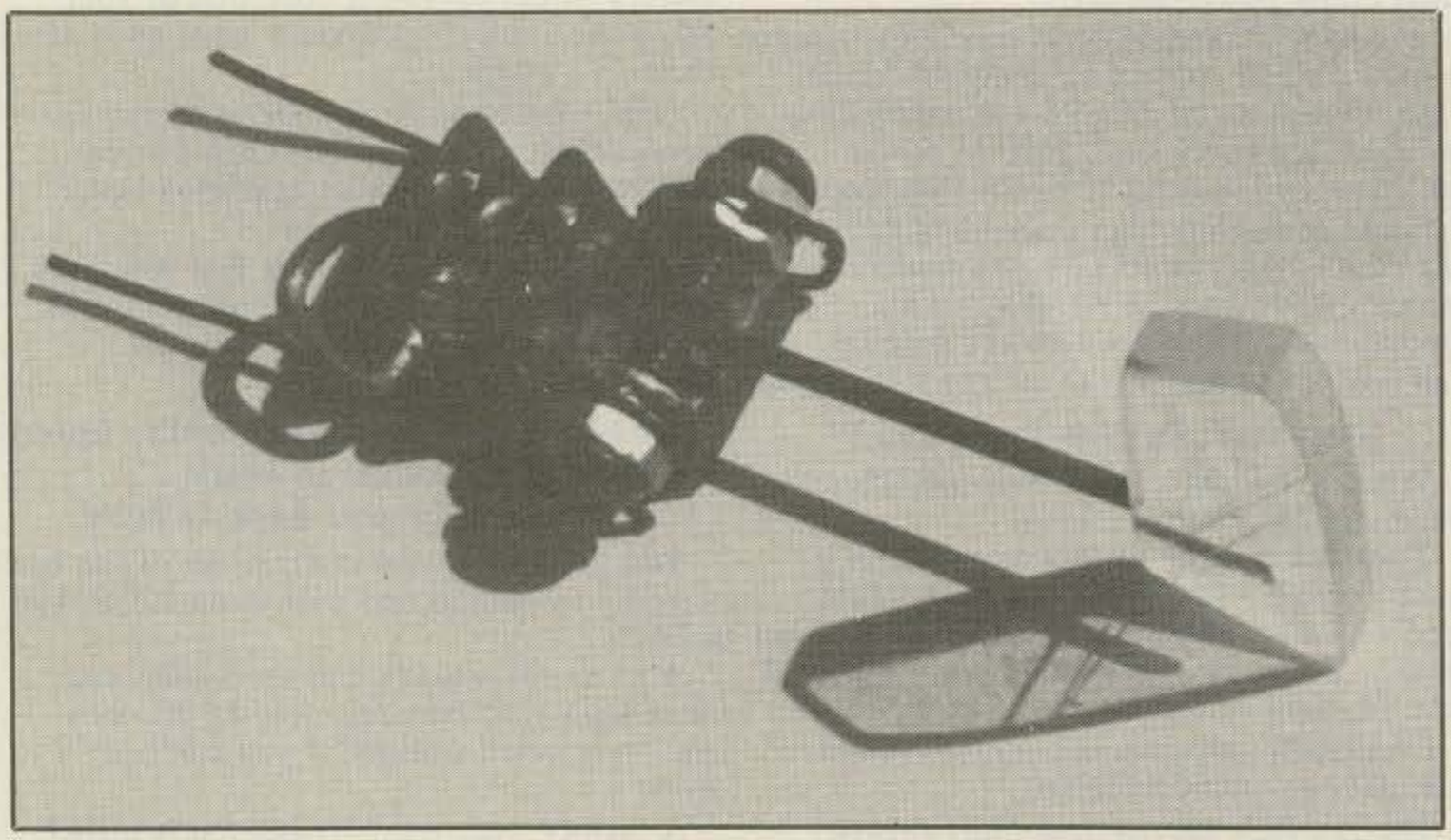

The heart of the key showing brass spring/center contact and adjustable dit and dah contacts.

remained was to assemble the device to see how it worked.

My plan was to mount two of the nuts, one on either side of one end of the barrier strip. I marked the center of the last partition at the same height as the hole in the nut and drilled straight through all of the partitions and out the back. For this I chose a drill bit the same size as the brass rod. I redrilled the first (front) hole slightly larger so that the rod would be held in place by two plastic partitions and able to move slightly at the third. Next I counterbored the two mounting holes in the front of the block and added two more small holes, one where each nut would be positioned. I decided to mount the nuts in place with epoxy. The purpose of the extra holes was to allow some of the epoxy to squirt through and help hold things together. Before mounting the nuts, I filed several of the flat sides on each nut, soldered a wire to each, and then positioned them in the epoxy spread on the barrier strip. This would allow the sides I filed to come in contact with it. The purpose in this was to give a better holding surface than was originally presented.

After clamping the assembly together I set it aside and waited for it to harden. As the Radio Shack barrier strip I chose comes two in a pack, I used this time to bend the brass rod into sort of a "P" shape. Ultimately, the straight section would go through the several holes and make contact with the ends of the bolts as it was moved. The tail end of the "P" would be held in place by one of the pan-head screws of the plastic block.

Finishing Up

At this point the heart of the paddle key is complete. I mounted mine in a small Radio Shack cabinet, which was big enough to contain the keyer circuit I had chosen to use, the battery, and everything. A grommet placed around the hole where the brass shaft protrudes, dry transfer letters, and a "power on" LED gave it a more professional appearance.

After practicing with the keyer, I decided how long the shaft should be and glued a piece of ¼ inch plexiglass to the end, making sure it was large enough to position my fingers properly.

On the Air

Having never used an electronic keyer before, I spent some time pacticing and adjusting the speed of the keyer circuit before actually trying it out. I have been very pleased with the action of the paddle key, and found that my sending speed jumped with no additional effort once I got the hang of things. Certainly the key didn't break the budget, and it gave me the opportunity to make something worthwhile out of commonplace materials.

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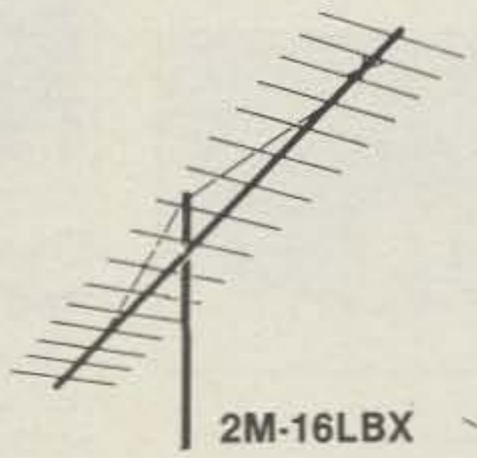
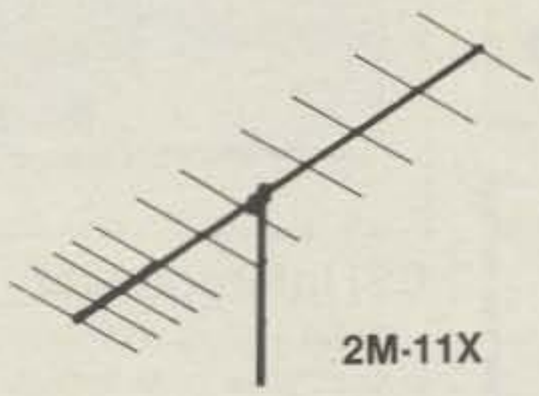
Windload.....2.44 sq. ft.
Turn Radius.....15 ft., 5 in.
Weight.....10 lbs.


2M-16LBX

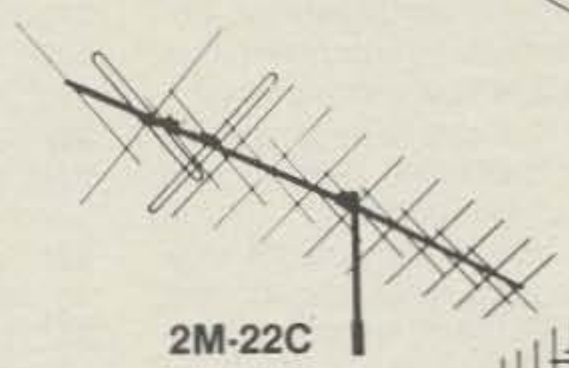
2M—11X

Bandwidth.....144-148 MHz
Gain.....12.5 dBd
VSWR.....1.2:1
F/B.....20 dB min.
Element Length...40⅝" max.
Boom Length.....15 ft., 4 in.
Windload.....1.38 sq. ft.
Turn Radius.....15 ft., 4 in.
Weight.....5.5 lbs.


2M-11X

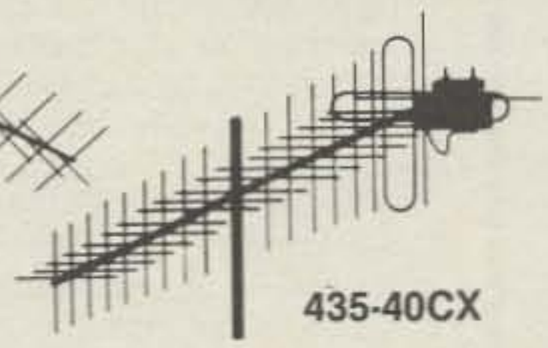
2M—22C

Bandwidth.....144-148 MHz
Gain.....13 dBc
VSWR.....better than 1.5:1
F/B.....20 dB min.
Element Length.....41" max.
Boom Length.....19 ft., 1 in.
Windload.....1.85 sq. ft.
Turn Radius.....13 ft.
Weight.....11 lbs.


2M-22C

435—40CX

Bandwidth.....410-450 MHz
Gain.....15.2 dBc
VSWR.....1.5:1
F/B.....20 dB min.
Element Length.13.625" max.
Boom Length.....175.5 in.
Windload.....1.16 sq. ft.
Turn Radius.....105 in.
Weight.....10 lbs.


435-40CX

Antenna gain figures used by MIRAGE/klm are measured according to the National Bureau of Standards. These figures are actual gain listed in dB at free space measured over a dipole. Some manufacturers do not choose to use this standard and therefore indicate gain figures that appear to be higher.

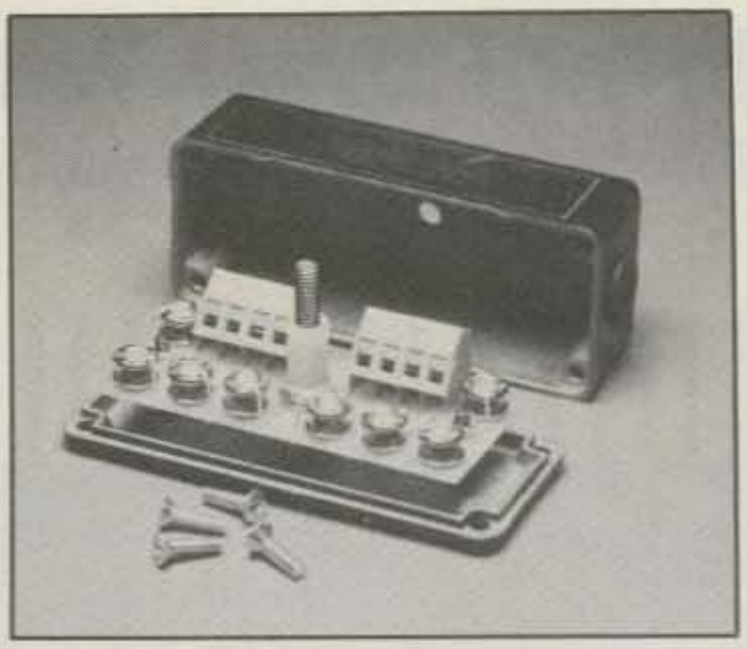
To order, contact your local dealer, or call us direct.

MIRAGE/KLM

P.O. Box 1000 Morgan Hill, CA 95037
(408) 779-7363 (800) 538-2140 (outside CA)

CIRCLE 68 ON READER SERVICE CARD

CQ SHOWCASE



Alpha Delta Model CLP Surge Protector

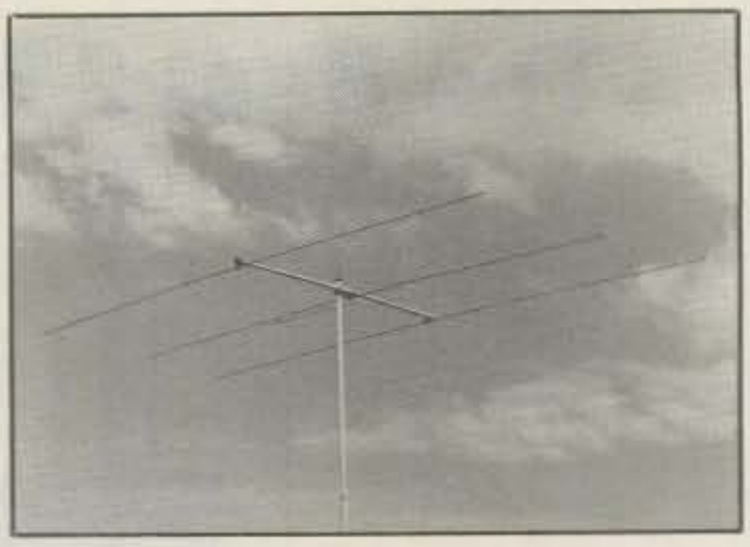
The Alpha Delta CLP protects your communications equipment against destructive lightning-induced surge voltages that occur on the control lines to your rotor control and remote antenna switch boxes. Straightforward installation, no soldering. The CLP protects up to eight AWG wire control line cables, and covers the most commonly used rotor and remote switch models. It requires no modification to control boxes. It utilizes eight NEMP-rated high-surge current field-replaceable gas-tube Arc-Plug cartridges. Each line is individually protected. The CLP is equally effective for modem/phone line protection.

Model CLP control line transi-trap protector sells for $49.95 (plus $3.00 shipping and handling). For more information contact Alpha Delta Communications, P.O. Box 571, Centerville (Dayton), OH 45459, or circle number 101 on the reader service card.

CSI Interconnect

The Model CS-700 by Connect Systems, Inc. is a simplex base-station interconnect that provides user-selectable VOX enhanced sampling (sampling rate reduced while land party is speaking) or VOX controlled sampling (no sampling while land party is speaking). The latter mode is similar to using a straight VOX patch. The CS-700 is a low-cost interconnect which includes high-end features such as autodialing, redial, fully regenerated DTMF (or pulse) dialing, automatic busy/dialtone disconnect, user-programmable CW ID, etc. A built-in key board and digital display make all features and modes user-selectable/programmable. Only three quick connections are made to the base-station radio. The automatic set-up feature quickly sets the optimum sampling width for the radio being used.

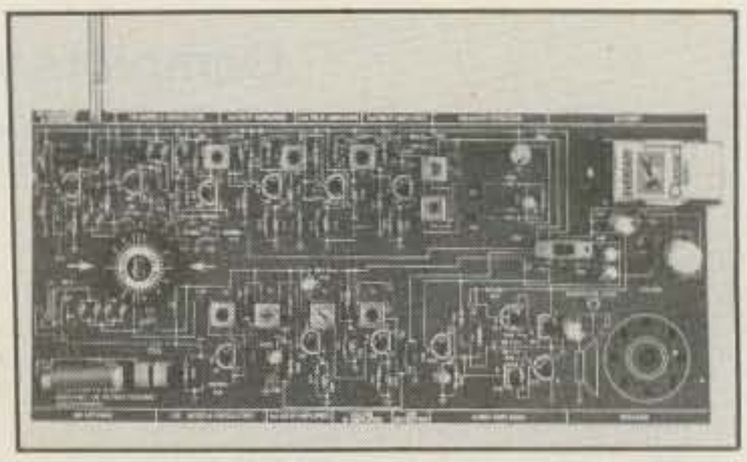
For more information, contact Connect Systems, Inc., 2064 Eastman Avenue #113, Ventura, CA 93003, or circle number 107 on the reader service card.



Cushcraft Ten-3 Ten Meter Yagi

The Cushcraft Ten-3 is a three-element Yagi that offers 8 dB forward gain at an affordable price. The beam also offers a front-to-back ratio of 25 dB. The Ten-3 has an 8 foot boom and takes a mast size of 1.5 to 2.0 inches, making it easy to install on a simple mount with only a light rotator. The reddi match system provides 50 ohm feed for a standard PL259 connector. The antenna is power rated for 2000 watts PEP. Assembly is quick and easy, maker says. All tubing is heavy-wall, hard-drawn, bright-finish aluminum.

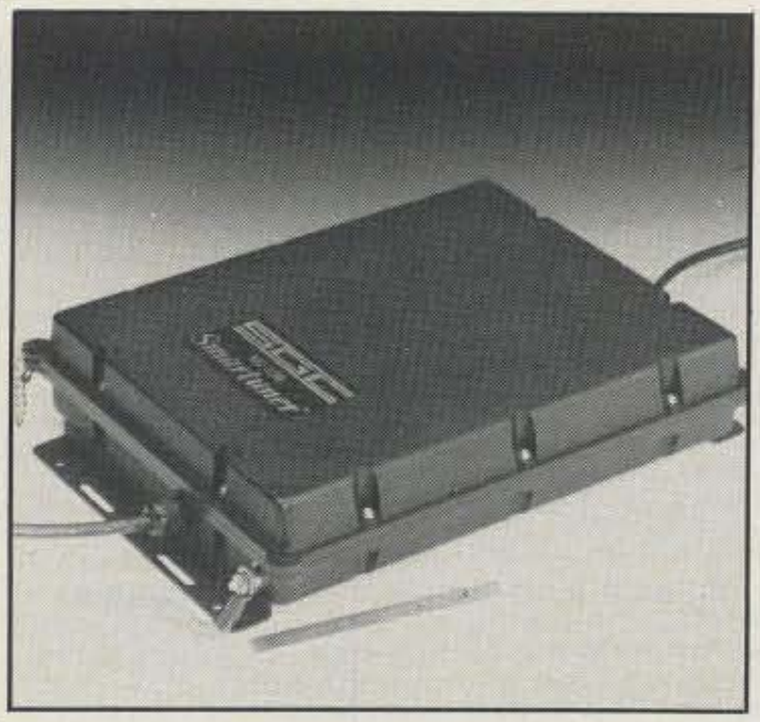
For more information, contact Cushcraft Corp., P.O.Box 4680, 48 Perimeter Road, Manchester, NH 03108, or circle number 102 on the reader service card.



Elenco Electronics Radio Kit/Training Course

The AM-FM-108 Transistor Radio Kit is an educationally oriented radio kit designed to expand understanding of basic radio theory. It is capable of receiving both AM and FM. The circuits are laid out in systematic order on an oversized PC board so that the student can easily understand the flow of the radio signals from antenna to speaker. Construction begins with the building of the AM radio, static testing each circuit and then dynamic testing with voltage and signals. Upon completion of the AM radio section, the student constructs and tests the FM radio circuit. Alignment procedures complete the construction of the projects. No cabinet is necessary. A special bracket provides the necessary support to use the radio in any location.

A manual providing theory, construction, testing, and alignment is included, along with a "magic wand" that assists in the alignment of RF circuits. Earphone and battery are included. List price is $29.95. For more information, contact Elenco Electronics, Inc., 150 W. Carpenter Ave., Wheeling, IL 60090, or circle number 103 on the reader service card.



SGC Antenna Coupler

SGC, Inc. has introduced the SG-230 microprocessor controlled antenna coupler housed in a waterproof case. The SG-230 will work with any marine, aviation, or amateur single sideband transceiver. The SG-230 antenna coupler (trade name Smartuner) will tune any length antenna from 23 to 80 ft. in the 1.8 to 30 MHz HF bands and 8 to 80 ft. in the 3.5 to 30 MHz bands. Input power levels are 10 to 150 watts PEP. The Smartuner is fully automatic and requires only RF from a transceiver and a 12 volt line for the intelligent switch CPU. Tuning time is 2–3 seconds for any new frequency; once tuned, the Smartuner will "remember" the frequency and tuning values and will re-select these values in less than 10 ms.

The SG-230 is housed in a molded black waterproof case. Price of the SG-230 is $525.00. For more information, contact SGC, Inc., SGC Building, 13737 S.E. 26th St., Bellevue, WA 98005 or circle number 106 on the reader service card.

AEA AT-3000 3 KW Antenna Tuner

AEA's AT-3000 incorporates the same features of the AT-300 300-watt antenna tuner, but in a high-powered package. It features 3,000 watts continuous duty cycle; front-panel switch to select two unbalanced (coax-fed) antennas, a dummy load, or a balanced antenna; peak- and average-reading cross-needle meter which shows forward power, reflected power, and SWR; high, medium, and low power selectable from front panel; 20-tap inductor with patent-pending CAM switch design for accurate tuning; two-coil design which provides harmonic reduction and maximum power transfer for a wider range of impedance matches.

For more information on the AT-3000, contact Advanced Electronic Applications (AEA), 2006 196th St. SW, Lynwood, WA 98036, or circle number 104 on the reader service card.

uniden®

$12,000,000 Scanner Sale

Uniden Corporation of America has purchased the consumer products line of Regency Electronics Inc. for $12,000,000. To celebrate this purchase, we're having our largest scanner sale in history! Use the coupon in this ad for big savings. Hurry...offer ends March 31, 1990.

★★★ MONEY SAVING COUPON ★★★

COUPON COUPON

Get special savings on the scanners listed in this coupon. This coupon must be included with your prepaid order. Credit cards, personal checks and quantity discounts are excluded from this offer. Offer valid only on prepaid orders mailed directly to Communications Electronics Inc., P.O. Box 1045 – Dept. UNI3, Ann Arbor, Michigan 48106-1045 U.S.A. Coupon expires March 31, 1990. Coupon may not be used in conjunction with any other offer from CEI. Coupon may be photocopied. Add $12.00 for shipping in the continental U.S.A.

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Regency R1600-T.....$239.95
Regency R1099-T.....$99.95
Regency RH606B-T.....$419.95
Regency RH256B-T.....$294.95
Bearcat 200XLT-T2.....$229.95
Bearcat 100XLT-T $184.95
Bearcat 800XLT-T2.....$229.95
Uniden HR2510-T $229.95
Uniden HR2600-T $274.95
Uniden PRO500D-T2.....$29.95

★★★★ VALUABLE COUPON ★★★★

Bearcat® 760XLT-T

List price $499.95/**CE price $244.95/SPECIAL**
12-Band, 100 Channel • Crystalless • AC/DC
Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.
The *Bearcat* 760XLT has 100 programmable channels organized as five channel banks for easy use, and 12 bands of coverage including the 800 MHz. band. The *Bearcat* 760XLT mounts neatly under the dash and connects directly to fuse block or battery. The unit also has an AC adaptor, flip down stand and telescopic antenna for desk top use. 6-5/16" W x 1⅝" H x 7⅜" D. Model **BC 590XLT-T** is a similar version without the 800 MHz. band for only $194.95. Order your scanner from CEI today.

NEW! Regency® Products

R4030-T *Regency* 200 ch. handheld scanner $254.95
R4020-T *Regency* 100 ch. handheld scanner $189.95
R4010-T *Regency* 10 channel handheld scanner...$114.95
R1600-T *Regency* 100 channel mobile scanner ...$244.95
P200-T *Regency* 40 channel CB Mobile $38.95
P210-T *Regency* 40 channel CB Mobile $56.95
P220-T *Regency* 40 channel CB Mobile $79.95
P300-T *Regency* 40 channel SSB CB Mobile.....$137.95
P400-T *Regency* 40 channel SSB CB Base.....$174.95
PR110-T *Regency* "Passport" size radar detector ...$114.95
PR120-T *Regency* "micro" size radar detector.....$144.95
MP5100XL-T *Regency* 40 Ch. marine transceiver...$139.95
MP5510XL-T *Regency* 60 Ch. marine transceiver...$159.95
MP6000XL-T *Regency* 60 Ch. marine transceiver...$209.95
MP2000XL-T *Regency* handheld marine trans.....$189.95

Regency® RH256B-T

List price $799.95/**CE price $299.95/SPECIAL**
16 Channel • 25 Watt Transceiver • Priority
The *Regency* RH256B is a sixteen-channel VHF land mobile transceiver designed to cover any frequency between 150 to 162 MHz. Since this radio is synthesized, no expensive crystals are needed to store up to 16 frequencies without battery backup. All radios come with CTCSS tone and scanning capabilities. A monitor and night/day switch is also standard. This transceiver even has a priority function. The RH256 makes an ideal radio for any police or fire department volunteer because of its low cost and high performance. A *60 Watt* VHF 150-162 MHz. version called the **RH606B-T** is available for $429.95. A UHF 15 watt, 16 channel version of this radio called the **RU156B-T** is also available and covers 450-482 MHz. but the cost is $454.95.

★★★ Uniden CB Radios ★★★

The *Uniden* line of Citizens Band Radio transceivers is styled to compliment other mobile audio equipment. Uniden CB radios are so reliable that they have a two year limited warranty. From the feature packed PRO 810E to the 310E handheld, there is no better Citizens Band radio on the market today.

PRO310E-T *Uniden* 40 Ch. Portable/Mobile CB...$83.95
PRO330E-T *Uniden* 40 Ch. Remote mount CB...$104.95
PRO500D-T *Uniden* 40 Channel CB Mobile $38.95
KARATE-T *Uniden* 40 channel rescue radio $53.95
GRANT-T *Uniden* 40 channel SSB CB mobile....$166.95
MADISON-T *Uniden* 40 channel SSB CB base...$244.95
PC122-T *Uniden* 40 channel SSB CB mobile.....$119.95
PRO510XL-T *Uniden* 40 channel CB Mobile.....$38.95
PRO520XL-T *Uniden* 40 channel CB Mobile.....$56.95
PRO530XL-T *Uniden* 40 channel CB Mobile.....$79.95
PRO540E-T *Uniden* 40 channel CB Mobile.....$97.95
PRO640E-T *Uniden* 40 channel SSB CB Mobile...$137.95
PRO710E-T *Uniden* 40 channel CB Base $119.95
PRO810E-T *Uniden* 40 channel SSB CB Base...$174.95

★★★ Uniden Radar Detectors ★★★

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RD25-T *Uniden* visor mount radar detector.....$54.95
RD500-T Uniden visor mount radar detector.....$74.95

Bearcat® 200XLT-T2

List price $509.95/**CE price $239.95/SPECIAL**
12-Band, 200 Channel • 800 MHz. Handheld
Search • Limit • Hold • Priority • Lockout
Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.
The *Bearcat* 200XLT sets a new standard for handheld scanners in performance and dependability. This full featured unit has 200 programmable channels with 10 scanning banks and 12 band coverage. If you want a very similar model without the 800 MHz. band and 100 channels, order the **BC 100XLT-T** for only $189.95. Includes antenna, carrying case with belt loop, ni-cad battery pack, AC adapter and earphone. Order your scanner now.

Bearcat® 800XLT-T2

List price $549.95/**CE price $239.95/SPECIAL**
12-Band, 40 Channel • No-crystal scanner
Priority control • Search/Scan • AC/DC
Bands: 29-54, 118-174, 406-512, 806-912 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.
The Uniden 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9¼" x 4½" x 12½." If you do not need the 800 MHz. band, a similar model called the **BC 210XLT-T** is available for $178.95.

Bearcat® 145XL-T

List price $189.95/**CE price $94.95/SPECIAL**
10-Band, 16 Channel • No-crystal scanner
Priority control • Weather search • AC/DC
Bands: 29-54, 136-174, 406-512 MHz.
The *Bearcat* 145XL is a 16 channel, programmable scanner covering ten frequency bands. The unit features a built-in delay function that adds a three second delay on all channels to prevent missed transmissions. A mobile version called the **BC560XLT-T** featuring priority, weather search, channel lockout and more is available for $94.95. CEI's package price includes mobile mounting bracket and mobile power cord.

President® HR2510-T

List price $499.95/**CE price $239.95/SPECIAL**
10 Meter Mobile Transceiver • Digital VFO
Full Band Coverage • All-Mode Operation
Backlit liquid crystal display • Auto Squelch
RIT • Preprogrammed 10 KHz. Channels
Frequency Coverage: 28.0000 MHz. to 29.6999 MHz.
The *President* HR2510 Mobile 10 Meter Transceiver made by Uniden, has everything you need for amateur radio communications. Up to 25 Watt PEP USB/LSB and 25 Watt CW mode. Noise Blanker. PA mode. Digital VFO. Built-in S/RF/MOD/SWR meter. Channel switch on the microphone, and much more! The HR2510 lets you operate AM, FM, USB, LSB or CW. The digitally synthesized frequency control gives you maximum stability and you may choose either pre-programmed 10 KHz. channel steps, or use the built-in VFO for steps down to 100 Hz. There's also RIT (Receiver Incremental Tuning) to give you perfectly tuned signals. With receive scanning, you can scan 50 channels in any one of four band segments to find out where the action is. Order your HR2510 from CEI today.

NEW! President® HR2600-T

List price $599.95/**CE price $299.95/SPECIAL**
10 Meter Mobile Transceiver • New Features
The new *President* HR2600 Mobile 10 Meter Transceiver is similar to the *Uniden* HR2510 but now has repeater offsets (100 KHz.) and CTCSS encode.

BC760XLT
800 MHz. mobile scanner SPECIAL!

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If you purchase a scanner, CB, radar detector or cordless phone from any store in the U.S. or Canada within the last 30 days, you can get up to three years of extended service contract from Warrantech. This service extension plan begins *after* the manufacturer's warranty expires. Warrantech will perform all necessary labor and will not charge for return shipping. Extended service contracts are not refundable and apply only to the original purchaser. A two year extended contract on a mobile or base scanner is $29.99 and three years is $39.99. For handheld scanners, 2 years is $59.99 and 3 years is $79.99. For radar detectors, two years is $29.99. For CB radios, 2 years is $39.99. For cordless phones, 3 years is $34.99. Order your extended service contract today.

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RFD5-T N.W & Northern Plains Frequency Dir.....$14.95
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A1300-T 25 MHz–1.3 GHz Discone antenna.....$109.95
USAMM-T Mag mount VHF ant. w/ 12' cable $39.95
USAK-T ¾" hole mount VHF ant. w/ 17' cable $35.95
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	Circ. Pol. Harness	20.00
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	70-MBM88	135.00
900 MHz	DY20-900	94.00
1268 MHz	1268-LY	65.00
1296 MHz	1296-LY	65.00
1691 MHz	1691-LY	75.00

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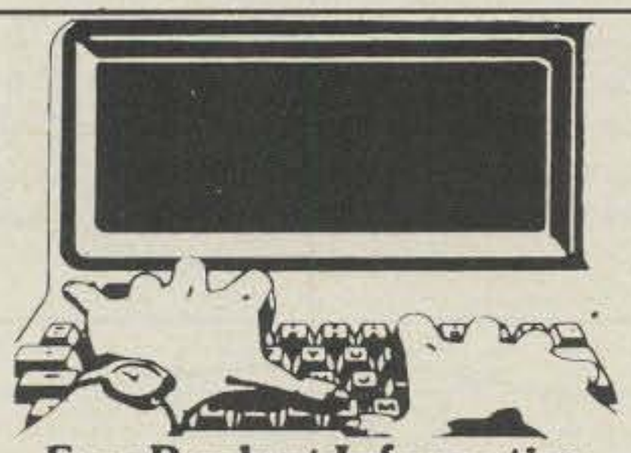

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PL258AM Amphenol female-female (barrel)	1.65
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UG21DS N plug for RG8,213,214 Silver	3.35
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UG146A SO239 to N plug adapter, teflon	6.50
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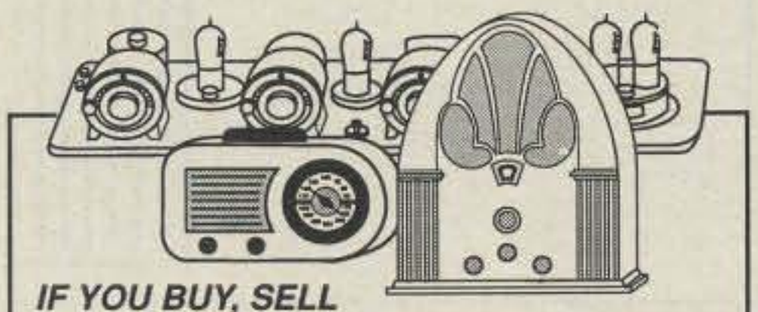

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Last year's Hurricane Hugo, the California earthquake, and smaller local incidents made most of us aware of the importance of emergency communications. Not all of us have access to a generator or the room to store one, but there is a lot that can be done with batteries. W5PFG presents a primer on Gel Cell batteries, how they work, and how to put them to work.

Briefly Speaking: Gel Cell Batteries

BY W. MAX ADAMS*, W5PFG

Gel Cell batteries are so named because of their manner of construction, which includes a jelly-like electrolyte. The electrochemistry of a Gel Cell is essentially the same as that of traditional "flooded" lead acid cells, and they provide many useful "portable source power" features for operation of electronic equipment. These features include fully sealed cell design, high discharge rates, fast and float charge capability, repetitive deep-cycle discharge, and exceptional low-temperature performance. Gel Cell batteries provide 2.0 volts (nominal) per cell; the physical size of cell "plates" determines its stored energy capacity, which is rated in dischargeable ampere hours (AH).

Briefly speaking, when discussing battery charge/discharge, it is very helpful to know the meaning of several convenient "buzzwords," such as:

Primary Cell—An electrochemical energy device which is discharged once and is then discarded.

Secondary Cell—A reversible (charge and discharge) reusable electrochemical energy device.

Amp Hour (AH)—Current in amperes multiplied by time in hours.

Capacity (C)—Ampere hours, specified by the manufacturer, available from a cell or battery.

Constant Current Charge—A method of cell charging by applying a nonvarying current to a cell or battery.

Constant Voltage Charge—A method of cell charging by applying a nonvarying voltage to a cell or battery.

Float Charge—Application of a constant voltage to maintain full cell or battery capacity.

Overcharge—Excess charge put into a cell or battery beyond that needed for full charge.

Trickle Charge—Application of a constant current to maintain full cell or battery capacity.

Cell Reversal—Cell polarity reversal caused by excessive discharge.

Cell End-of-Life—80 percent of cell rated capacity.

Cycle—A charge plus a discharge.

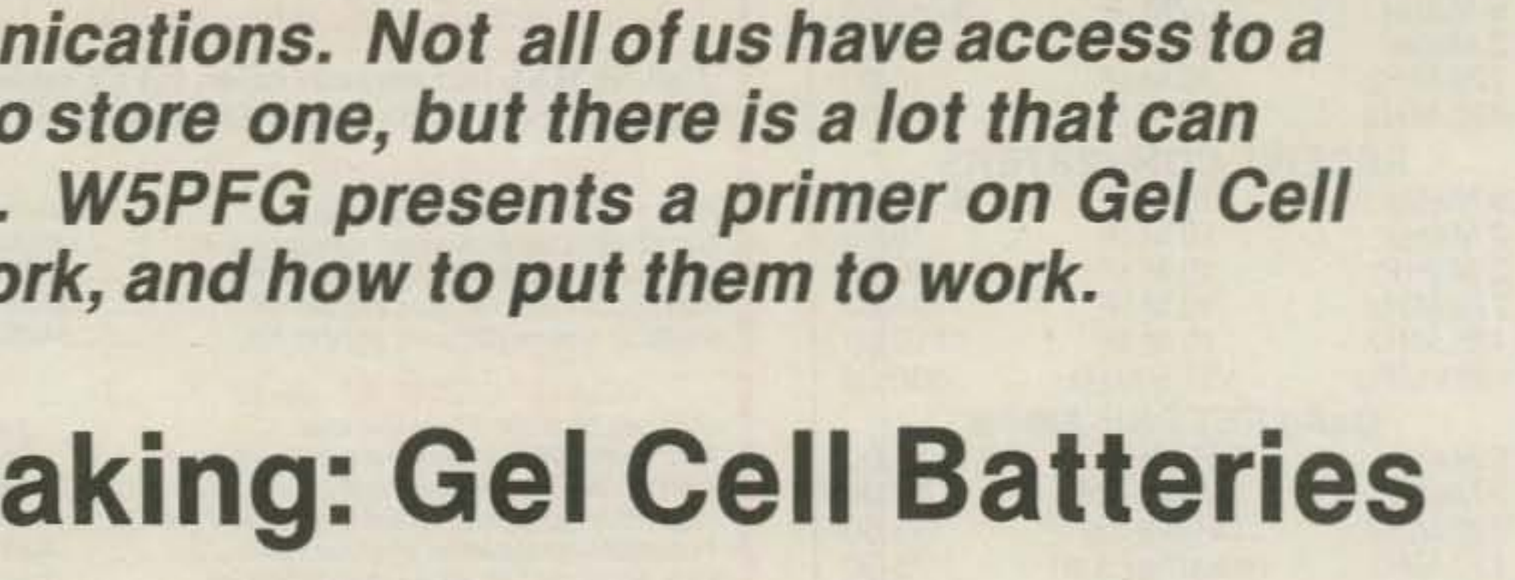

Fig. 1 - Gel Cell construction features (typical).

Gel Cell Construction

Basic Gel Cell elements are formed of two very thin pure lead grids coated with lead oxides and separated by an absorbent, fiberglass mat (see fig. 1). The lead grids, commonly known as plates, and their separator material are spirally wound to form a laminated, high-density cylinder. A lead post is welded to each

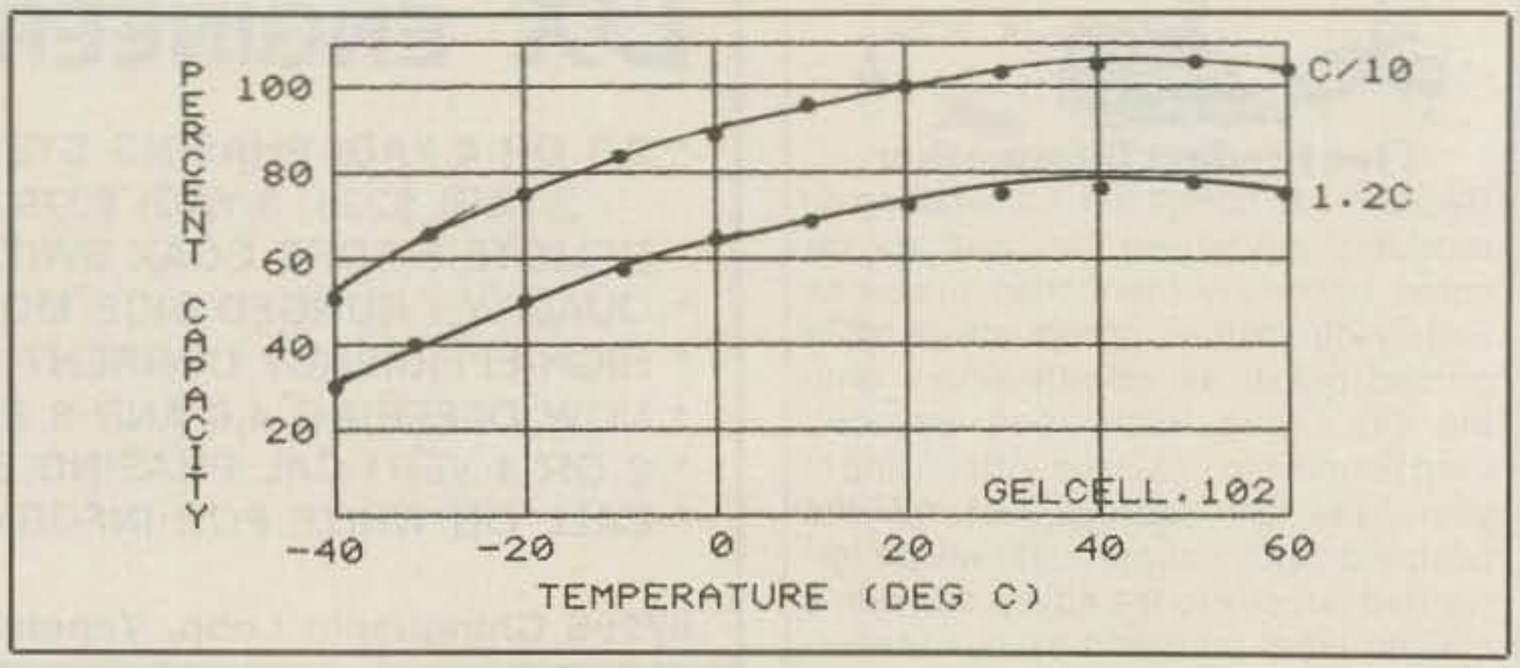

Fig. 2- Gel Cell temperature capacity relationship.

*P.O. Box 504, Fairfield, TX 75840

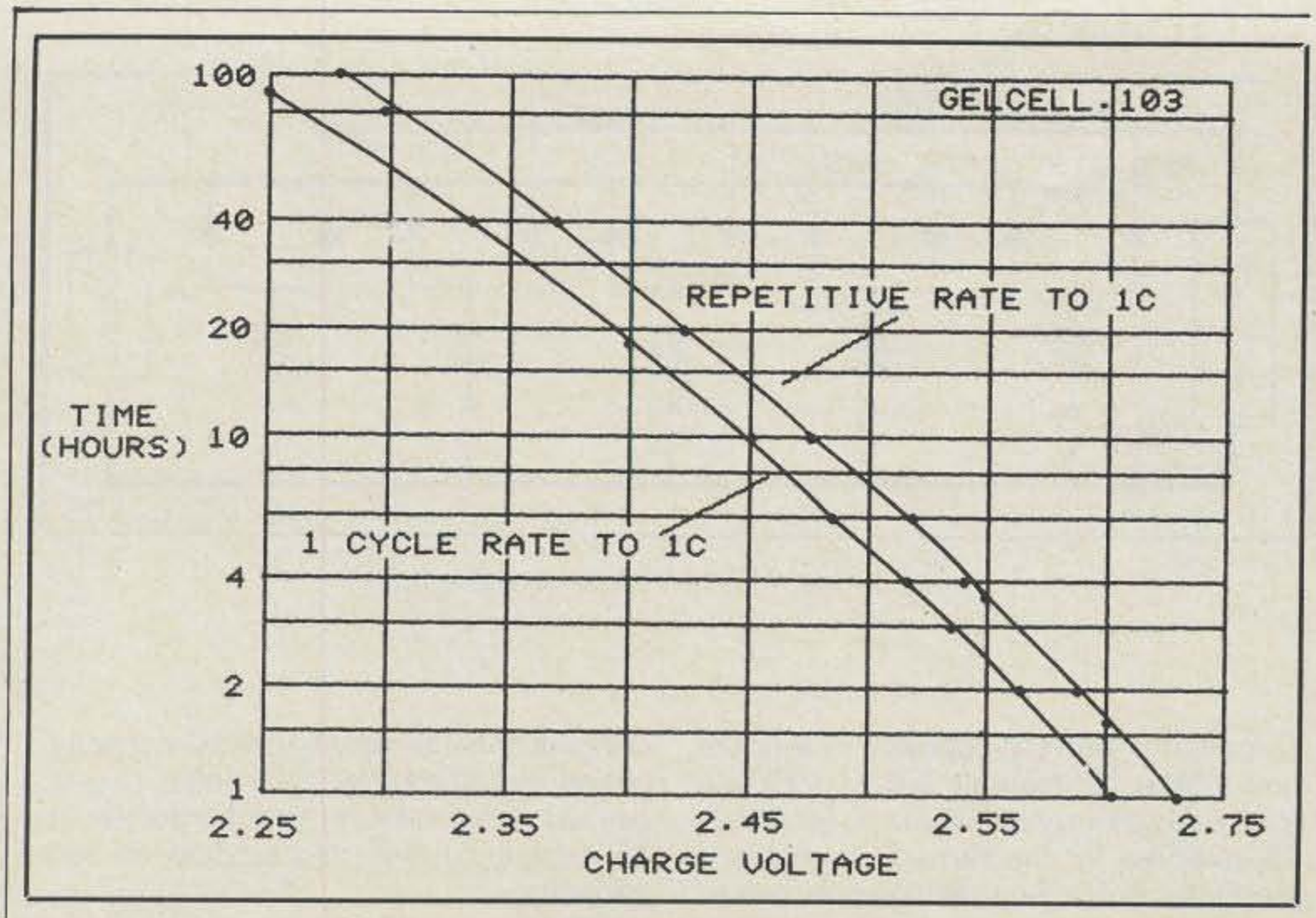

Fig. 3- Constant-voltage charging time/voltage relationship.

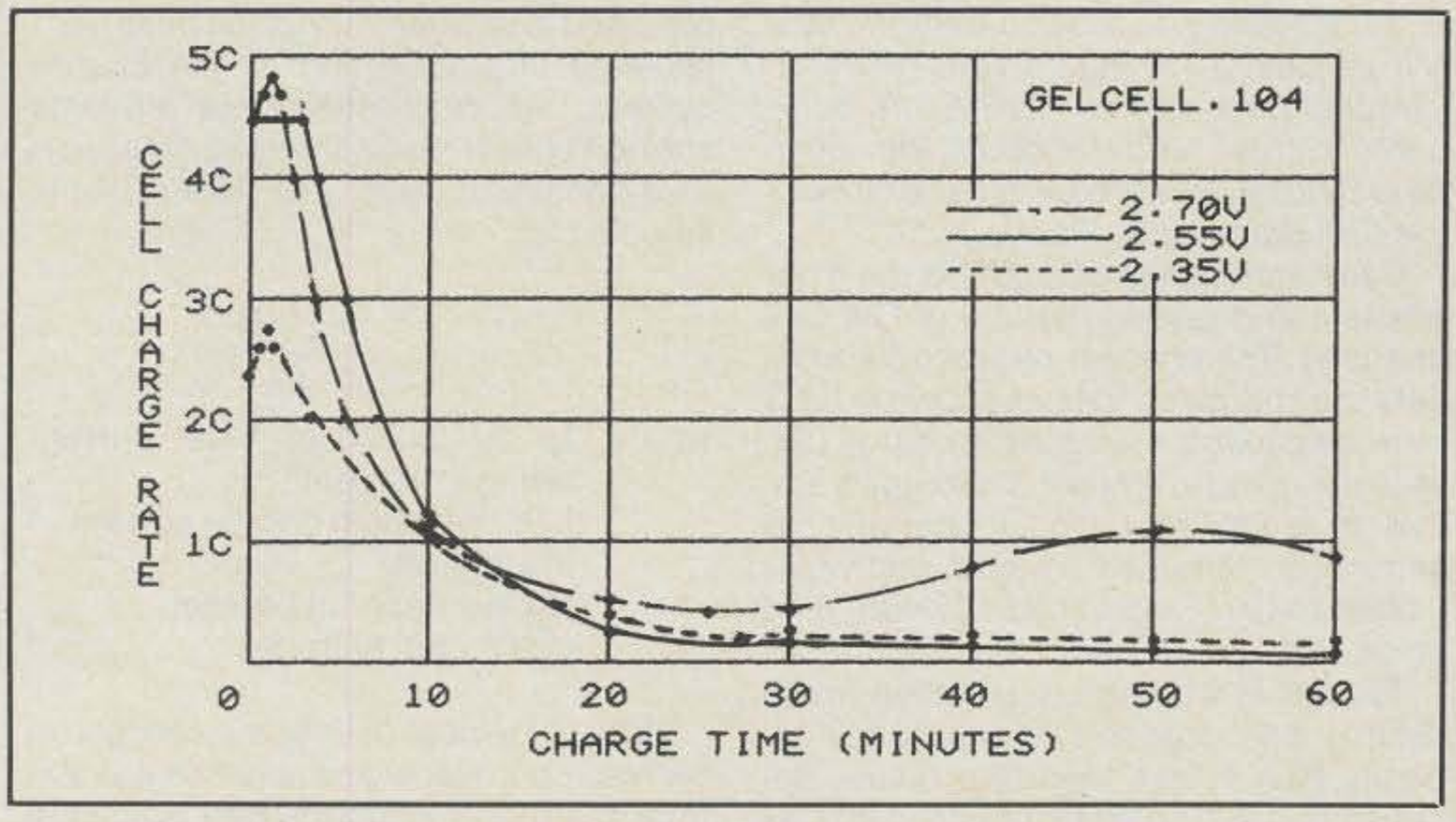

Fig. 4- Cell fast charge rate conditions (typical).

plate, which in turn is connected to a stronger metal terminal. The cell assembly is installed in a polypropylene insulating liner, and covered with an inner/outer cap assembly which contains an automatically resealable, pressure-relief valve. The entire cell assembly is contained in a crimp-sealed metal can and partially filled with a water-dilute sulfuric acid electrolyte. Only enough electrolyte is added to coat the plates, thereby creating a "starved electrolyte" condition necessary for chemical (gaseous) recombination reactions. When compared to flooded lead acid cells, Gel Cells are essentially "dry"; Gel Cells can be charged, discharged, and stored in any position.

The objective of electrochemical cell charging is to force current through the assembly in the direction opposite that of discharge. Proper balancing of electrode material and pressure-vent-valve design serve to prevent water loss, particularly during overcharge. Cell design is such that the positive plate will become fully charged and commence producing oxygen before the negative plate is completely charged. During overcharge, excess oxygen recombines with the negative plate, thereby preventing its escape via the vent valve to atmosphere. However, because of misapplication or abuse, excessive (40-60 PSI) gases are vented to atmosphere by automatic operation of the pressure-relief valve.

Battery charge/discharge characteristics are best expressed as multiples or fractional parts of full charge capacity (**C**).

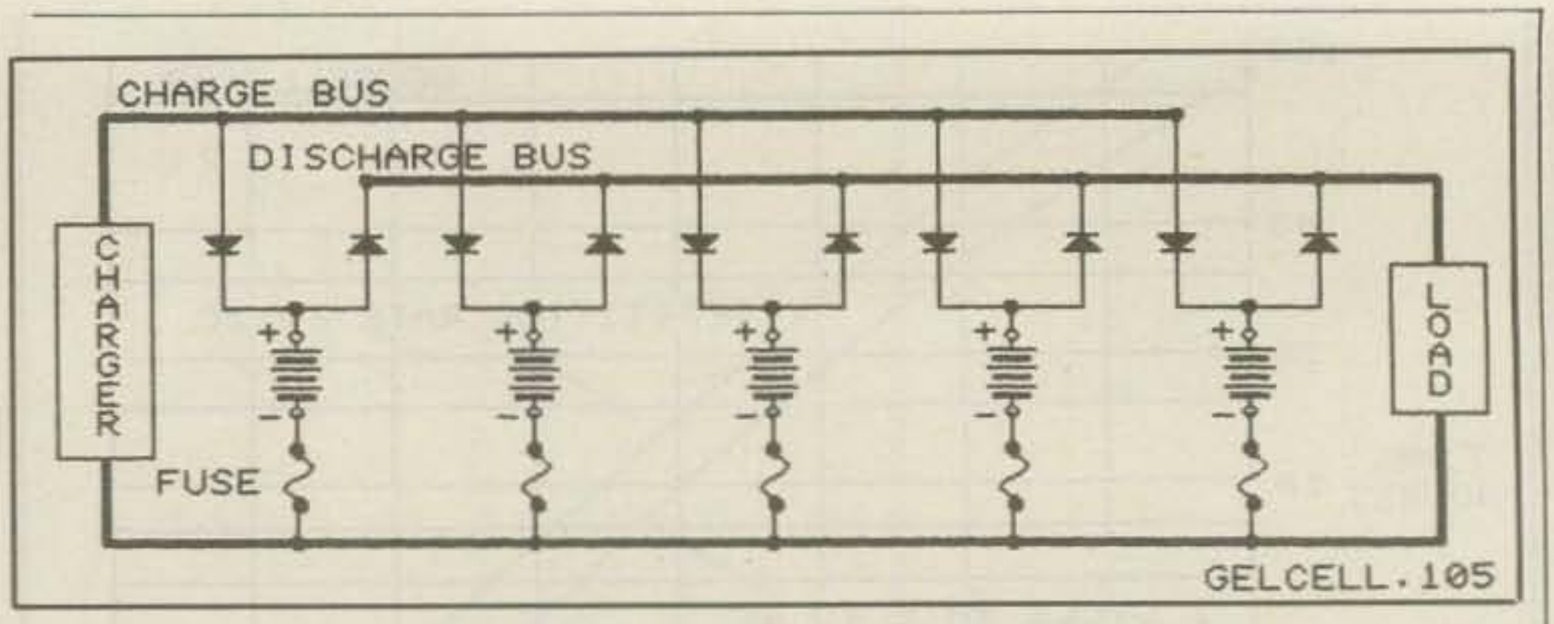

Fig. 5- Multi-battery parallel operation.

C indicates battery capacity in ampere hours (**AH**); for example, a C/5 (1/5C) rate for a 5 AH battery is 500 ma. A 3C rate is 15 amperes for the same 5 AH battery. Gel Cells' battery capacity *increases* as temperature *increases* and also *increases* as discharge rate *decreases*, with the effects shown in fig. 2. Since most applications are at or near room temperature, in the following discussion battery rates will consider a 73°F (23°C) environment. *(Graphic data and text reference courtesy of Gates Energy Products, Inc., Business Battery Department of General Electric Co., Gainesville, Florida.)*

Constant-voltage charging is the most efficient and fastest method of Gel Cell charging. The charger required to duplicate the charge conditions shown in fig. 3 must be capable of supplying charge current at a 2C rate. When the charger is limited to a C/5 rate, fig. 3 charge time should be increased 5 hours, and when limited to C/10, increased 10 hours, and so on.

Gel cell fast charge is a method which returns dischargeable energy to full capacity (1C) in less than four hours. Because of the starved electrolyte Gel Cell construction, many typical fast-charge applications require less than one hour to reach 1C charge capacity, as shown in fig. 4. Fast (5C) charging of 2.5 AH Gel Cells require a constant-votage 12.5 ampere DC power source; a 5 AH cell requires a 25 ampere DC power source. Notice in fig. 4 that during the first few minutes, when charging at the 2.55 VDC rate, the cell accepts full charging source capability. Also notice that charge rate increases considerably above 1C capacity during overcharge at 2.75 volts. This is due to internal heating, which after about 15 cycles causes degradation of cell capacity.

When more than four cells are operated in parallel, steering diodes and individual fuse protection should be provided, as shown in fig. 5. The charge diodes and fuse prevent shorted cells from shunting and accepting all the charge current; the discharge diode prevents shorted cells from discharging other parallel connected cells. The fuse rating is selected by:

$$I_F = \frac{2\,I_c\,(max)}{X_B}$$

where, I_F is individual fuse current rating in amperes
I_c is maximum charge current in amperes
X_B is number of parallel connected batteries

When a number of cells are charged in series, it is advantageous to use a C/500 (maximum) trickle charge rate. Since the same current flows in all cells, trickle charging tends to balance the charge of each cell.

For standby power applications, Gel Cells should be maintained at 2.35 volts (± 0.05 volts) float (trickle) charge. Rates above 2.4 volts per cell should be avoided to prevent excessive plate corrosion. An overcharge rate of 0.001C is sufficient to maintaining a 2.35 volt charge, after a higher charge rate is complete.

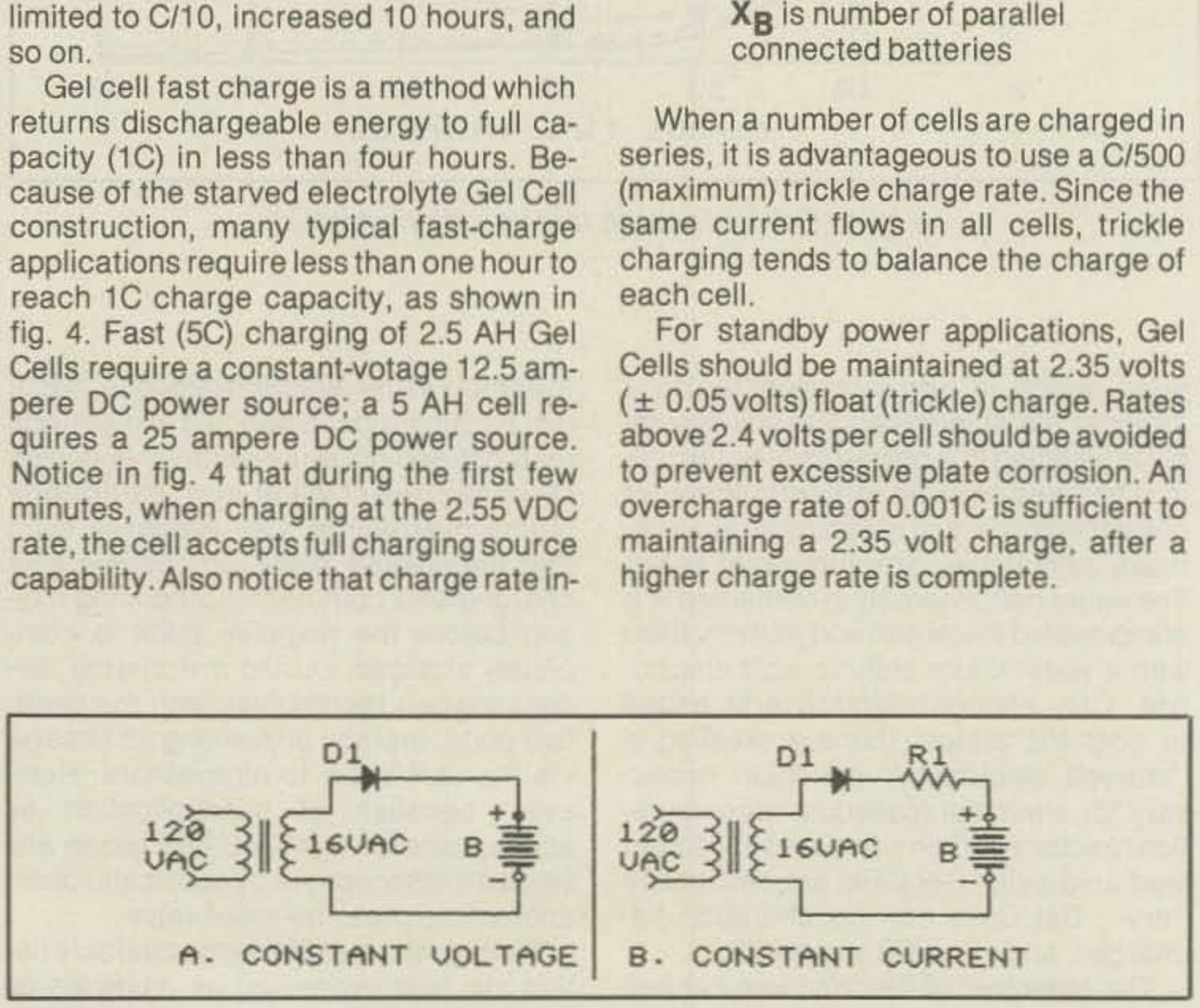

Fig. 6- Simple battery chargers.

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100 MHz	< 3 mv	< 1 mv	< 3 mv	< .5 mv	< 5 mv
450 MHz	< 3 mv	< 5 mv	< 3 mv	< 1 mv	< 5 mv
850 MHz	< 3 mv	< 20 mv	< 5 mv	NA	< 5 mv
1.3 GHz	< 7 mv	< 100 mv	< 7 mv	NA	< 10 mv
2.2 GHz	< 30 mv	NA	< 30 mv	NA	< 30 mv
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Gel Cell solar charge is enhanced because of their extended overcharge capability. Constant voltage charging is preferred, thereby offsetting the variable effects of light intensity and temperature. Because each solar charging system is different, no specific charge rate can be defined. Consult solar cell manufacturing representatives for their specifications and recommendations.

Notice in fig. 6 that a series charge circuit resistance is included to form a simple constant-current charger. Transformer T1's secondary winding can be designed to provide the necessary series resistance, rather than that of a discrete series resistor. Transformer winding resistance is not shown on charger schematics and in parts lists, but must be considered when transformer replacement is necessary. When constructing a practical charging system, the circuit shown in fig. 6 must be modified to consider charge rate, charge time, line voltage variations, and allowable overcharge conditions.

An improved constant-voltage charging circuit is shown in fig. 7. Notice that voltage regulation is provided by zener diode, ZD1. This arrangement is not adjustable, thereby preventing correction of component tolerance variation and setting of more precise charge rates.

Notice in fig. 8 that constant voltage

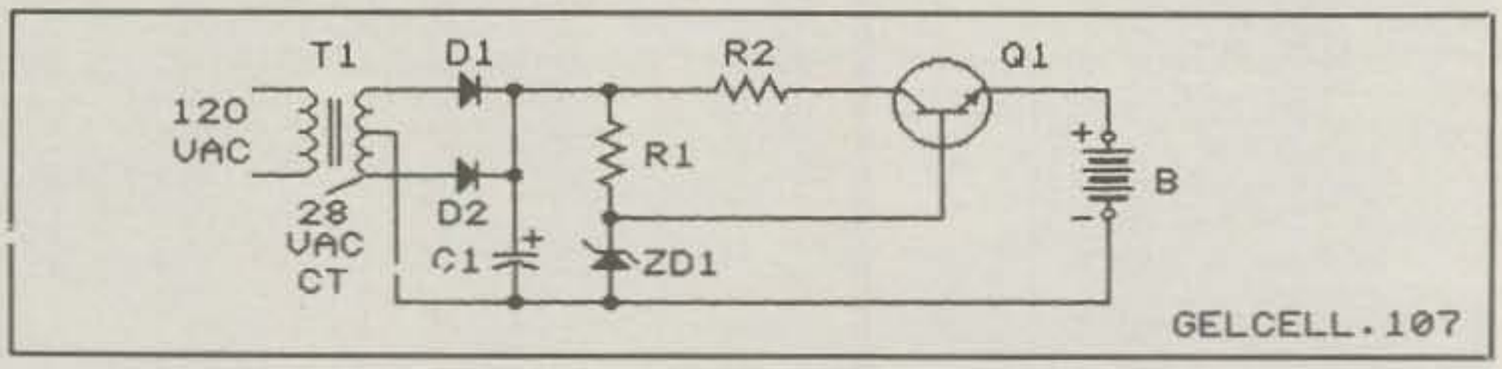
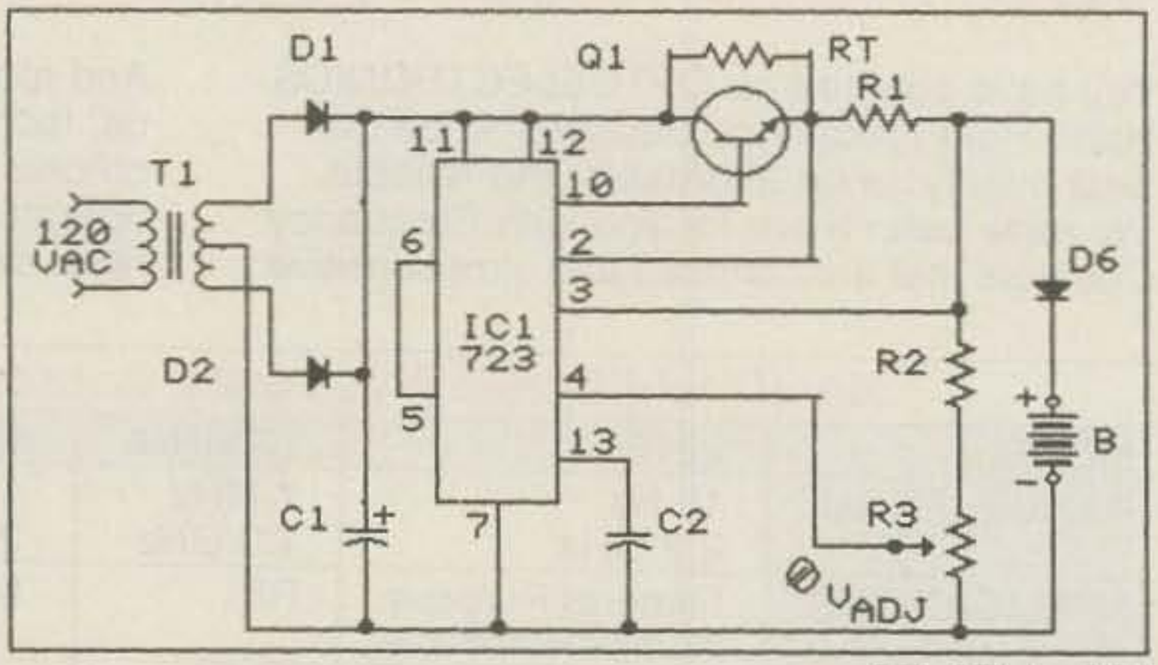


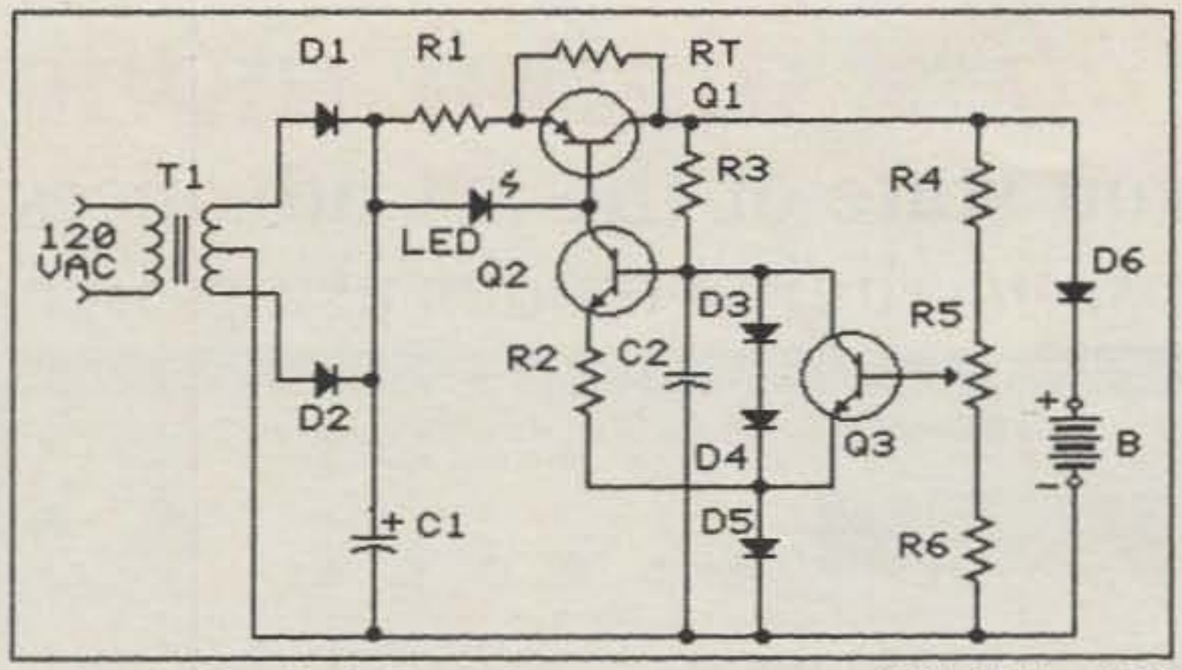
Fig. 7- Improved battery charger.



PARTS LIST

B	BATTERY, 6 V, 5 AH GELL CELL
C1	250 MFD, 50 V ELECTROLYTIC
C2	.01 DISK CERAMIC
D1, D2	1N4001, OR EQUIVALENT
D3	1N4002, OR EQUIVALENT
IC1	UA723
Q1	2N3055
R1	SELECTED: R = 0.7V/I (MAX) CHARGE LIMIT
RT	SELECTED (SEE TEXT)
R2	4.7K, 1/2W, 5%
R3	5K, 1/2W
T1	24VAC, CT, 2A

Fig. 8- IC regulated battery charger.



U.S. PAT. 3,919,618 GELCELL.109

PARTS LIST

B	6 VOLT, 5 AH GELL CELL BATTERY	R1	5.1 1/2 WATT
C1	250MFD, 50V ELECTROLYTIC	R2	27 1/2 WATT
C2	.005 DISC	R3	4.7K 1/4 WATT
D1 - D5	1N4001 OR EQUIVALENT	R4	8.6K 1/4 WATT
D6	1N4002 OR EQUIVALENT	R5	1K 1/2 WATT
Q1	2N3567	R6	1K 1/4 WATT
Q2, Q3	2N2222	RT	SELECTED (SEE TEXT)

Fig. 9- Two-step battery charger (for cycling operation only).

regulation is provided integrated circuit IC-1 and that high current is supplied through series pass transistor Q1. Charge voltage is adjustable by means of a variable resistance in the output voltage sampling circuit and because of high-gain IC1 amplifiers, precise voltage regulation is greatly improved. A series voltage drop across resistor R1 provides charge current limiting via control of IC-1 and conduction of Q1. Diode D3 serves to disconnect the battery charging circuit, when full battery charge is reached or charge source voltage is lost. Resistor RT

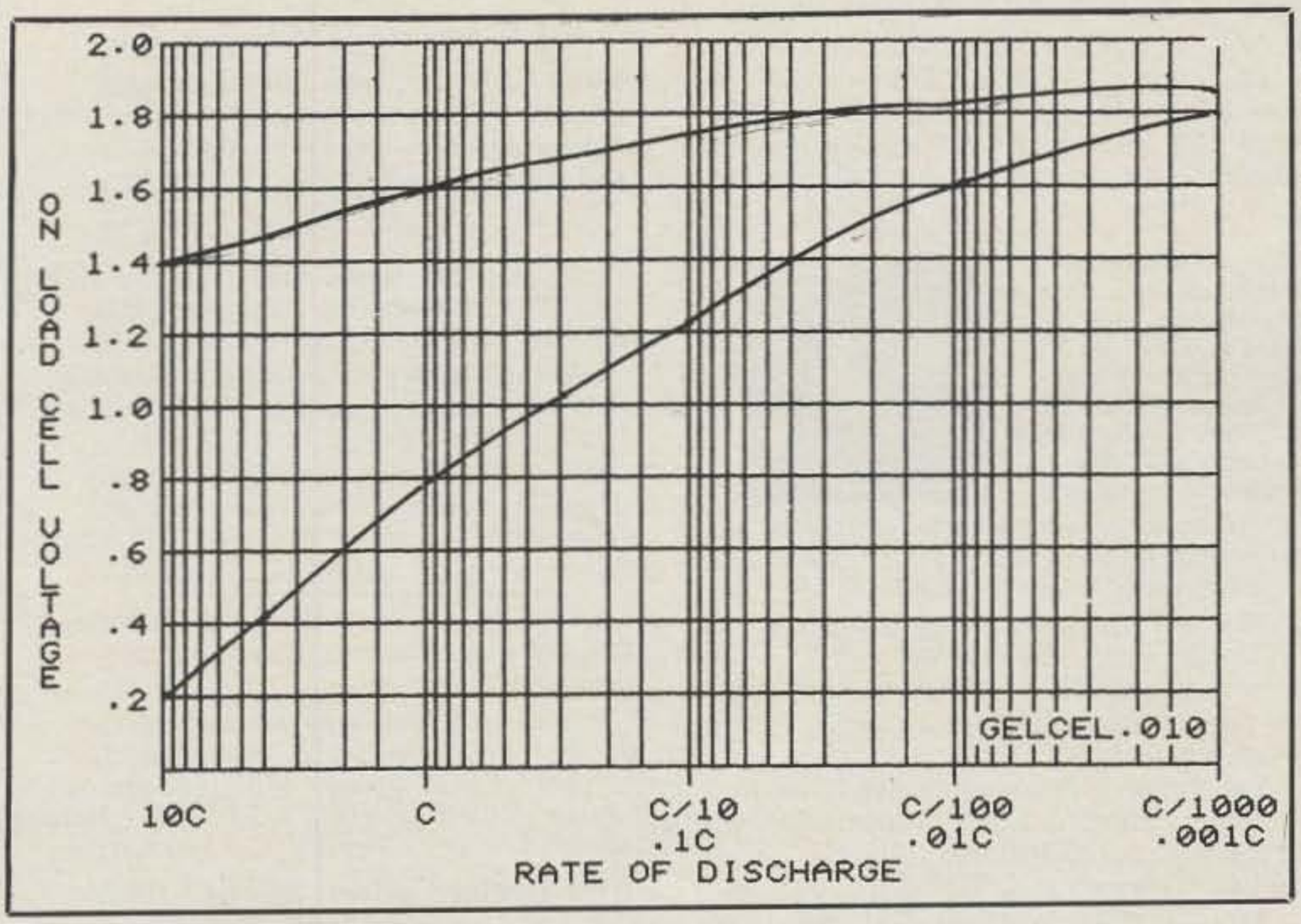


Fig. 10- Recommended disconnect data (typical).

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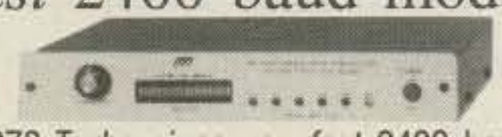

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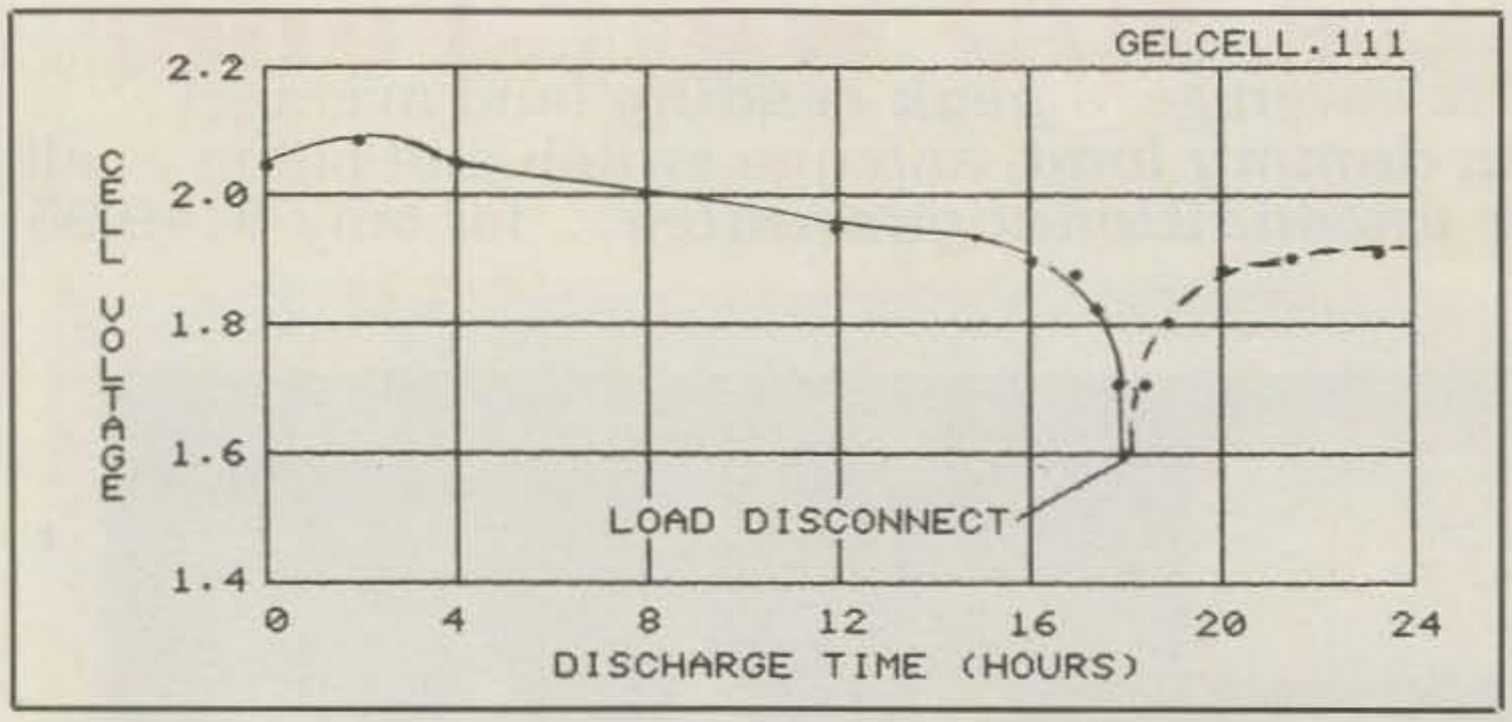


Fig. 11 - Gel Cell discharge (typical).

provides battery trickle charge current, when line voltage is available and Q1 is not active.

The most desirable battery life and recharge characteristics are enhanced by use of a two-step, constant-current charger; a high charge rate until 100% charge capacity is reached, followed by a lower trickle charge rate. The circuit shown in fig. 9 is a two-step-type charger, with the following basic characteristics:

1. Easily adapted to various voltage and AH ratings.
2. Output short circuit protection.
3. 16-hour (95%C) recharge.
4. Automatic start up in high rate, with high-rate charge indication.
5. Automatic change to trickle charge following the high-rate charge.
6. Provides safe (continuous) overcharge.

Notice in fig. 9 that the component values are specified for a 6 volt D-cell battery. (See Table I for size D-cell specifications.) Other cells, with different voltage and AH specifications, will require modification of the circuit shown in fig. 8.

Note: *Since Gel Cells are capable of delivering short-duration, high-discharge current, care should be exercised to prevent direct short circuits across their output terminals. A direct short may cause excessive cell heat, burns, fire, or explosions. Gel cell batteries should always be operated in a well-ventilated environment.*

Because of small physical and electrochemical differences, one or more series-connected cells may discharge their usable energy before the other cells in a battery. The minimum voltage point is a function of discharge rate. The lower curve, shown in fig. 10, represents the minimum discharge voltage level at which the cell should be disconnected from its load for optimum cell life. Discharging the cell below these recommended levels, or leaving the cell connected to a load in a discharged condition, will cause "over-discharge." Over-discharge can result in *increased* cell impedance which results in lower recharge current flow. Continued over-discharge abuse can also lead to formation of metallic "whiskers" in the separator material, thereby *lowering* cell resistance (a "short circuit" condition). Whiskers can be removed by a short-duration reverse "zapping" voltage applied across a cell, a **dangerous**, but often effective procedure. In the event the "short" is the result of other conditions, severe heat and possible explosion can result in serious personal injury or equipment damage.

Discharging a cell completely, to zero volts, can cause cell polarity reversal. Cell polarity reversal can be overcome by making several complete, normal charge/discharge cycles.

Referring to fig. 8, the (typical) discharge graph of a Gel Cell, notice that the cell is disconnected from its load at 1.6 volts. The dashed portion of the curve is the result of an electrochemical open-circuit phenomenon which causes an increase of cell voltage, up to approximately 2 volts. Charge/discharge voltage sensing must include different ON/OFF (hysteresis) levels, such as shown in fig. 9; otherwise, the load will be "reconnected" before the previously discharged energy is completely restored.

Emergency communication in times of natural or manmade disaster is traditionally a vital part of amateur radio. Simple battery backup power can be included as part of your station's equipment to prevent interrupted communication due to commercial power outages. Twelve volt Gel Cell batteries may be connected in a "float"-charge-like manner, directly to a regulated 13.8 VDC (minimum) power source, automotive charging system, or any good filtered battery charger. All battery chargers when interfaced directly to 12 VDC electronic equipment should include output overvoltage protection, such as the popular crowbar circuit. Incidentally, be sure to disconnect the Gel Cell from the automotive charging system when starting the engine, thereby preventing partial discharge because of starting load support by the Gel Cell battery.

Battery-charge recovery is an important consideration of any emergency-backup battery-power system. For example, unless the dischargeable energy is quickly replaced, when commercial power is restored after an initial power outage, any subsequent outage will not be supported by the battery backup system for its "normal" full-capacity time.

A $5.00 fleamarket Gel Cell bargain battery is only a trivial investment to keep several thousand dollars of whistles and bells tooting and ringing in case of emergency! Six D-size 5 AH Gel Cells provide over one hour of intermittent transmit/receive power for both my Kenwood 7950 (7 AH load) and 144.17 MHz repeater (6.5 AH load).

To illustrate a point, how many people do you think would "check-in" on a routine weekly "emergency net" should there be a wide-area commercial power outage 10 seconds before net time? CQ

As packet radio grows in popularity, more and better networking techniques are needed. K4ABT tells us how we can help.

Advances in Packet Networking

BY BUCK ROGERS*, K4ABT

Preparing for the implementation of the 2400 BPS links on 10 meters has taken me away from some of the other happenings within the packet arena. There are several notes that you can take while reading about the advances in nodes, gateways, and (backbone) trunks. The node routing and the various platforms that are being introduced are a few of the items that bear mentioning.

I would like to begin by inviting you to look into ways and means to help support your LAN. Even better, find a way to support the SYSOP who keeps the nodes and gateways of your LAN operating.

Support The SYSOP

Packet radio has now become the fastest growing segment of our hobby. This growth factor has brought on the demand for more and better networking techniques. The biggest factor is the demands that are placed on the SYSOP. But what about the SYSOP? The SYSOP is the packeteer who puts up the local node(s) or gateway(s) and then enjoys watching others have fun using them.

There is one small problem that surrounds this kind of thinking. *There are very few SYSOPs* to go around, and the list is dwindling.

In many LANs I've visited in recent months the story is the same. There are many users of the LANs, but only two or three packeteers who are actually supporting the system with their time, labor, and (very limited) funds.

Here is the one big complaint that we SYSOPs have. Many times the node or gateway will get hit by lightning, or some other malfunction may occur. It only takes a few minutes before someone is sending "nasty-grams" implying that the "system is always down," "the SYSOP has 'lid-listed' us," or "why doesn't old &!* keep his nodes working," etc. Most of these "nasty-grams" are sent by users who never so much as lift a finger to support the node that he or she is grumbling about.

The next scenario will come as no surprise to some of you SYSOPs who have experienced the same problem. I received a phone call at 1 AM telling me that one of my nodes was off the air, and the BBSes wouldn't be able to get the mail forwarded unless it was put back on soon. This may explain why my telephone is no longer listed in my name.

Get Involved

I conduct packet forums at clubs and hamfests around the southeast, and I repeatedly hear the complaints about "not enough participation," or "no one wants to help," or "everyone is too busy to help." The problem appears to be universal, with few exceptions.

If you want your LAN to grow and do well, get involved, donate time, and contribute to the upkeep of your LAN. If the SYSOP is willing to keep the system operating, then give him some support in the form of revenue or old rigs that you no longer use. Give a little time to the installation of a new node or digi.

If a new backbone or trunk is about to be introduced to your area, then look into how you and other packeteers of your LAN can contribute to the backbone construction, and how your group can help the SYSOP(s) with financial support.

Recently Frank, K4ICT, and I were on the LAN discussing the events of the coming day (Saturday) in preparation for the raising of an antenna for a new node-switch. I was surprised when the phone rang and another local packeteer wanted to know if he could be of any help to us. The next surprise was his. I said yes!

Bruce, WB4OLD, has been there to help ever since he "volunteered" that first time. I overheard him telling another local packeteer, "If they need any help with a node installation and if you ask Buck, you'd better be darn sure you mean it, cause Buck will say yes!" We had fun while building the node that Saturday, even if it did rain like the day before the Ark sailed.

So it becomes a feeling of pride when you can say, "I helped the SYSOP build that node." When it comes to complaining about the node or gateway fault, or inoperability, ask yourself, "What did *I* do to help? Do I have grumblers rights?" If the answers are negative, then it may be time to look into ways that you can help the SYSOP(s) make your LAN better.

Writing The Next Chapter For Tomorrow's Packet

I've given you a short introduction to some of the network-type nodes in other issues of *CQ*. This is not the time nor the place to start preaching to the end users about the good and evils of networking. Furthermore, I'm not about to pit the user of the Net/Rom against the users of TexNet. I will say that TCP/IP has been around about as long as all the others have, yet it doesn't seem to have caught on as much as the other high-level net—working protocols have. I don't know why.

In our system we are using several types of network nodes ranging from the Ka-nodes, Net/Roms, The/Nets, ROSE switches, and the LAN/LNK. I've written about most of these in several back issues of *CQ*.

To add some flare to the network issue, we are going to look into one of the latest of these network systems, the **ROSE** switch. The protocol is AX.25, and the address scheme is X.121 addressing.

With the introduction of the ROSE switch we are about to find ourselves confronted with still another decision. The choice may come about in an easy manner, since the ROSE switch seems to favor a telecommunications switching similarity. It offers a different approach to routing, since the SYSOP is the configuration control manager.

By "configuration control manager" I mean the SYSOP builds the routes into the switch as they are needed. Thus there is no hourly updating or clutter (poop) on the frequency. As we all are aware, when highly populated over an area the nodes can add more "poop" to the frequency than five packet stations with their bea-

506 Pheasant Ridge Drive, Warner Robins, GA 31088

cons turned on and set to send beacons every five minutes.

Another element that seems to decrease with the addition of the ROSE switches is the ever increasing "node-nockin's" (pulling nodes lists). The best part of all is that the ROSE switch will not have a list of 50 or more nodes in it with only 10 nodes in the list that are usable.

As a matter of fact, the ROSE switch doesn't send lists to the other switches that are outdated. Sometimes we have a band opening or temperature inversion that allows a lot of distant nodes to upset the balance of our node lists in the network-type nodes. When this happens our node lists become invalid, since the normal paths that were created by the local nodes a few days before are destroyed. Add to this the increased propagation and skip conditions that are part of our VHF life-style for the next couple of years, and we are in for a lot of erroneous node lists. The ROSE switch circumvents this problem by allowing us to build the paths as they are needed, and they are not destroyed by a freak late-night band opening.

Another problem that plagues many of us is having a node and a route to that node residing in the route tables long after the node has been changed or removed. For some reason the end result is that the nodes will continue to use or attempt to use the old route to access another node. After many tries we are blessed with "Failure with (Nodecall)." This problem is brought about because the nodes are updating every 30 minutes or so. The old nodecall stays resident, since it is in other nodes lists far removed from the *neighbor* node.

As I mentioned earlier, the addressing scheme utilizes routing techniques that are similar to those used in the telephone industry. The scenario for the manner in which the ROSE switch functions would be something like the following.

At the southeast side of our LAN is Jesup, Georgia, while on the northwest side is Roberta, Georgia. In theory we should configure the switches with the routes to one another by using the local area code and the exchange in each switch. We must be careful to see that no switch bears the same area code and telephone exchange.

There are several ROSE switches between the Jesup, Georgia switch and the Roberta, Georgia switch. The only switches that must know how to reach one another are the two switches just mentioned. The Jesup switch bears the call N4PJR-5 and the ID of 912427, while the Roberta switch bears the call KS4C-5 and the ID of 404321. Since I am working with an imaginary system, let's imagine that I'm at Jesup, Georgia and I wish to connect to Mike, N4NAU, at Anniston, Alabama. The route is about 300 miles. All I have to do to make the connection to Mike is issue a connect request to N4NAU VIA N4PJR-5, 404321 and the rest is history. Shortly I have the ever familiar ***** connected to N4NAU** displayed on my screen.

With this kind of system operating across the country we might implement a nationwide packet system that could be used as easily as the telephone that is sitting across the table from us. The code can be burned into an EPROM and placed into many of the TNC-2 clones such as the PAC-COMM TNC-200, TINY-2, Micro-Power-2, AEA PK-80, MFJ-1270B, and MFJ-1274.

The ROSE switch is shareware distributed within the amateur radio community. The executable firmware is available from several sources and from many telephone BBSes. The firmware is also available directly from the author, Tom Moulton, W2VY. If you would like more information about the ROSE switch, you may contact Tom at The Radio Amateur Telecommunications Society (RATS), 206 North Vivyen Street, Bergenfield, New Jersey 07621.

Having fun via packet radio.

73 de BucK4ABT

CQ

Please send all reader inquiries directly.

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

From the Notebook—Part I

This month we flip the pages of our Antennas and Accessories notebook for a peek at some interesting antennas and software. Let's focus on antennas first.

Antenna Notes

Suitcase Antennas de W4FA. In last February's issue, *CQ* colleague John J. Schultz, W4FA, described his portable, 100 watt HF "suitcase station" that has served him well in his many stateside and overseas travels. This was his "The Evolution of an HF Suitcase Station" on p. 52. In that article John described the equipment that he carries (tuner, SWR/power meter, small baluns, coax, etc.) in considerable detail, and he also covered the set of wire antennas he uses for the station. On balance, John prefers using wire-type antennas with a wide-range antenna tuner rather than trap-type multiband antennas, even if the latter can be collapsed to fit into the suitcase or in a shipping tube.

Fig. 1 shows a representative selection of the antennas John uses in connection with his suitcase station. Fig. 1(A) is a version of the popular multiband Windom antenna. A small, 1:6 Palomar Engineers coaxial balun couples the coax to the antenna, which gives good results on 40, 20, and 10 meters even without using a tuner. A tuner will allow operation on 15, although you may have to adjust the length of the coax a bit.

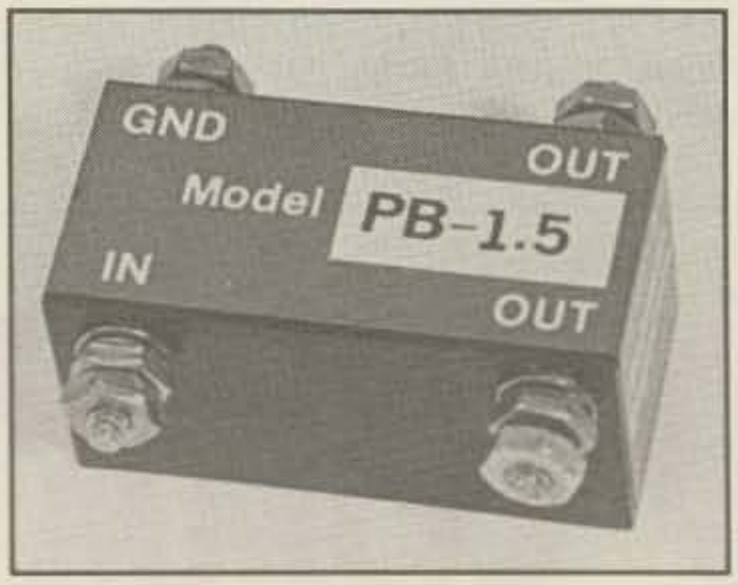
The antenna in fig. 1(B) gives acceptable coverage of 40, 20, 15, and 10 meters using a 1:1.5 balun and an antenna tuner. The antenna of fig. 1(C) evolved from a shortened dipole for 80 meters, although it will also operate well on 40, 20, and 10 meters and with reduced efficiency on 15 meters. The antenna shown in fig. 1(D) will operate on 40, 20, 15, and 10 meters.

The first three antennas can also be used in inverted-Vee fashion, although the resonance points will change somewhat, and you will have to experiment with the leg lengths or rely more on a tuner to couple power to the antenna and transmission line.

All of these antennas make use of miniature Palomar Engineers PB series baluns. The 1:1.5, 1:6, and 1:12 baluns allow you to couple a coaxial line (small-diameter RG-174 in this case) to a variety of wire-type portable antennas. In those situations where a "proper" antenna can't be constructed, John uses a random-length wire antenna, operated against ground.

We thank John for permission to reprint his ingenious portable antenna designs, and we look forward to an "eyeball QSO" with him now that he's rumored to be back stateside.

317 Poplar Drive, Millbrook, AL 36054



Handy Palomar PB series baluns are available in 11 different impedance ratios. They can be used as baluns or matching transformers to match folded dipoles, rhombics, beverages, and high-impedance antennas to 50 ohm coaxial line. The tiny (2 × 2 × 4 cm) baluns are rated at 350 watts PEP or 100 watts CW. They are priced at about $27 each. (Photo courtesy Palomar Engineers)

Com-Rad Untennas™. An unusual line of compact VHF and UHF mobile antennas is offered by Jim Waldron through his Com-Rad Industries, which name, incidentally, stands for "Compact Radiating Systems."

These low-profile antennas, which Jim has offered for about ten years, vaguely resemble small hula-hoops, and are known in the trade as directional-discontinuity ring-radiators, or DDRRs. Normally, when vertical antenna height is reduced by loading, efficiency deteriorates rapidly. In the DDRR, circumferential aperture is substituted for the collinear portion of the antenna that is lost in reducing the height. This construction offers a height reduction over conventional verticals of up to 30 to 1; DDRRs can range in size from as little as 6 inches to 5,000 feet in diameter and 2 inches to 300 feet in height, depending upon the frequency band covered (and, for the large DDRRs, the size of one's budget!).

The DDRR's low profile even makes it possible to mount the antennas underneath vehicles, which is often done by government agencies who find a need to conceal an antenna on surveillance vehicles. Top-mounted antennas, with their diminished height, reduce damage caused by garage doors, underground ramps, trees, service-station canopies, and the like.

The DDRR produces a typical dipole doughnut radiation pattern when the antenna's diameter is not large in wavelength. The design allows direct connection of transmission lines across the antenna's aperture. The antenna is especially suited for mobile work, since there is little signal-effect flutter from the DDRR, while wind effects from comparable verticals can be severe. The high "Q" DDRR design also acts as a sharp bandpass filter centered on the design frequency, thus reducing the potential for intermodulation interference.

In practice, the Untenna, a form of DDRR, boasts an essentially omnidirectional and vertically polarized radiation pattern. The typical Untenna measures only about 2½ inches in height but compares favorably with a full-size (quarter wave) vertical. The rigid construction practically eliminates flutter and "picket fencing," and an adjustable impedance tap point matches the antenna to any type of coax.

The Untenna's frequency and input impedance can be varied without trimming, enabling you to compensate for any detuning effects caused by other objects mounted on the vehicle. (On most models, you raise the disc to raise the frequency and lower the disc to lower the frequency. On the low-band helical model, tuning is accomplished by adjusting the position of the antenna's tuning wire.)

Com-Rad offers several VHF and UHF models suitable for amateur use. Various models cover the 27-85, 115-170, 210-240, and 400-470 MHz frequency bands. Also, a single-line-fed, dual-channel model is available to cover the 115-170 MHz and the 400-470 MHz bands.

Two mounting options are available. One is direct mounting to the vehicle's roof using standard Motorola-type mounts. The other is a magnetic mount for non-vinyl tops. The low-band (27-85 MHz) helical model CR109A also is available with a flange mount for fixed station or mobile use, as well as with a ground screen for portable use.

Jim notes that many people consider the Untennas to be "the silliest looking things ever conceived." (He said it. I didn't!) Thus, for those who still think the antennas are silly after reading about them, he sells a plastic covers for them "so people won't think you are silly for trying one." The radomes—aircraft-like weather-resistant covers made of opaque high-impact plastic—are available for all models; the outside can be painted to match the vehicle color.

For more information and pricing, contact Jim Waldron at Com-Rad Industries, P.O. Box 554, Grand Island, NY 14072.

10 Meter EDZs. Zack Schindler, N8FNR, sent me some information on a 10 meter Extended Double Zepp (EDZ) antenna that he offers for sale. He believes his design is a good choice for the Novice, since the pretuned feature reduces or eliminates the often frustrating job of trimming one's first antenna.

His EDZ is based on the 12 meter antenna by John J. Reh, K7KGP, which he described in his article, "An Extended Double Zepp Antenna for 12 Meters," in December 1987 *QST*. To recall, the EDZ is a popular single-band wire antenna which has a 3 dB gain over the conventional halfwave dipole; the antenna consists of two collinear 0.64 wavelength elements fed in phase.

Zack offers the 10 meter EDZs fully assem-

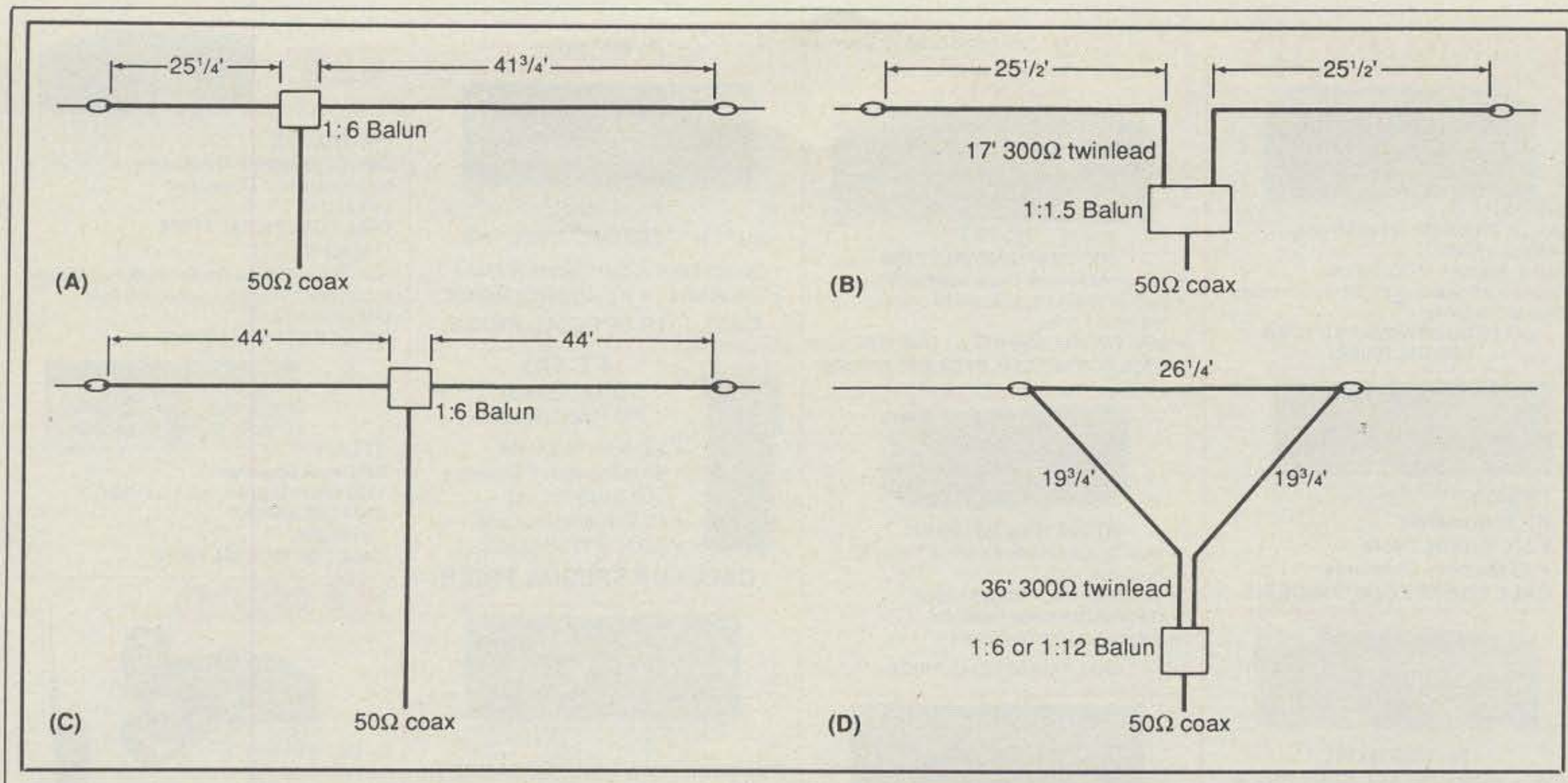


Fig. 1 - Shown here is a sampling of the wire antenna designs that John J. Schultz, W4FA, uses in connection with his traveling suitcase station. The frequency bands covered by each of the four designs shown here are explained in the text and are keyed to the sketch. John often uses a simple random-length wire, operated against ground, when a "proper" temporary antenna can't be erected. (See CQ, February 1989, p. 54.)

bled and pruned with a noise bridge. Thus, each antenna is individually tuned, rather than being just cut to formula length and then assembled. He adjusts each antenna to favor the Novice portion of 10 meters with a low SWR, although the antenna is usable from 28.0 to 28.8 MHz with an SWR of less than 2:1. No antenna tuner should be required; the antennas are coax-fed using a section of 450 ohm ladderline as a matching section and a 1:1 balun. The antenna is priced at $75 postpaid.

For more details, contact Zack Schindler, N8FNR, 413 Vester, Ferndale, MI 48220-1955.

17/12 Meter Rotary Dipole. Contest Radio, Inc., offers a 17/12 meter dual WARC-band rotatable dipole, the RD-2W. Constructed of 6061-T6 aluminum tubing and using stainless steel antenna hardware, the antenna has less than 1 sq. ft. of wind load and has a wind survival of 80 mph or more. The RD-2W makes use of a heavy-duty bakelite mounting plate, a 1 inch bakelite dowel at the center for added strength, and high-power (2 KW) traps.

The 25 ft., 9 lb. antenna is designed to mount above an existing tribander without causing additional mechanical problems. It is designed for direct 50 ohm coax feed, with SWR typically about 1.3:1 across both bands; actual SWR will vary with height above ground and other factors. Assembly time is about one hour, with the traps being pretuned. The price is $96.95 delivered.

For details, contact Contest Radio, Inc., 449 Widow Sweets Rd., Exeter, RI 02822.

Urban Antennas. We often receive inquiries from amateurs attempting to operate from apartments and condominiums where outdoor antennas are prohibited or severely restricted. I sympathize with them, having "hammed" under such conditions myself. Operating on the HF bands, especially, under such conditions requires a great deal of ingenuity. Window-mounted and similar types of antennas have provided at least a partial answer to the operating problem for some amateurs.

Urban Antennas, Inc. has come up with two models. One is the A-10 outdoor antenna for 10, 12, and 15 meters; it also is usable for CB, SWLing, and scanner operation. The A-10 has aluminum tubing elements, with capacity hats at the ends of the elements to reduce the overall length of the antenna while allowing full halfwave dipole operation. The antenna elements are in two adjustable telescoping sections; these can be adjusted to the desired frequency of interest.

The mounting brackets are on a special base which may be clamped to a windowsill, railing, or practically any other surface. The mounting hardware includes a large bar clamp which opens to 18 inches; it is used to attach the antenna to the supporting surface. The base allows you to position the elements in different ways, such as to form a Vee or a dipole. The A-10 is fed directly with coax and is priced at $89.50.

A second antenna is the A-20 apartment antenna, which covers the 20, 17, 15, 12, 10, and 6 meter bands. Optional coils are available for operation on 30, 40, and 75 meters. It is designed to mount almost anywhere—on windows, railings, masts, trees, or chimneys.

You can set up the A-20 in several size configurations. Each element is about 8 ft. long. Where space is severely restricted, the A-20 may also be assembled on any of its bands with elements that are either 3 or 5 ft. long. Two elements are used in the dipole or Vee configuration, so grounds or radials are not needed. The antenna is tuned by adjusting short telescoping whips at the end of each element. By taking advantage of the adjustable lengths of the elements and whips, the A-20 may be set to any frequency between 13 and 80 MHz.

The special mounting board used by the A-20 allows the elements to be positioned in different ways. A large bar clamp is used to secure it to windowsills, railings, or tables. The antenna may also be mounted on a mast, or hung as a vertical dipole from a tree. The high-Q loading coils are of #12 solid copper wire and wound on lightweight, 1 inch diameter polycarbonate forms. Direct coax feed is used. The A-20 is priced at $149.50.

For more information, including typical SWR curves and mounting sketches, contact Urban Antennas, Inc., Box 662, Bryn Athyn, PA 19009.

Ham 10™ Antenna. David M. Hallow, KE9BD, who is Technical Supervisor at American Antenna Corp., sent us some information on the Ham 10 mobile antenna, which he designed and developed.

According to Dave, about two years ago he started using converted CB sets on 10 meters and wanted a mobile antenna to "help these flea-powered rigs make the most of every last milliwatt." The logical thing, he felt, was to adapt a high-quality mobile CB antenna to 10 meters.

He selected American Antenna's own base-loaded K40 CB antenna, which is manufactured on an automated production line to close tolerances. Dave indicates that various modifications were made to the K40 to allow operation on 10 meters; prototypes of the modified antenna were tested by members of his local radio club.

The coil itself is designed to handle 750 watts DC or 1500 watts PEP. The whip is of #17-7PH stainless steel, with a special "radiused tip" which is said to reduce static buildup while eliminating the need for the usual "little ball" at the end. All metal parts are made of stainless steel.

The Ham 10 offers a bandwidth of about 1.5 MHz between 2:1 SWR points. As supplied, it provides adequate coverage of the SSB and CW band segments. It can be repeaked for the FM portion of the band; the whip retracts into the coil a full 2 inches for easy retuning. Mounting options include a magnetic mounting

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- USB/LSB/CW, AM Receive Optional Module for AM Transmit and FM TX/RX
- 160-10M Operation • 100W Output
- Receive 30 kHz-33 MHz

CALL FOR SPECIAL PRICE

IC-2GAT
2 meter HT
RX 138-174 MHz
TX 140-150 MHz
7 Watts

IC-32AT
Super Dualband FM HT
- 5 Watts on Both Bands
- RX 138-174 MHz 440-450 MHz
- Stores Standard & Odd Offsets

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YAESU

FT-1000
SUPER "PERFORMANCE" HF
- Direct Digital Synthesis (DDS)
- 200 Watts • All Amateur Bands

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FT-470
DUAL BAND FM HANDHELD
- 2 meter/440 MHz
- Simultaneous Receive Of Both Bands
- PL Encode/Decode
- 2.3 to 5 Watts Output

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FT-757 GXII
PORTABILITY & PERFORMANCE HF
- 100 Watts • 10 Memories
- Dual VFO's • All Mode Coverage
- 500 kHz To 30 MHz Receive

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Heath

HW-9	QRP Transceiver	CALL FOR SPECIAL PRICE
HK-1	Pocket Packet Unit	
SA-5010A	Memory Keyer	
HD-1481	Coax Switch	
HN-31A	Dummy Load	
HM-2140A	HF Wattmeter	
D-1422A	Antenna Noise Bridge	
HD-1250	Grid Meter	
HDP-1396	Headphones	
HD-1234	Coax Switch	

AMERITRON

AL80A

	LIST		LIST
AL80A	$985.00	ATR15	380.00
AL84	479.00	RCS4	134.50
AL1200	1825.00	RCS8V	134.50
AL1500	2370.00		

CALL FOR SPECIAL SALE PRICES!

concepts

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

Model	Band	In-Out	List Price
2-23	2M	2-30W	$112.00
2-217	2M	2-170W	$299.00
2-117	2M	10-170W	$299.00
2-417	2M	45-170W	$299.00
3-22	220	2-20W	$112.00
3-211	220	2-110W	$299.00
3-312	220	30-120W	$264.00

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PARAGON
Gen. Coverage HF Transceiver, Multiprocessor Controlled
List $2,245.
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OMNI V
Ham Band Optimized for Reduced Phase Noise and Dynamic Range, 160-10M
List Price $2,245.
CALL FOR SPECIAL PRICE

TITAN
HF Linear Amplifier
1500 Watts Output, 160-15M, Pair of EIMAC 3CX800A7
List $2,995.
CALL FOR SPECIAL PRICE

ALINCO

DJ-100T 2 Meter HT
DJ-500T Dual Band HT
DR-110T 45W, 2M Moible
DR-510T Dual Band, 45W Mobile

AMPS
ELH 230G 2M, 2W in 30W out
ELH 230D 2M, 2W in 60W out
ELH 260D 2M, 2W in 60W out

AEA

PK-232 MBX
CALL FOR OTHER AEA PRODUCTS

Kantronics

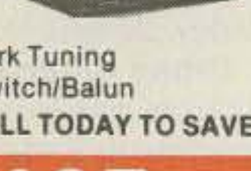
KAM ALL MODE TNC $289.95
CALL FOR OTHER KANTRONICS PRODUCTS

MFJ

NEW Model MFJ-986 3KW Tuner
Only $239.95

1278 Multi Mode TNC	$239.95
1270B TNC Unit	$129.95
202/204 Antenna Bridges	$59.95/$79.95
250 Oil Load	$49.95
260/262 Dry Loads	$29.95/$69.95
407/422 Elect. Keyers	$69.95/$119.95
901/941D Tuners	$59.95/$99.95
949D/989 Tuners	$139.95/$299.95

NYE VIKING



MBV-A 3KW Tuner
- Low Pass Pi-Network Tuning
- Built-in Antenna Switch/Balun

List Price $675 CALL TODAY TO SAVE $

FREE SHIPPING-UPS SURFACE (Continental USA) (most items, except towers/antennas)

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VISA MasterCard

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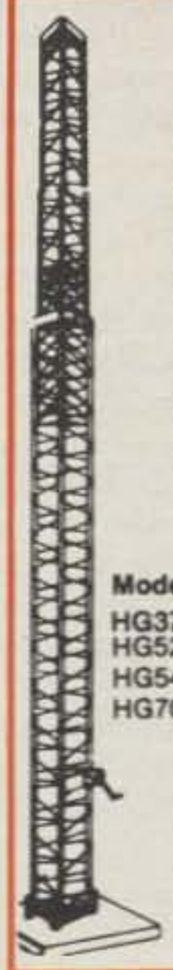
Mon-Fri: 9 am-5pm
Sat: 9 am-1pm

CIRCLE 112 ON READER SERVICE CARD

ANTENNA/TOWER SALE!



hy-gain

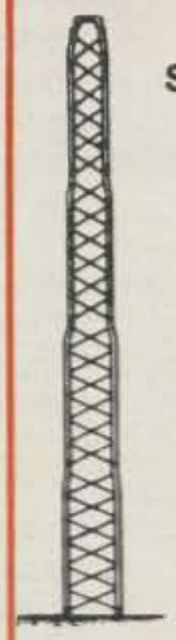
CRANKUP SALE!

All Models Shipped Factory Direct—Freight Paid*!

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

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
HG52SS	52 ft	9 sq ft	$CALL
HG54HD	54 ft	16 sq ft	$CALL
HG70HD	70 ft	16 sq ft	$CALL

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



ROHN

Self Supporting Towers On SALE!

FREIGHT PREPAID

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

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	228	$449
HBX48	48 ft	10 sq ft	303	$589
HBX56	56 ft	10 sq ft	385	$699
HDBX40	40 ft	18 sq ft	281	$569
HDBX48	48 ft	18 sq ft	363	$689

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

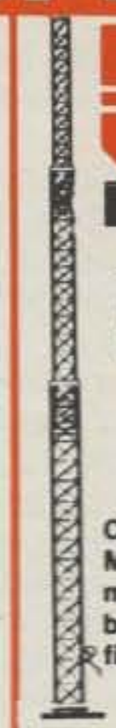
ROHN

Guyed Tower Packages

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

Packages shown below are rated for 70 mph wind zone. 90 mph wind zone packages slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

	Model 25G	Model 45G	Model 55G
50'	$849	$1229	$1549
60'	939	1389	1939
70'	999	1719	2159
80'	1199	1869	2369
90'	1289	2039	2579
100'	1369	2199	2989
110'	1449	2459	3209
120'	1669	2619	3429



US TOWER CORPORATION

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

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

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

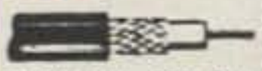
CALL FOR SALE PRICES!

Model	Min.Ht.	Max.Ht.	Ant.load*	Sale price
MA40 mast	21'	40'	10 sq ft	$629
MA550 mast	22'	50'	10 sq ft	999
TX438	22'	38'	18 sq ft	919
TX455	22'	55'	18 sq ft	1385
TX472	23'	72'	18 sq ft	2279
HDX555	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3559

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

Note-towers rated at 50 mph to EIA specifications

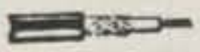
RG-213U



$.39/ft $379/1000 ft. Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X



$.22/ft $209/1000 ft.

- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

9086

$.45/ft $439/1000 ft.

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

HARDLINE/HELIAX®

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket	$.79/ft.
⅞" LDF4-50 Andrew Heliax®	$1.99/ft.
1⅝" LDF5-50 Andrew Heliax®	$4.99/ft.

select connectors below.

Heliax® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
⅞" Heliax®	$29	$29	$29	$29
1⅝" Heliax®	$55	$55	$55	$55

COAX CONNECTORS

Amphenol Silver PL259	$1.50
UG21B N Male	$3.50
9086/9913 N Male Connector	$4.95

ANTENNA WIRE & ACCESSORIES

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

VAN GORDEN

1:1 Balun $15 Center Insulator $8

Dipole Kits D80 $31.95/D40 $28.95

Short Dipole Kits SD80 $35.95/SD40 $33.95

All-band Dipole w/ladder line $29.95

G5RV all band antenna $49.95

ALPHA DELTA

DX-A 160-80-40 Sloper $49

CUSHCRAFT

CALL FOR SPECIAL PRICES!

A3 3-el Tribander	
A4S 4-el Tribander Beam w/S.S. Hdwre	
A743 & A744, 30/40 mtr KIT for the A3 & A4	
R4 20-10 mtr Vertical	
AP8 80-10 mtr Vertical	
AV5 80-10 mtr Vertical	
D40 40 mtr Dipole	
40-2CD 2-el 40 mtr Beam	
A50-5 5-el 6 mtr Beam	
215 WB NEW 15-el 2 mtr Beam	
230 WB NEW 30-el 2 mtr Beam	
4218 XL 18-el 2 mtr Beam	
3219 19-el 2 mtr Beam	
424B 24-el 432 MHz Beam	
ARX2B 2 mtr Vertical	

hy-gain

CALL FOR SPECIAL PRICES!

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

HUSTLER

6BTV 80-10 mtr Vert	$149	5BTV 80-10 mtr Vert	$129
4BTV 40-10 mtr Vert	$99	G7-144 2-mtr Base	$129
G6-144B 2-mtr Base	$89		

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6VX 80-10m Vertical $159.95 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical $149.95 Delivered
- Full Legal Power
- Automatic Band Switching

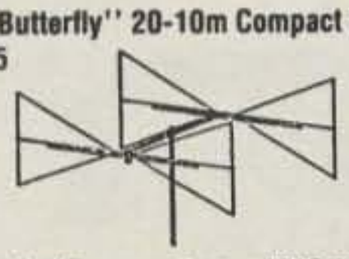
Accessories:

RMK II Roof Mtg. Kit	$59.95
STR II Stub-Tuned Radials	$39.95
TBR160 160m Coil Kit	$59.95
30m Add-on Kit	$39.95
17/12m Add-on Kit	$39.95

HF6V HF2V

FREE UPS on ACCESSORIES when purchased with antenna

HF5B "Butterfly" 20-10m Compact Beam $259.95



- Unique Design Reduces Size
- No Lossy Traps
- Turns w/TV Rotor
- Boom Length 6 Feet
- Element Length 12.5 Feet

FREE UPS Shipping in Continental USA

MIRAGE/KLM

KT34A 4-el Broad Band Triband Beam	$419
KT34XA 6-el Broad Band Triband Beam	$619

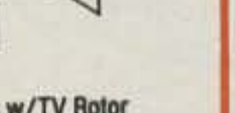
ROTORS

Alliance HD73 (10.7 sq. ft. rating)	$129.95
Alliance U110 (3 sq. ft. rating)	$49
Telex CD 4511 (8.5 sq. ft. rating)	$Call
Telex HAM 4 (15 sq. ft. rating)	$Call
Telex Tailtwister (20 sq. ft. rating)	$Call
Telex HDR300 Heavy Duty (25 sq. ft. rating)	$Call

ROTOR CABLE

Standard 8 cord cables $.25/ft. (vinyl jacket 2-#18 & 6-#22 ga)

Heavy Duty 8 Cond cable $.45/ft (vinyl jacket 2-#16 & 6-#18 ga)



ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G	$54.50	45G	$153.50
25G	$65.50	55G	$197.50

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	CALL FOR PRICES
FK2558	58 ft.	13.3 sq. ft.	
FK2568	68 ft.	11.7 sq. ft.	
FK4544	44 ft.	34.8 sq. ft.	
FK4554	54 ft.	29.1 sq. ft.	
FK4564	64 ft.	28.4 sq. ft.	

25G Double Guy Kit	$299.
45G Double Guy Kit	$319.

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	$.15/ft
1/4 EHS Guywire (6650 lb rating)	$.18/ft
5/16 EHS Guywire (11,200 lb rating)	$.29/ft
5/32 7 x 7 Aircraft Cable (2700 lb rating)	$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32")	$.45
1/4 CCM Cable Clamp (1/4" Cable)	$.55
1/4 TH Thimble (fits all sizes)	$.45
3/8EE (3/8" Eye & Eye Turnbuckle)	$6.95
3/8EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
1/2 x 9EE (1/2" x 9" Eye to Eye Turnbuckle)	$9.95
1/2 x 9EJ (1/2" x 9" Eye & Jaw Turnbuckle)	$10.95
1/2 x 12EE (1/2" x 12" Eye & Eye Turnbuckle)	$12.95
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle)	$13.95
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle)	$16.95
3/16" Preformed Guy Grip	$2.49
1/4" Preformed Guy Grip	$2.99
6" Diam - 4 ft Long Earth Screw Anchor	$19.95
500 D Guy insulator (5/32" or 3/16" Cable)	$1.99
502 Guy Insulator (1/4" Cable)	$3.49
5/8" Diam - 8 ft Copper Clad Ground Rod	$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	$.32/ft
HPTG4000 Guy Cable (4000 lb rating)	$.52/ft
HPTG6700 Guy Cable (6700 lb rating)	$.72/ft
9901LD Cable End (for 2100/4000 cable)	$9.95
9902LD Cable End (for 6700 cable)	$11.95
Socketfast Potting Compound (does 6-8 ends)	$16.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$29	$49	$69	$89
.18 in Wall	$49	$89	$129	$149
.25 in Wall	$69	$129	$189	$249

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

CIRCLE 52 ON READER SERVICE CARD

bracket, a "unimount" for mirrors or luggage racks, an L-bracket for side mounting on RVs, and a through-the-roof gasket. The basic antenna is priced at $49.95.

For more information, contact American Antenna Corp., 1500 Executive Drive, Elgin, IL 60123.

AEA Antennas. AEA is probably best known to amateurs for its line of multimode data controllers; Morse keyers; packet, FSTV, and FAX gear; antenna tuners; and IsoPole™ VHF/UHF antennas.

Recently, the firm has expanded its antenna line to include a number of 50, 144, and 430 MHz Yagis and mobile "eggbeater" antennas. The new antennas are the result of AEA acquiring rights to the M2 Enterprises antenna line from Mike Staal, K6MYC, the founder and antenna designer of KLM antennas. A recent AEA flyer shows that three 6 meter Yagis with up to 11 elements, and five 2 meter Yagis having up to 22 elements (two of these with circular polarization), are offered. A mobile omnidirectional, horizontally polarized 2 meter eggbeater is also offered, as are Yagis and a mobile eggbeater for 430 MHz.

Some of the features of the M2 antenna line include electronically tuned baluns and driver elements, stainless steel hardware in critical areas, driven-element housing cavities filled with silicon dielectric for weather resistance, swaged boom sections for good structural strength, and "O"-rings on all connectors.

A new addition to the line is the AEA 430-16. It is a computer-optimized Yagi designed for ATV operation, DXing on 432 MHz, and satellite transmit/receive on 439.5 MHz. The 16-element antenna has a claimed 14.3 dBd gain and handles 250 watts. It has a butterfly dipole driven element and covers 420-440 MHz. Price is $119.95.

For a catalog and specs, contact Advanced Electronic Applications, Inc., 2006 196th St. S.W., Lynnwood, WA 98036.

Pauldon Associates Catalog. I noticed that in a recent catalog, in addition to their mainstay products—VHF/UHF amplifiers and receive preamps—the firm also offers a variety of antenna relay switch boxes.

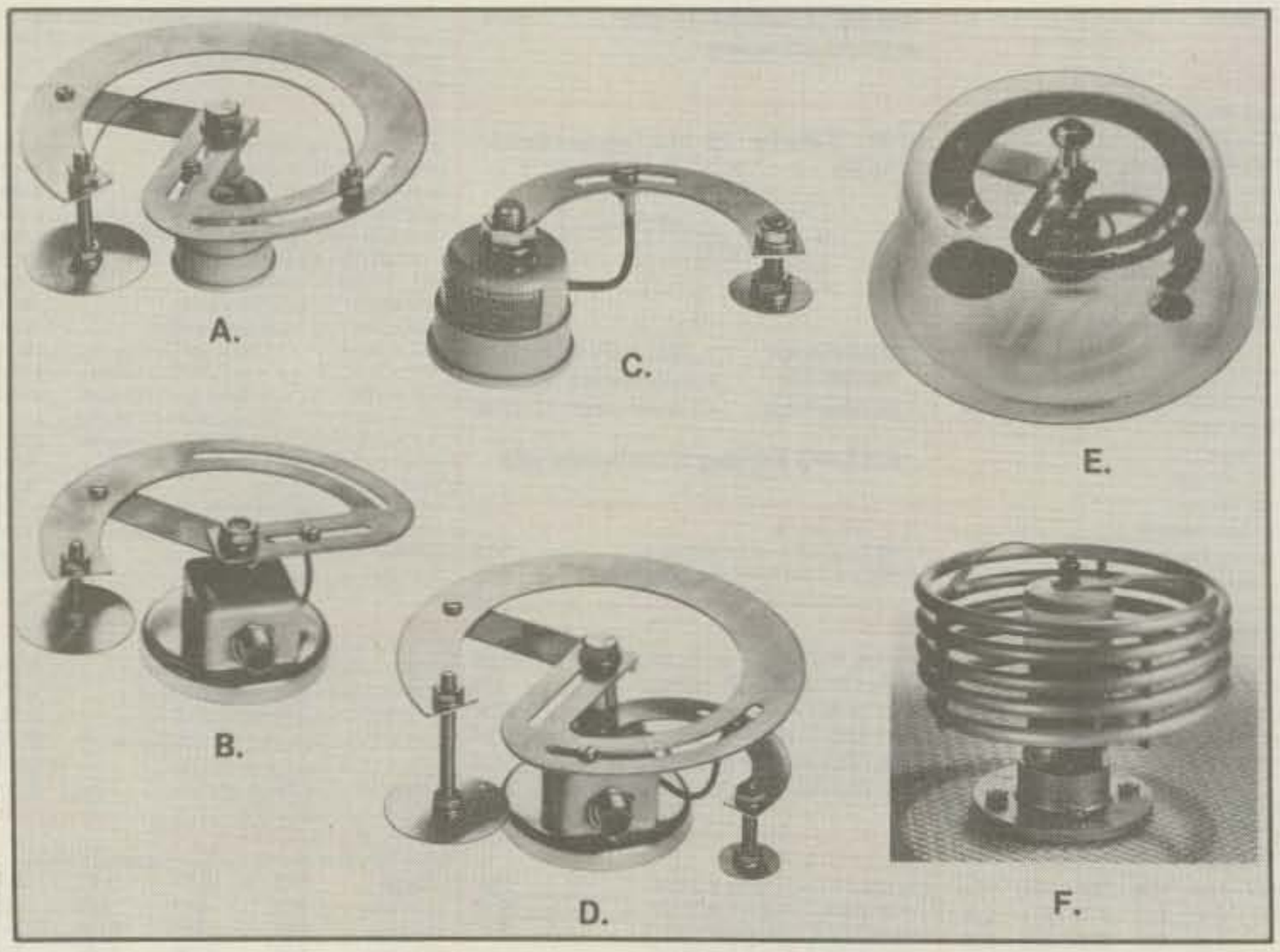
Various control boxes and antenna-mounted relay models are offered for transmit/receive (T/R) switching for use on any frequency up to and including the 902-928 MHz band; they're also working on a 1.2 GHz version. Models are available for RF sensing as well as standard voltage-controlled switching. Various models are available priced from $39 to $189; custom models are also available.

For more information, contact Pauldon Associates, 210 Utica St., Tonawanda, NY 14150.

RadioKit Catalog. A new RadioKit catalog has news that the firm has moved to a new store near Interstate 93, at 15 Londonderry Rd., Unit 8, Londonderry, NH 03053. The mailing address (Box 973, Pelham, NH 03076) remains the same.

RadioKit is a good source of hard-to-find radio and antenna parts, hardware, and supplies. Among the items they stock that are of special interest are R-X noise bridges, solid-state T/R switches, baluns, FET dip oscillators, variable capacitors, RF transmitting capacitors, and roller variable inductors.

RadioKit also stocks RF chokes, coax/RF relays and switches, inductors, wire, ferrite beads, filters, antenna coils and traps, antennas, antenna tuners, and ground rods. A number of kits of various types are also handled.



The Untennas™, based on the DDRR design, are described in the text. These antennas are offered in several models to cover frequency ranges of 27-85 MHz, 115-170 MHz, 210-240 MHz, and 400-470 MHz. The antennas shown in this photo are the model (A) CR2A for 115-170 MHz; (B) CR3A for 210-240 MHz; (C) CR4A for 400-470 MHZ; (D) CR2/4A Dual Band for 115-170 MHz and 400-470 MHz; (E) CR2/4A Dual Band with protective radome; and (F) CR109A for 27-85 MHz, with optional ground plane. Note that in (E) the transparent radome is for photographic purposes only (the real ones are opaque), and that in (F) the number of turns of the helical radiating element varies from three to five depending upon the actual design frequency. (Photo courtesy Com-Rad Industries)

New MFJ SWR/Wattmeters. A recent bulletin from MFJ shows that they are now using a new peak- and average-reading cross-needle SWR/wattmeter in four top-of-the-line MFJ tuners. With the new meters, a set of pushbuttons let you select high or low power ranges, meter lamp on or off, and peak or average power readings.

The MFJ tuners with the new peak-reading meter include the MFJ-949D 300 watt tuner, the MFJ-962C 1.5 KW tuner, the MFJ-986 3 KW "Differential-T"™ tuner with roller inductor, and the MFJ-989C 3 KW roller inductor tuner.

Incidentally, in last September's *CQ*, John J. Schultz, W4FA, reviewed the MFJ-986 Differential-T tuner, along with the MFJ-264 dummy load; this tuner includes the new peak-reading circuitry. In the course of testing the tuner, he checked the metering against commercial-quality power/SWR units, and was impressed with the accuracy of the tuner's metering circuitry. The SWR and power readings were both quite close in terms of both accuracy and reliability to those obtained with the commercial equipment.

Software Notes

G and G Products. G and G Electronics of Maryland now offers the communications terminal/interface systems, operating programs, and Morse code tutors that were formerly manufactured by Microlog.

These include ART-1, a complete communications terminal for sending and receiving CW, RTTY, and AMTOR, for use with the Commodore 64/128 ($199); AIRDISK, an operating program for use with interface hardware and either the Vic-20 or Commodore 64/128 ($39.95); AIR-ROM, a cartridge version of AIRDISK for the C64/128 ($59.95); AIR-1, a complete interface system for CW, RTTY, and AMTOR, for the Vic-20 or C-64/128 ($199); and SWL, a receive-only cartridge for CW, RTTY, and AMTOR for the C-64/128 ($64). RTTY capability on all units includes both Baudot and ASCII. G and G also offers Morse Coach, a complete cartridge-based teaching and testing program for the C-64/128 ($49.95).

For more information and spec sheets, contact G and G Electronics of Maryland, 8524 Dakota Drive, Gaithersburg, MD 20877.

QSO Tutor. E. Jeff Duncan, Jr., N4CST, offers QSO Tutor for the IBM PC and compatibles. The program is available in separate versions for each license class (Novice, Technician, General, Advanced, and Extra) and is designed to run on IBM compatible PCs with CGA, EGA, or VGA graphics capability and at least 256K of memory. It is also usable with monochrome monitors and non-graphics computers.

According to Jeff, while many programs have been written to cover the Morse code portion of the amateur license exams, no "study oriented" programs have been written for the theory portion. QSO Tutor provides a complete library of all of the questions in the pools for each class, as well as the associated figures in full-screen, four-color graphics, and explanations for appropriate questions.

A typical initial session would be a random selection from the total question pool. After trying a portion or all of the pool, you can request a detailed score in which each of the technical sections are analyzed individually. The program depicts results in a bar graph showing the sections requiring additional

Included in this photo are several of the MFJ tuners which incorporate the new MFJ peak-and average-reading cross-needle SWR/wattmeter. MFJ tuners with the new peak reading include the MFJ-949D, MFJ-962C, MFJ-986, and MFJ-989C. (Photo courtesy MFJ Enterprises)

study. In following sessions, you can select sections in which to concentrate study; only appropriate questions will be presented. Any session can be interrupted at any time.

Sample tests can be taken and will be randomly generated from a "seed" using the PC's system time function. As a result, millions of sample test combinations exist and are comprised of the appropriate number of questions from each section of the question pool. An analysis of the sample test is also available showing detailed percentages by section and suggesting areas for additional study. Written tests with graphics and answer sheets may be printed out.

The program is priced at $29.95 per license class, postpaid. For more information, contact QSO Software, 208 Partridge Way, Kennett Square, PA 19348.

MULTIFAX Updates. Elmer W. Schwittek, K2LAF, continues to upgrade his MULTIFAX weather facsimile software for the IBM PC and compatibles, which we first took note of in the August 1987 column. His software records, views, manipulates, saves, and prints weather facsimile (WEFAX) pictures and charts from satellite and ground-based transmissions. MULTIFAX functions with all known FAX signals, including FAX from the NOAA geosynchronous (GOES) and polar orbiting weather satellites, US Navy HF WEFAX broadcasts, and similar transmissions.

In all MULTIFAX versions the FAX signal is sampled and stored in memory 1280 times per recorded FAX line. During recording the proper samples are selected from storage so that the full view is displayed. During subsequent viewing you may choose to display a greater level of detail and ultimately display all samples (one pixel per sample) at the expense of viewing a reduced picture area. MULTIFAX offers options that allow a tradeoff between the number of colors and length of recording. Thus, if you have a computer with 640K of memory, you can record about four "pages" (full screens) of two-color weather charts or two pages of four-color weather charts.

The programs are available in at least two different versions and on 5.25 or 3.5 inch disks. A 40-page instruction book is included which contains sections describing computer facsimile systems, a program tutorial, a description of the required interface hardware and sources, and operating techniques and timing.

MULTIFAX is priced at $49 for first-time buyers; users who have purchased earlier versions are charged $20. A 5.25 inch demo disk that contains sample views using MULTIFAX is available for $2.00. For more information, contact Elmer W. Schwittek, K2LAF, 2347 Coach House Lane, Naples, FL 33942.

WordStar Add-Ons. Last month we briefly reviewed WordStar 5.5, our personal choice in general-purpose wordprocessing software. Like many top-rank, flexible programs, it has spawned a number of so-called "enhancement programs" that are designed to work hand-in-glove with it. We'll take a look at a couple of them here.

MouseMenus™. This program provides pop-up menu support for WordStar™ from version 3.3 up, as well as WordStar 2000. The program allows you to use a mouse to perform virtually all of the functions that the wordprocessor normally makes available through the somewhat awkward CTRL and function key combinations. Because all of the program's functions may be accessed through MouseMenus, wordprocessing speed and ease are significantly increased for both the novice and the expert.

For example, you can insert any of the "dot commands" that WordStar uses by simply moving and clicking the mouse. Pop-up menus provide plain English choices that automatically place the correct dot command in the proper position at the beginning of a line or page. With the program you don't need to remember obscure commands and your eyes don't have to leave the screen to locate often awkward key combinations.

MouseMenus requires PC- or MS-DOS 2.0 or higher. It works with any Microsoft (two-button) or Logitech (three-button) mouse and uses less than 70K of memory. The program is priced at $49 and is available from MouseMenus, Inc., P.O. Box 1020, Brookline, MA 02146.

MouseMenus also is available for other popular commercial programs such as WordPerfect™, MultiMate Advantage II™, and dBase IV™.

Definitions Plus!™. This software, which is best described as "a dictionary on a disk," contains the complete electronic *American Heritage Dictionary*, Office Edition. It thus provides instant reference dictionary information either as a stand-alone product or as a "pop-up" over most popular wordprocessing packages, spelling checkers, and electronic thesauruses, including WordStar. (WordStar 5.5, which I reviewed, offers limited word definitions both in the thesaurus and in the spellchecker.)

Definitions Plus! displays multiple word definitions, plus full dictionary information (including parts of speech, usage notes, inflected forms, citations, etc.) for over 115,000 words and word forms. Thus, using user-defined "hot keys," you can retrieve and review detailed information about a word within your document, spellchecker, or thesaurus; select the exact word you need; verify the correct usage of a word or phrase; and even strengthen your verbal skills and your knowledge of the English language.

The program requires DOS 2.0 or higher, about 99K of available computer RAM, and a hard disk—this because the 115,000-word dictionary requires slightly under 2.3 megabytes (MB) of disk space. Program is priced at $149; a free demo disk is available.

For information, contact DCR/WordScience Corporation, 1090 Shary Circle, Suite 200, Concord, CA 94518.

Short Bursts

How Many PCs? Have you long since given up guessing how many PCs there are in operation around the world? According to information published by the International Data Corporation (IDC) of Framingham, MA, worldwide shipments of PCs in 1988 were estimated at 20 million, and are expected to grow to 23 million by 1990! The top five PC markets are in the United States, Britain, West Germany, Japan and France.

Some interesting facts brought out by the IDC bulletin include the fact that the United States and Britain hold 80 percent of the world market for PC shipments. Surprisingly, Japan has only *6 percent* of the total worldwide market. The lack of growth of PCs in Japan is probably because of a lack of software compatibility and standards there, as well as the difficulty of translating software into Kanji.

As you might have guessed from the computer sales booths at most hamfests of any size, manufacturers in Taiwan and Korea have become increasingly important players in the worldwide PC market. Over 2 million PCs were exported from Taiwan in 1988, and most of these went to the U.S. and Europe. A total of 61 percent of all PCs shipped worldwide are IBM or compatible PCs.

According to IDC, 35 percent of the PCs shipped in 1988 were fast 80286 microprocessor-based machines, while 6 percent were even faster 80386-based systems. Demand for the 80386 machines was low mainly because of chip shortages and user caution over the new "Micro Channel" architecture.

Wrapping It Up

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

Overheard: If it jams, kick it. If it breaks, pitch it out. After all, wasn't it going bad anyway?

73, Karl, W8FX

PACKET USER'S NOTEBOOK

BY BUCK ROGERS, K4ABT

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Higher Speeds For Trunks

Last month we started the new year with the construction of the CONVERS node that we talked about in the December issue. This month we are going to interface the CONVERS into a 2400 BPS system, and while doing so, we will cover some of the add-on 2400 BPS modems and how they are easily added to some of the popular TNCs.

Most of the TNCs and modems covered in this month's column have been installed by me, but I must caution the reader: You will be required to perform precision cuts of traces and soldering of tiny connections. There are certain requirements and cautions that must be considered when modifying equipment of today's design characteristics. The tiny circuit traces on the printed circuit boards (PCBs) are sometimes fragile, and a slip of the hand can cause damage that may not be apparent until it is time to test the mod. With this in mind, it would be in the best interest of the reader to proceed with caution. I'll describe these mods as best I can. However, I cannot be responsible for damage from errors, omissions, and/or accidents.

Higher Speeds For The Trunks

The 2400 BPS system is not new to packet. However, its popularity has just begun to emerge into a useful and dependable mode. This is not saying that it is the way to go for the backbone and trunk routes, but it is a faster way to have QSOs and to pass files direct, station-to-station, and for the LAN frequencies.

After the smoke cleared from the recent "networking conference" in Colorado, several different ideas and concepts (some new) related to the high-speed trunking systems emerged.

DRSI with their "AWESOME I/O" card and Kantronics with their "de 56" platform version of the high-speed modem driver are two of the systems that were introduced. I've not heard a lot about the 56 KB modem that was being distributed by GRAPES, except that a few of them are being installed into the LANs that neighbor Atlanta. If I hear any news of this system, I'll put it into a future issue.

506 Pheasant Ridge Drive, Warner Robins, GA 31088

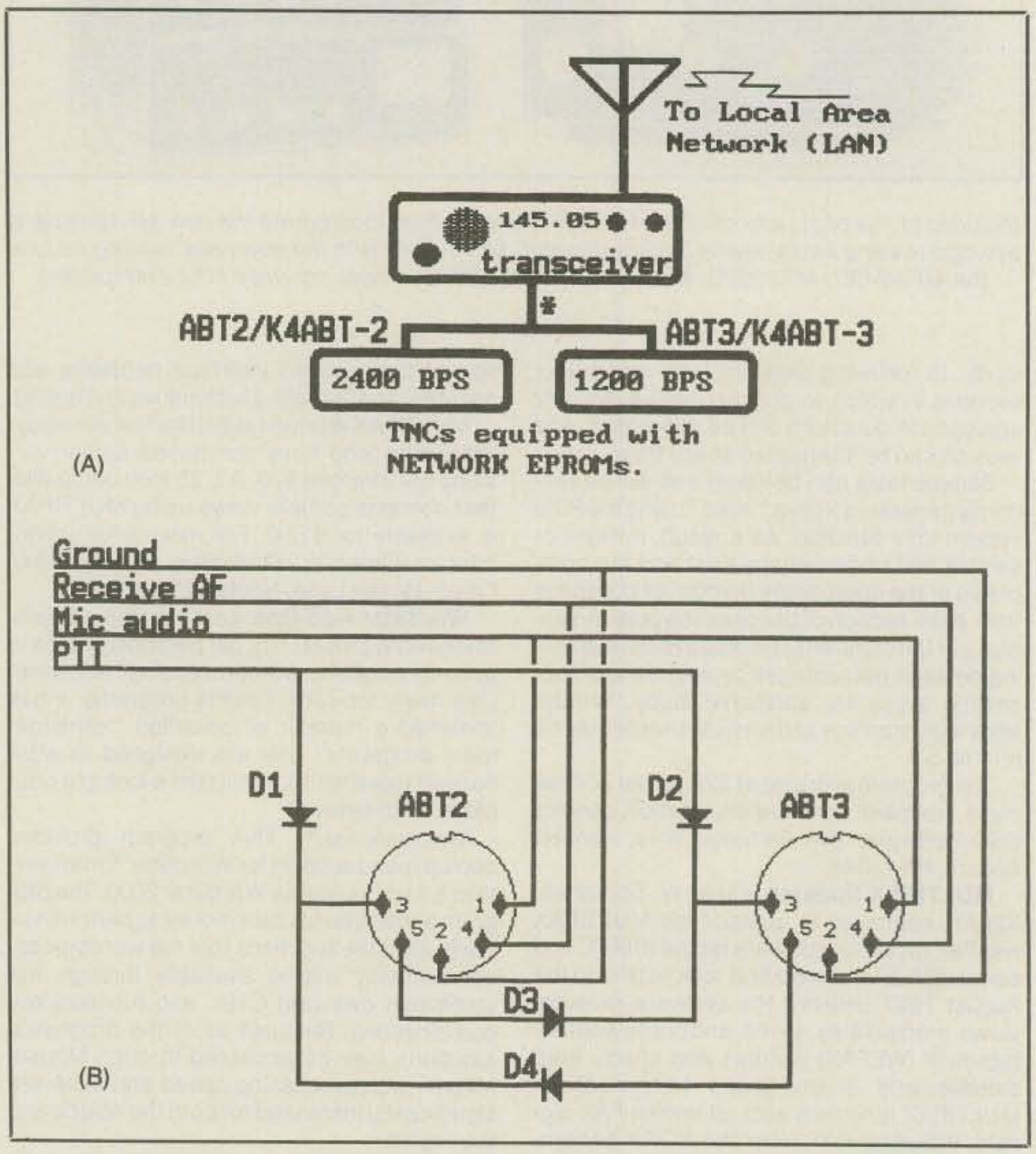


Fig. 1(A)- Single-frequency, dual-speed "gateway" 1200/2400 BPS. Either TNC can support a network EPROM or CONVERS node, and one will connect to the other via the radio port access. (B)Special radio port interface cable (note diodes are 1N4004).

TAPR indicated that progress is being made with the 9600 BPS 2 meter transceiver and it will be released for beta-tests soon. Some of the manufacturers I spoke with after the networking conference indicate they will probably produce and distribute a version of this RF modem. Indications are that the cost to the end user is broad and can range from $300 to $500, depending on the source of the 9600 BPS transceiver.

With companies planning to manufacture and market these radios, the intent is to produce them with the end user in mind, but likely as not, the first run will wind up in service on the mountain as a node, to support a backbone.

The HF and VHF Alternative

Now consider, if you will, what is going to happen to packet at the user level over the next three to five years. There will be all kinds of super trunks, backbones, and mucho-megabyte delivery systems.

The end user (packeteer) will be using the TNC that he or she bought prior to 1989. This TNC will let data flow onto the CRT at a pace that we can read. Aside from that, perhaps the next fellow will

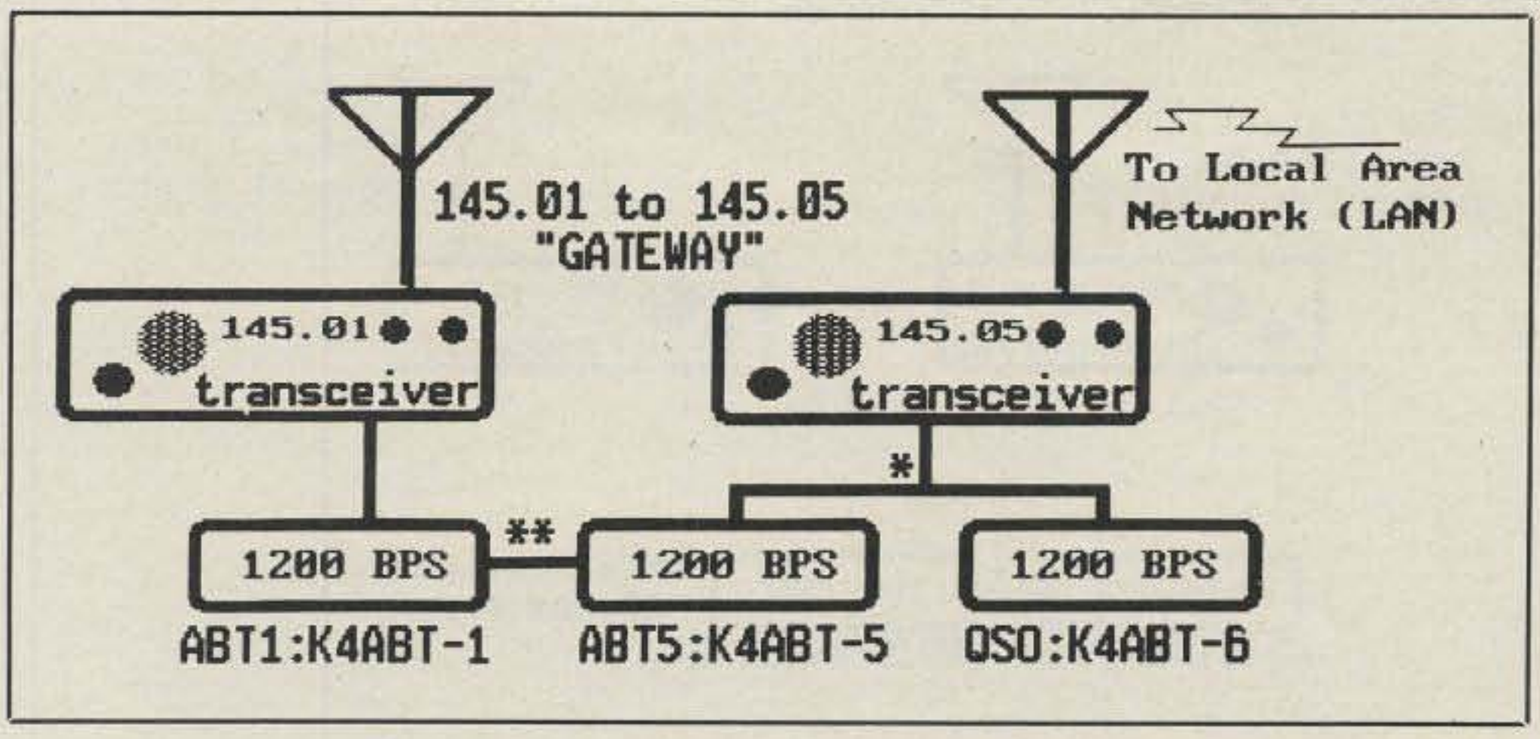


*Fig. 2- This drawing illustrates how the CONVERS node "QSO" is attached to network node ABT5. (See fig. 1(B) for description of the special radio port interface cable. **See "special" RS-232 cable in last month's column.)*

want the best of both worlds and use a speed which will support file transfer and QSOs.

Let's Talk Modems

The 56,000 BPS modems being distributed by GRAPES, or the 9600 BPS modems from TAPR and other sources, can fill the need for backbone and trunking circuits.

There are new platform modem drivers/TNCs from DRSI and Kantronics which can be used with these modems to provide the trunking in a UHF environment. There are some very effective 9600 BPS RF modems from AEA, PACCOMM, and GLB that support higher speed trunking for UHF also. I will cover these and other backbone/trunking methods in an upcoming issue, but for now let's concern ourselves with the pressing need of higher speeds for the end user. This is where this month's "Packet User's Notebook" comes to grip with reality.

Higher Speeds For The End User

This article is not about the high speeds for the backbone and trunks. This month's column deals with the need for a faster and easier *user access* to and from these high-speed trunks and gateways. At the same time it will provide for a means to deliver QSO packets, point to point, in an orderly manner and still maintain some continuity to the text as it moves across the screen. A case in point is when we are in a QSO on the QSO, CONVERS, and CONFERENCE nodes. This brings us to one of this month's topics.

Quite likely, as you read this month's column, Jack, N7OO, has just completed the installation of the 2400 BPS CONVERS node. The CONVERS node conversion which was discussed in last month's column and this month's 2400 BPS conversion were made to the TNC. I was hoping to have the TNC ready by Christmas, and that is still my goal, and at the same time Jack has been preparing the converted CB radio for this 2400 BPS CONVERS node. The TNC must be interfaced into a rather complex node cluster at the N7OO location.

As Jack, myself, and many other SYSOPs will attest, the diode matrix that is constructed can become somewhat of a diode headache. For the SYSOP who never documents this diode complex, and configuration, the headache could soon become a nightmare.

The new CONVERS node is being added to 10 meters, similar to the CONF node that is attached to the AZSE node. Many of us frequently use the CONF roundtable node. The 2400 BPS, AZ24 CONVERS node will operate on or about 28.100 MHz LSB.

As many HF packeteers are aware, we are already using 1200 BPS on 28.195 MHz LSB and on 28.200 LSB. There are a few stations and BBSes showing up on 28.205 MHz LSB. The large majority of the 1200 BPS users are to be found on 28.195 LSB.

The introduction of a 2400 BPS CONVERS node may prove to be a welcome addition at 10 meters. 2400 BPS is Quadrature Phase Shift Keying (QPSK). It is legal on 10 meters or above 28 MHz. The ability of the PSK signal to cut through the QRM may also prove to be an asset to the HFer. The important reason to use 2400 BPS at 10 meters is because at varying times of the day, these frequencies present some QSB to the user's signal, and the quicker a packet can be moved between stations, the easier it is to maintain continuity of a QSO.

Several TNC manufacturers produce and supply a 2400 BPS/PSK add-on modem as an option. This add-on can significantly increase the effective throughput of your station when it is activated and used in a direct connect application. The

ease at which we pass binary files using 2400 BPS PSK is representative of just how well it functions as a point-to-point packet communications mode.

DRSI of Clearwater, Florida is one manufacturer who builds an internal TNC called the PC*Packet Adapter. This TNC plugs into a vacant socket of the PC mother board. DRSI is now offering an add-on externally-connected modem, model number M-24. The installation of the M-24, 2400 BPS modem is simple, and no soldering or cutting of the circuit board is necessary. Suggested list price is $99.95, and the modems are available from Digital Radio Systems Inc., 2065 Range Road, Clearwater, FL 34625. The toll-free order line is 1-800-999-0204.

With the MFJ TNCs the modem is installed inside the TNC, and the late-model MFJ TNCs do not require any cutting or mods to the PCB. The only installation requirement is for the user to remove two or three push-on jumpers from the header "staking pins." The staking pins where the jumpers were located now become the support platform as well as the connecting points for the new modem. Switching between 1200 BPS and 2400 BPS is achieved by virtue of the DIP switches on the rear apron of the TNC. With some help from your TAPR TNC-2 manual, the MFJ-2400 add-on modem can be added to most any TNC-2 clone.

In the case of the MFJ-1278/Turbo, the switching between speeds is software commands, similar to commands used to switch between radio ports of the MFJ-1278.

The MFJ-1270B and MFJ-1274 will use the same MFJ-2400 add-on modem that is used in the MFJ-1278/Turbo. The suggested price of the MFJ-2400 add-on modem is $69.95. (MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762. Toll-free order line is 1-800-647-1800.)

Kantronics was one of the early producers of 2400 BPS on VHF with the KPC-2400 TNC. This TNC can operate 300 BPS, 1200 BPS, and 2400 BPS/QPSK, and performs well at any of these speeds.

In addition to the KPC-2400 TNC they also support two of their other TNCs with an add-on modem called the KM-2400, which fits inside the TNC. The modem is attached to staking pins that are provided inside the KPC-4 and the KAM.

The installation of these modems requires the cutting of three traces on the PCB of the KPC-4, and five traces on the PCB of the KAM. With the addition of the

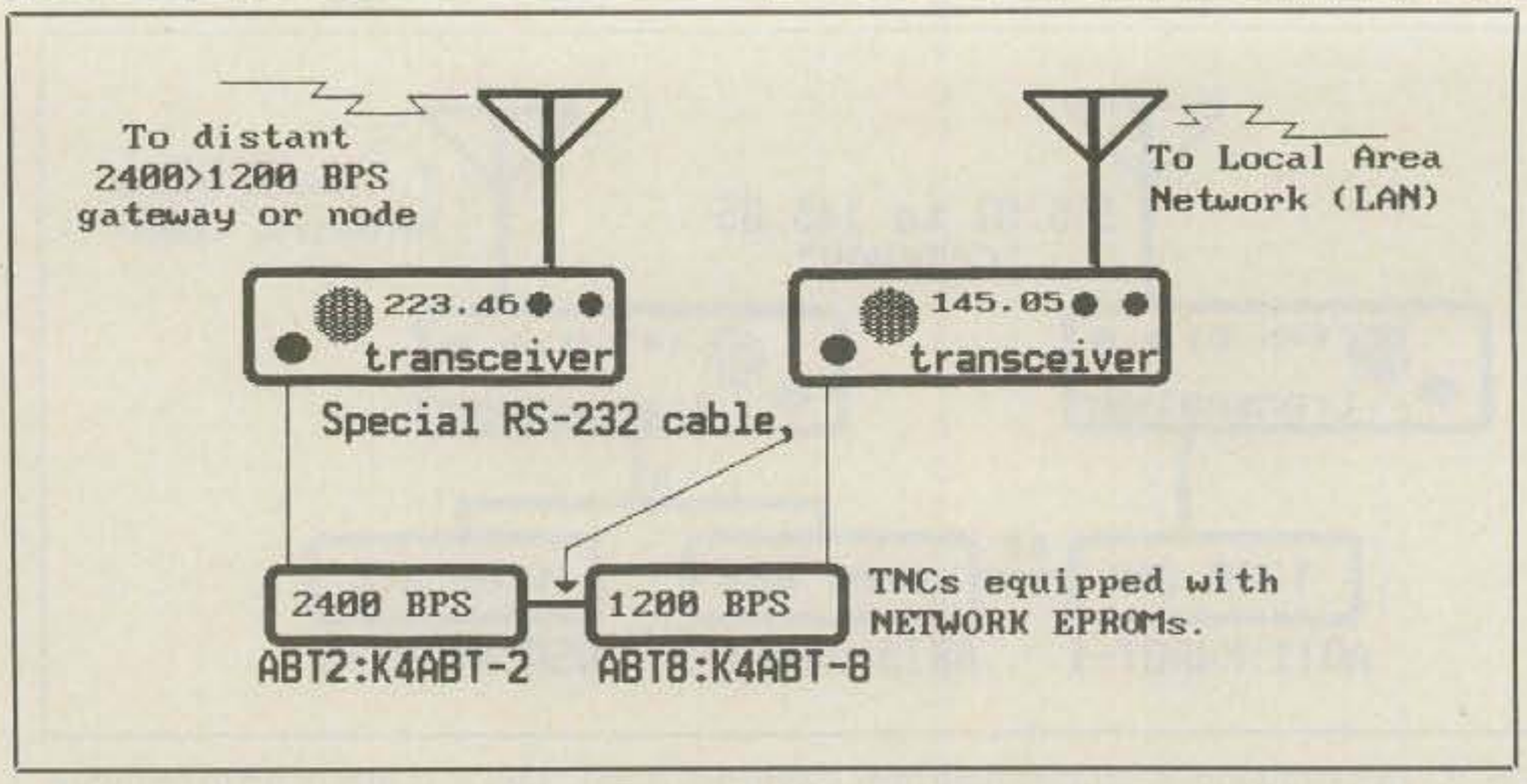


Fig. 3- VHF to UHF, and 1200 BPS to 2400 BPS "gateway." Novice participation into the 145.05 MHz LAN via the 2400 BPS "trunk" port on 223.460 MHz.

KM-2400, the use of the 2400 BPS modems can be placed into action by two software commands.

Using a slightly different approach, the Kantronics TNC-2400 add-on modem can easily be added to the Heath HD-4040, TAPRTNC-1, TAPR TNC-2, AEA PK-1, AEA PK-80, and MFJ-1270. The instructions that are supplied with the Kantronics TNC-2400 are well documented to provide easy installation in these TNCs. *Use extreme caution when making the cuts to the traces on the circuit boards!* The suggested list price of the TNC-2400 add-on modem is $69.95. (Kantronics, Inc., 1202 E. 23rd Street, Lawrence, KS 66046. The order line is 913-842-7745.)

Adding 2400 Baud Modem to the AEA PK-232

To add the TNC-2400 modem to the AEA PK-232 is a bit more time consuming than the addition to the other TNCs. The following 2400 modification to put the PK-232 on 2400 BPS was worked out by several DX PacketCluster™ users in the Atlanta area. The final solution to the mods to the PK-232 was by Dean Fredriksen, W8ZF. Dean has provided us with the documentation, explaining how he and other PacketCluster users added the TNC-2400 to the PK-232.

I. Modifications/Settings on the Kantronics 2400 BPS Modem Board

1. Add a .005 uF capacitor in parallel with C19 (or alternately, replace C19 with a .0068 capacitor).

2. Add a 0.1 uF capacitor in parallel with C18 (or alternately, replace C18 with a 0.1 or 0.12 capacitor).

3. Cut the jumper next to the 20-pin connector that grounds the trace coming from pin 27 of U3 (P423).

4. Connect a jumper from the pad coming from pin 27 of U3 (in step 3) to the pad that runs to pins 1 and 2 of the 20-pin connector.

5. Jumper K1 will be set as needed for audio level.

6. Jumpers K2-K5 in position 1.

II. Wiring on PK-232

1. Wire a 20-pin header to mate with the Kantronics 2400 BPS modem board by connecting the following wires. (Be careful not to short adjacent pins or to overheat the IC's and sockets!)

a. Center pin of JP6 to pin 1 of the 20-pin modem header.

b. Pin 17 of U7 to pin 5 of the 20-pin modem header.

c. Pin 3 of U8 to pin 12 of 20-pin modem header.

d. Pin 14 of U7 to pin 14 of the 20-pin modem header.

e. Center pin of JP4 to pin 17 of the 20-pin modem header.

f. Inside pin (towards the center of the PK-232 board) of JP4 to pin 18 of the 20-pin modem header.

g. Center pin of JP5 to pin 19 of the 20-pin modem header.

h. Pins 2, 3, 4, 6-11, 13, 15, 16, and 20 will have no connection.

2. Wire the 5-pin plug/pigtail supplied with the modem board to the following points on the PK-232:

a. Orange wire of the 5-pin plug to pin 1 of J4 (RX audio).

b. Red wire of the 5-pin plug to pin 2 of J4 (TX audio).

c. Black wire to the circuit-board ground foil surrounding the screw near J2 (Ground).

d. White wire to pin 14 of U19 (+ 5 VDC).

e. Yellow wire to pin 1 of U20 (– 10 VDC).

3. Set the following jumpers on the PK-232:

a. Remove the jumper on JP4.

b. Leave jumper on JP5 in the original position.

III. Plug the 20-pin header into the modem board, making sure that the pin numbers on both plugs agree.

IV. Plug the 5-pin plug into the modem board.

V. Set the audio jumper on K1 of the modem board for the proper level to drive your transmitter's audio input.

VI. You are ready to operate 2400 BPS QPSK!

Note: If a problem with level or operation is encountered, try moving the jumpers K2 through K5 to the alternate jumper position on the modem.

I suggest trying to find a ribbon cable and a self-piercing 20-pin header for the wiring in the PK-232. When the above is finished, simply typing HBAUD 2400 will put the PK-232 in 2400 BPS QPSK. The Kantronics 2400 BPS modem board is auto-switched in and out under software control. The on-board modem is used for 1200 BPS and below. Tie-wrap the loose wires into neat bundles and route them neatly.

The only known side-effect of this enhancement is that when MONITOR is turned ON in 1200 BPS, transmitted packets are also decoded and sent to the attached terminal. The packets are not shown when the monitor mode is disabled or when using 2400 BPS.—Dean, W8ZF.

The 2400 BPS CONVERS Node

All that is needed now to convert the TNC-2 that we have just modified to 2400 BPS is to install the EPROM that was discussed in last month's article. The next thing you will want to do is add a "gateway" to 2400 BPS from 1200 BPS. This way you can have the benefit of both worlds.

Those who wish to get across the LAN at a faster speed should try the 2400/1200 BPS gateway which I have illustrated in fig. 1(A). Fig. 1(B) gives you the wiring diagram of the "special" radio port interface cable. The diodes D1, D2, D3, and D4 are 1N4004. They are provided to prevent both of the node/TNCs from transmitting at the same time. Fig. 2 gives you another means to add the CONVERS node to one of the gateway ports without defeating the use of the gateway port.

1200 BPS to 2400 BPS Gateway

Let's add another touch of class to this node by building it into a medium-speed gateway to another LAN, or even a backbone. With the cost of some trunks and the high-speed modems, some user/SYSOP-supported systems may wish to consider this simple alternative solution. The requirement here is that both nodes be equipped with the network EPROM, and one of these nodes will also have a 2400 BPS modem installed in it. I'll circumvent the need for a lot of text by allowing fig. 3 to represent a thousand words. This illustration defines the manner in which this two-speed, two-frequency gateway is constructed.

Look for us on 10 meters and connect at either speed to one of the CONVERS nodes. "CONF" is the alias of the 1200 BPS CONVERSE node, and AZ24 is the alias of the 2400 BPS CONVERS node. That's it for this month. We're having fun at 2400 BPS/PSK!

73, BucK4ABT

AWARDS

BY DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for February is:

Ray Gomes, K9KKX
USA-CA All Counties #592,
ALL SSB, 11-9-88

"I was born in Honolulu, Hawaii on August 8, 1917. I became interested in radio as a child, listening to the early broadcast stations with the early crystal sets. A few years later, with the first all-band receivers, I listened for hours to the shortwave and amateur stations, logging whatever I heard. While in high school I purchased an amateur radio conversion kit with plug-in coils that tapped into the family radio for voltages. I listened for hours to amateurs working each other, but it was not until the late 1930s, when I enlisted in the Hawaii National Guard's 298th Infantry, that I became a radio operator. I learned the code from a native Hawaiian sergeant who was also an old time amateur. After a few months of training I was able to copy and send at 17 words per minute and took the amateur exam at the FCC office in the Aloha Tower in Honolulu. It was quite a thrill when my first ticket arrived in October 1938 with the call K6QMA (Hawaii's prefix was then K6) Class B (now General class). With a homebrew 6L6 tritet oscillator and a National SW3 receiver, plus a 40 meter center-fed Zepp antenna, I worked stations all over the world with 20 watts on 40 and 20 CW. I also operated the National Guard amateur station handling traffic to Washington, D.C., as well as handling traffic at the home station, and made BPL for handling more than 1000 messages a month.

"I was a civilian employee at the Pearl Harbor Naval Shipyard when the Japanese attacked on December 7, 1941. I had just driven a few miles to my home after working a ten hour night shift when the air attacks began. A rumor went out that an amateur was giving information to the Japanese navy. That evening, while I was at work, military intelligence personnel visited every amateur's home, and the first thing they did was feel the transmitter tubes. I did what most amateurs did; I donated my radio gear to the military.

"Some months later I enlisted in the Army Air Corps, 7th Air Force, at Hickam Air Base and was assigned to duty in the Air Base Squadron, which had two anti-

Ray, K9KKX, ready to brave the northern Illinois elements to run counties.

quated B-12 Martin bombers with two 30 caliber machine gun turrets and a couple of smaller airplanes. As a radio operator I got to fly in these bombers as well as in other aircraft like the B-17 Flying Fortress. Later I was placed on detached duty as radio operator with the 19th Troop Carrier Squadron which flew C-47's and LB-30's between the islands. A couple of years later I was transferred to the Barking Sands Air Base on Kauai, where I flew in UC-78's, C-47's, and B-24's of the Bomb Group stationed there, and even got to fly co-pilot once in a while in the UC-78's. I will never forget a flight at Hickam AFB when General MacArthur's chief of staff, a Major General Sutherland, flew our plane. This was one of the few times I ever wore a parachute. He had been a balloon pilot in World War I.

"I finally got my military discharge in 1945 and worked for about a year for the Hawaiian Air Depot at Hickam as a radar and radio equipment installer. I worked on fighter planes, transport C-54's, and bombers like the B-29, as well as on two of General MacArthur's planes—a C-47 and later a C-54. In 1949 I worked for a year for the American Graves Registration Service on the island of Saipan in the Marianas. I was given permission by the Navy to operate as KG6SB and made many AM contacts from Africa to all over the Pacific Islands and also to marines stationed in China.

"After the war, when amateur radio was once again authorized, I got the new call KH6IB which I held until 1955 when I moved to the Chicago area and got the call K9KKX. In that same year I attended a school of medical technology and worked for a year at Evanston Hospital, then for four years I was in charge of the Publications Division of the Chicago Natural History Museum (now the Field Museum). I later worked for a graphic arts camera manufacturer until I retired in 1982.

"I first ran into the county hunters on 40 meters CW when I worked a county hunter not far away who gave me all the information on county hunting. Later when I bought a Swan 500 and went on SSB, I ran into the 20 meter county hunter net as well as the CHC net on 3.943 MHz and began working the counties on SSB.

"In 1969 I drove to Milwaukee and picked up a Swan Cygnet and started mobile operating, attending the Mountain Home, Arkansas convention, where a little more than 15 mobile county hunters showed up. On the way down from Illinois I gave out my first counties while driving 70 miles per hour with two amateurs—one in Greenland and one in California—guiding me with their maps. Also on the way, my Hustler antenna bent over with the wind and speed, and I had to stop to return it to vertical. At the convention I learned about guying a mobile antenna, and I first made the acquaintance of a mobile-operator county hunter, Danny, K8DRO. Since then I have made many trips giving out counties in all states except North and South Carolina, California, Oregon, Washington, and Alaska. I enjoyed giving out counties more than collecting them, so it took me over 20 years finally to work them all. I attended annual conventions in Knoxville, Ft. Wayne, Peoria, Mission (Kansaa), and Idaho, as well as district conventions at Council Bluffs, Iowa, Joliet, Illinois), and Manchester, Tennessee, and had a wonderful time meeting all the county hunters.

"I will never forget the year my car engine burned out late at night while I was running counties on 20 meters. County hunters from New Zealand to England tried to help, and Marv, WB2SJQ, and Paul, W4YWX, phoned the Illinois state police and the local police. I soon had help and a tow to a nearby dealership. Another memorable moment occurred when a county hunter persuaded General Goldwater, K7UGA, to QSY to the county hunters net to work the mobiles from the Air Force tanker he was flying back from Vietnam. I was among those who were able to work him.

"I wish to thank all the mobilers as well as the many other station operators, including WA3TUC, K9DCJ, and many others too numerous to mention. A big 'thank you' must also go to the hard-working net

333 South Lincoln Ave., Mundelein, IL 60060

controls who seldom get the credit they deserve, for helping me work all the counties. In September 1988 Dick, NG9L, went out of his way to give me Acheson and Nodaway counties in Iowa, two of my last three. Then on October 17, 1988 Clyde, KAØNVT, made a special trip to Sioux county, North Dakota, my very last one. I anxiously waited in my mobile station, and finally ended my 20-year quest with receipt of Clyde's 5-7 signal report from Sioux county.

"I also wish to thank my dear wife and my daughter and four sons who had so much patience putting up with all my trips and radio operating. I now am planning to work them all again for that 'second time around.' Along with my interest in county hunting and county hunter net operations, I have also been a member of the YLISSB and operate extensively on the Century Club, OMISS, and 10-10 International nets. I have given many 10 meter county contacts to European, South American, and Hawaiian amateurs as well as other DX stations.

—73, Ray, K9KKX."

USA-CA Honor Roll

3000		1000	
NØCYB	666	VE1GU	1084
N5JRH	667	NØCYB	1085
		N4UMR	1086
2500		N5JRH	1087
NØCYB	739		
N5JRH	740	**500**	
NC2O	741	DL1LD	2361
		NØCYB	2362
2000		HAØHW	2363
NØCYB	808	N4UMR	2364
N5JRH	809	RA6AR	2365
		HA5NK	2366
1500		DK2OY	2367
VE1GU	894	N5JRH	2368
NØCYB	895		
N4UMR	896		
N5JRH	897		

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to *CQ* is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Communications, 76 North Broadway, Hicksville, NY 11801, USA for $1.25. To qualify for the special subscriber rate please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending an SASE to Dorothy Johnson, WB9RCY, USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060, USA. DX stations must include extra postage for airmail reply.

Awards Issued

Richard M. Sears, KB9ER, took the final step in his quest and claimed USA-CA All Counties #636, All SSB, dated 10-11-89.

W.R. "Woody" Crane, NØCYB, did it all in one giant leap by claiming USA-CA All Counties #637, USA-CA 3000 #666, USA-CA 2500 #739, USA-CA 2000 #808, USA-CA 1500 #895, USA-CA 1000 #1085, and USA-CA 500 #2362, All CW, dated 10-12-89.

Harold Gene Kennedy, N5JRH, also made a clean sweep of it and received USA-CA All Counties #638, USA-CA 3000 #667, USA-CA 2500 #740, USA-CA 2000 #809, USA-CA 1500 #897, USA-CA 1000 #1087, and USA-CA 500 #2368, All SSB, dated 10-30-89.

Ken Hanson, NC2O, updated his record and received USA-CA 2500 #741, All Mobile to Mobile, dated 10-31-89.

Ronald P. Smith, VE1GU, filed his good application for USA-CA 1500 #894, and USA-CA 1000 #1084, Mixed, dated 10-10-89.

Leonard A. Postage, N4UMR, got off to a good start in his quest for all counties and received USA-CA 1500 #896, USA-CA 1000 #1086, and USA-CA 500 #2364, All SSB, dated 10-13-89.

USA-CA 500 certificates went to:

Erich Wagner, DL1LD, USA-CA 500 #2361, Mixed, 10-6-89.

W.R. "Woody" Crane, NØCYB, USA-CA 500 #2362, All CW, 10-12-89.

Szabo Laszlo, HAØHW, USA-CA 500 #2363, Mixed, 10-13-89.

Leonard A. Postage, N4UMR, USA-CA 500 #2364, All SSB, 10-13-89.

Tom V. Stepanov, RA6AR (ex-UA6APP), USA-CA 500 #2365, Mixed, 10-17-89.

Gabor Lukacs, HA5NK, USA-CA 500 #2366, Mixed, 10-20-89.

Manfred Petersen, DK2OY, USA-CA 500 #2367, Mixed, 10-27-89.

Harold Gene Kennedy, N5JRH, USA-CA 500 #2368, All SSB, 10-30-89.

Awards Available

COP (Certificate of Proficiency) Awards, Golden Badge Award. The COP and Golden Badge Awards are sponsored by the United States Section of the International Police Association Radio Club. They are designed to enhance the spirit of friendship among radio amateurs throughout the world according to the motto of the IPA—*Servo per Amikeco* (Esperanto, meaning service through friendship).

The COP and Golden Badge Awards are open to all radio amateurs and SWL stations throughout the world. Award hunters must work IPA/RC members. A list of IPA/RC member stations is available from N6EIk, WA8VDC, or DK5JA for an SASE/US or 2 IRCs.

The awards have six steps, or classes. The object of the awards is to eventually work an IPA/RC member in each of the 50 states of the United States of America. Awards may be earned for CW only, SSB only, or mixed CW/SSB.

1. COP 5 (Certificate of Proficiency) Award—Basic award issued for working one IPAC/RC member in 5 different states of the U.S.A.

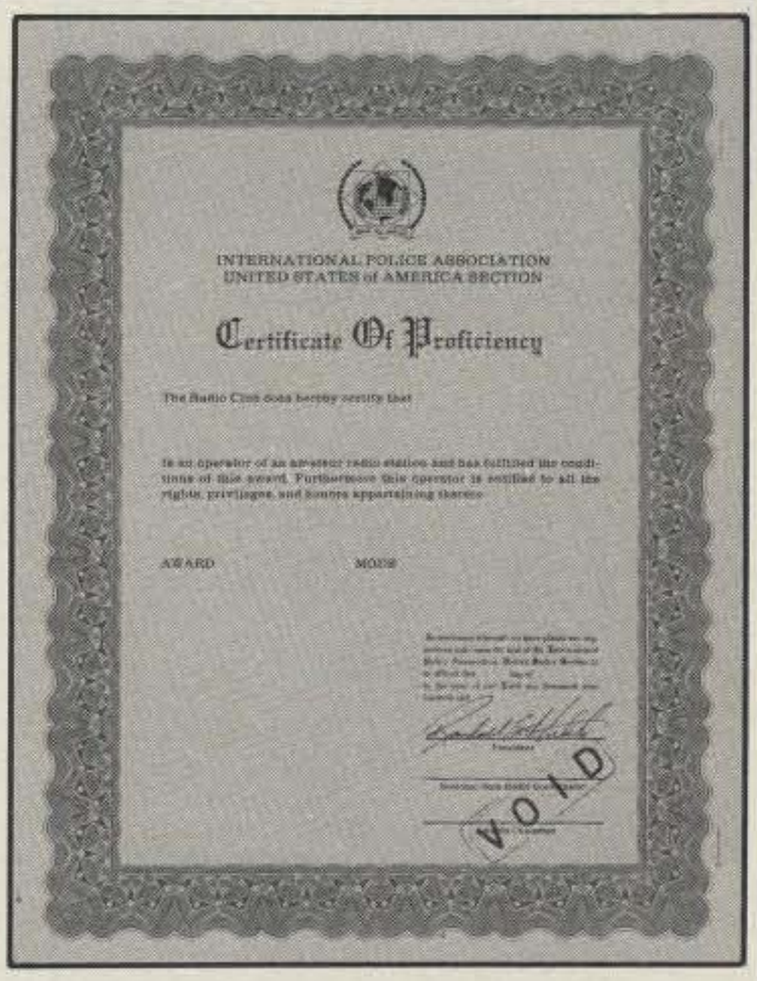
2. COP 15—Award issued for working one IPA/RC member in 15 different states of the U.S.A.

USA-CA Special Honor Roll

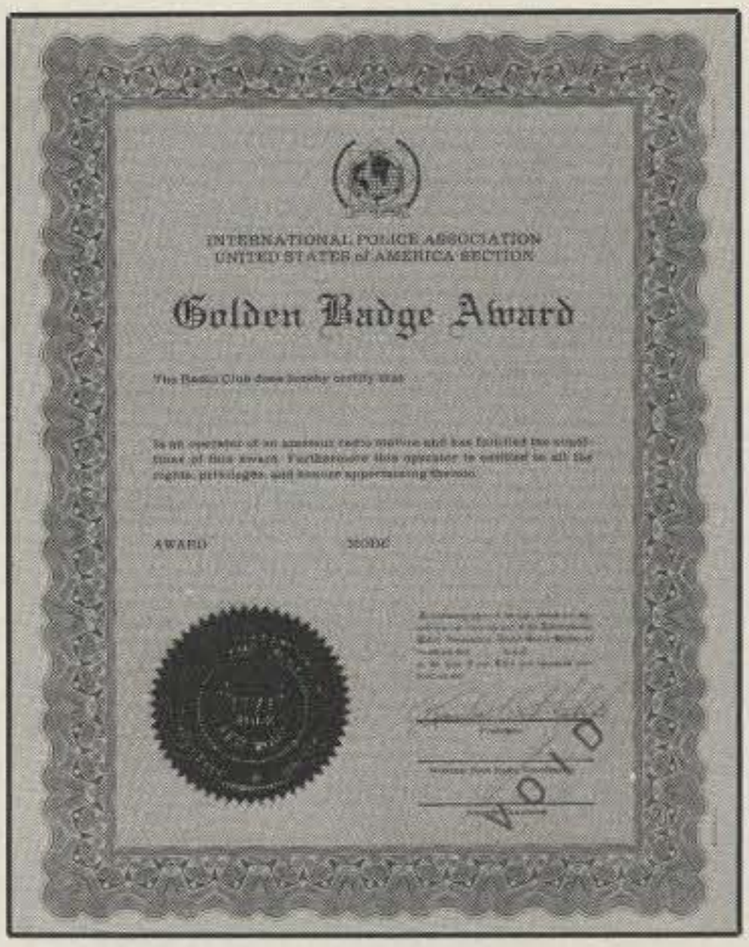
Richard M. Sears, KB9ER
USA-CA All Counties #636, All SSB, 10-11-89

W.R. "Woody" Crane, NØCYB
USA-CA All Counties #637, All CW, 10-12-89

Harold Gene Kennedy, N5JRH
USA-CA All Counties #638, All SSB, 10-30-89



Certificate of Proficiency awarded by the International Police Association, U.S.A. Section.



Golden Badge Award available from the International Police Association, U.S.A. Section.

3. COP 25—Award issued for working one IPA/RC member in 25 different states of the U.S.A.

4. COP 35—Award issued for working one IPA/RC member in 35 different states of the U.S.A.

5. COP 45—Award issued for working one IPA/RC member in 45 different states of the U.S.A.

6. Golden Badge Award—Award issued for working IPA/RC member in all 50 states of the U.S.A.

A member station may be worked more than once from different states (example: N6EIK may be worked in California then worked again while he is visiting in Nevada). The QTH state at the time of contact is counted toward the award.

Awards are issued for contacts made after 1 November 1985. There are no band or mode restrictions.

Send completed verified application/log sheet and IRCs or U.S. postage *(amount not given)* to IPA/RC Award Manager N6EIK, Edward A. Roach, 1209 Tulip Dr., Antioch, CA 94509, U.S.A.

DIG-Diplom Zodiak 270. In order to foster more activity on the 144 and 432 MHz bands on both telegraphy (A1A) and SSB (J3E), the Diplom Interessen Gruppe (DIG), a group of diploma-oriented radio amateurs, sponsors this diploma, starting in 1989, recognized by the "Deutscher Amateur-Radio-Club e.V." (DARC, member of IARU), the German amateur radio club. It is available to all licensed radio amateurs as well as to SWLs.

Diplom Zodiak 270 offered by the Diplom Interessen Gruppe (DIG), West Germany.

For the basic diploma and each of the stickers, the applicant is required to accumulate 50 points obtained through radio amateur contacts or observed radio amateur contacts by SWLs. The basic diploma together with one sticker as well as all other stickers may be collected within the following time periods (Zodiaks): March 21 to April 20 (Aries), April 21 to May 20 (Taurus), May 21 to June 20 (Gemini), June 21 to July 22 (Cancer), July 23 to August 23 (Leo), August 24 to September 23 (Virgo), September 24 to October 23 (Libra), October 24 to November 22 (Scorpio), November 23 to December 21 (Sagittarius), December 22 to January 20 (Capricorn), January 21 to February 19 (Aquarius), and February 20 to March 20 (Pisces).

All of the stickers may be collected in any order and without regard to the year of contact. The diploma will be completed upon issuance of the 12 different stickers. Very active radio amateurs may try to obtain the distinction several times—e.g., on SSB, on CW or mixed modes, and even within the same time periods of the Zodiak.

Only telegraphy (CW) and SSB contacts will count towards the 50 points in the following manner:

Each SSB QSO on 2 meters counts 1 point.

Each CW QSO on 2 meters counts 2 points.

Each SSB QSO on 70 cm counts 3 points.

Each CW QSO on 70 cm counts 4 points.

Each callsign may appear in the application only once within a given time period, notwithstanding band or mode used. Contest contacts are not valid. Should the diploma be requested for telegraphy only, a sticker "CW Award" may be applied for. The IARU band planning recommendations are to be strictly adhered to.

Requests for a diploma and stickers are to be sent together with a log book copy and a fee of DM 10.00 or 10 IRCs to the DIG award manager: Dieter Weckmann, DF8BQ (DIG 2720), Alte Reihe 28, D-2817 Dorverden, Fed. Rep. of Germany. For stickers only, send SAE and 1 IRC. A special award application log sheet is available from the DIG secretary, DJ8OT, or the award manager for an address label and 1 IRC.

DIG-CEPT-Diplom available from the Diplom Interessen Gruppe West Germany.

DIG-CEPT-Diplom. The Diplom Interessen Gruppe (DIG) sponsors this diploma.

Every licensed radio amateur and SWL may apply for it. The diploma requires proof of radio contacts with at least 77 stations (DIG friends exchange "vy 77" instead of "vy 73") operated by virtue of

the CEPT regulations from countries that are not their home countries. At least seven different countries must be among the required number of confirmed contacts.

There are no limitations of any kind, no stickers, no extensions, no mode or band regulations or mobile/portable restrictions.

The application will be sent with a GCR list, a confirmed list of all available QSL cards, an address label, and the fee of DM 10.00 or 10 IRCs to the DIG president and award manager, Wolfgang Landgraf, DL9HC, Weidenstr. 18, D-6802 Ladenburg, Fed. Rep. of Germany.

DXPA—The DX-Peditions Award. This award is sponsored by the Clipperton DX Club. The aim of the DXPA is to encourage and reward amateur radio traffic with DXpeditions. Organized and sponsored by the Clipperton DX Club, it is available to any licensed radio amateur or SWL.

Rule 10—Definition of an expedition. An expedition, with respect to this award, is a temporary activity, by an individual or group, duly authorized to operate in a place where amateur activity is either nil or limited.

The list of countries to which an expedition is automatically taken into account for the DXPA may be modified by the board of directors of the Clipperton DX Club, in the case of changes in the DXCC list (addition or deletion of countries), or if the activity of residents becomes too important.

Only the expeditions to these countries will be valid, including those temporarily using a resident's callsign. In some cases a resident's activity can also be credited (most sought after DXCC countries).

The Clipperton DX Club reserves the right to reject an operation if it is not authorized or if it does not comply with the spirit of amateur radio.

Rule 2—Qualification rules. The DXPA is available in three categories (QRO, QRP less than 5 watts, and SWL) for QSOs made or heard with 50 expeditions (35 for QRP stations). The number of expeditions credited is limited to two for a same DXCC country. All of the five continents must be represented. The Honor DXPA will be awarded for 35 QSOs with expeditions (20 for QRP) per band, on at least five of the authorized HF bands.

The QSOs need to be confirmed by QSL cards, which will have to go along with the official recap form. *Photocopies of both sides of QSL cards are also accepted.*

The cost of the DXPA is 70 FRF, $10 US, or 15 IRCs. The application form is available for an SASE or one IRC from the award manager of the Clipperton DX Club, Alain Tuduri, 132 rue des Champarons, 92700 Colombes, France.

Notes

Ted Melinosky, K1BV, editor of the "K1BV DX Awards Directory," receives information from time to time about awards based on contacts in the current year, as opposed to awards with long-term interest. He makes these "short-term" awards into a list which he will send free to anyone who sends him an SASE or IRC. At press time he had more than 30 on his list for contacts in 1989. Ted's address is 525 Foster Street, South Windsor, CT 06074-2936, U.S.A.

Thus was headlined the *Pasadena Star-News* recognition of the Pasadena Radio Club's public service following the California earthquake of 1989. Club members helped hospital and Red Cross officials get a clearer picture of the devastation and helped concerned relatives locate loved ones in the Bay Area. This information came courtesy of Dr. Palmer, WA6MUK, a well-known county hunter and vice-president of the Pasadena Radio Club, who figured prominently in the club's public-service mission.

73, Dorothy, WB9RCY

BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Here and There

The Radio Works Fall Discount Catalog 893 is available at $2 per copy. This 64 page catalog should be read by all new amateurs who are interested in wire antennas. In addition to his own fine line of products, Jim Thompson, W4THU, markets antenna products manufactured by Alpha Delta, Antenna SuperMarket, Barker and Williamson, Lakeview, Metz, Pro-Am, and Spi-Ro. Thirteen pages are devoted to the eleven Radio Works baluns, starting with a two-page specifications matrix. Three new baluns have been added to their line.

A variety of HF (3–30 MHz), VHF (30–300 MHz), and UHF (300–3000 MHz) antennas are supplemented by mobile antennas and limited space/emergency antennas, such as micro-dipoles and Intreeverts.

The Radio Works Carolina Windom/2 was added to Jim's product line at my request. I know that very few of my ex-students were able to erect an antenna longer than 100 feet; however, I have managed to fit 66 foot long antennas into almost every ex-student's available space. This antenna provides excellent performance on 40 through 10 meters (including the WARC bands) using a single coax feedline and no traps. Performance is optimized by using an antenna system tuner; however, I have experienced excellent performance results (DX contacts) without using a tuner.

The catalog lists an excellent variety of adapters, books, cable, coax switches, connectors, insulators, support lines, and wire. A super premium coaxial cable has been added to the latest catalog. Teflon-insulated PL-259 RF connectors are now available with gold, nickel, or silver plating.

This catalog may be purchased from the Radio Works at $2 each. The address is P.O. Box 6159, Portsmouth, VA 23703. The telephone number is 804-484-0140, and the facsimile number is 804-483-1873.

The July and August 1989 issues of *CQ* contain a useful antenna article. A copy of that article is available at no charge to anyone who requests one and provides a self-addressed envelope with double first class postage (45¢) attached. Please state what you want, and use my California address. A better copy can be obtained by purchasing both issues ($2.50 each) from *CQ*, 76 N. Broadway, Hicksville, NY 11801.

45527 Third Street East, Lancaster, CA 93535-1802

This is 19 year old Lori Bock, KB2HZI, of Lake Carmel, NY. She became interested in amateur radio while observing Ray Higgins N2IWE, operating. She passed the Novice examination after just three weeks of preparation. Lori has already contacted amateurs in 34 states and 76 countries. Lori helps disabled people at a nursing home.

Antennas

Wayne, NA9B, and Ann Burk, KA9TAC, market an apartment dweller's antenna system of their own design. The maximum assembled length is 16 feet and the disassembled length is less than 64 inches. This antenna is available in various configurations, and its price starts at $36.90 ppd.

Burk Electronics sells several types of antennas. Valor Pro-Am antennas are basically 4 foot fiberglass rods with appropriate amounts of wire wound on them. The assembly is covered with black or white (your choice) shrink tubing. A 4 foot adjustable stainless steel whip is mounted atop the assembly to enable one to tune the antenna to resonance at a desired frequency. Wintenna antennas are similar to Valor Pro-Am antennas.

Burk Electronics also sells mobile VHF antennas, mobile UHF antennas, base station antennas, antenna accessories, books, and equipment. Their address is 35 North Kensington, La Grange, Illinois 60525. Their telephone number is 312-482-9310. If you request a copy of their flyer, it speeds the response if you supply a self-addressed and stamped envelope (#10, business size).

Assembled 10 Meter Antenna

Zack Schindler, N8FPA, sells a completely assembled extended double Zepp antenna which provides three decibels of gain over a dipole. Three dB gain is a doubling of transmitted and received signal levels. This antenna is 44 feet long. The theory of operation is covered in pages 25 through 27 of the December 1987 *QST*. Zepp is a shortened version of Zeppelin; it is a term that is loosely applied to resonant end-fed antennas connected to two-wire transmission lines. Each antenna is individually trimmed to have a standing wave ratio of less than two-to-one (2:1) between 28.0 and 28.8 Megahertz. Every antenna is optimized for Novice band operation, which eliminates the need for Novices and Technicians to use an antenna tuner with this antenna. These antennas sell at $75 each (check or money order only) postpaid within the continental United States. The address is 413 Vester, Ferndale, MI 48220-1955. The telephone number is 313-541-1740.

De Forest Catalog Cover

One of the more popular items I give away is a copy of the first tube catalog's cover page. I do not believe a tube catalog existed anywhere in the world before Lee de Forest published his "Transmitting Audions" catalog. A free copy of this catalog's cover is available to anyone who requests it and furnishes a self-addressed stamped envelope. Please indicate what you want me to send in your SASE since I offer several items.

U.S.A.F. MARS Active During Hurricane Hugo

The 1968th Communications Squadron (Charleston, SC Air Force Base) put the Military Affiliate Radio System (MARS) to work before, during, and after Hurricane Hugo.

The 1913th Communications Group (Langley, VA Air Force Base) and the Andrews, MD Air Force Base maintained ra-

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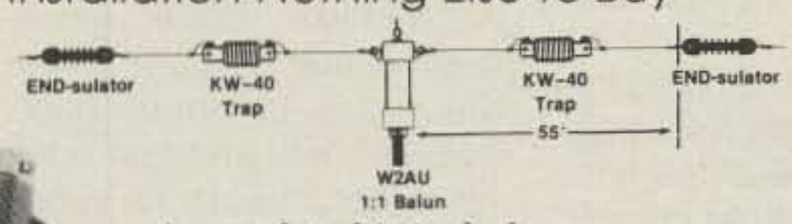

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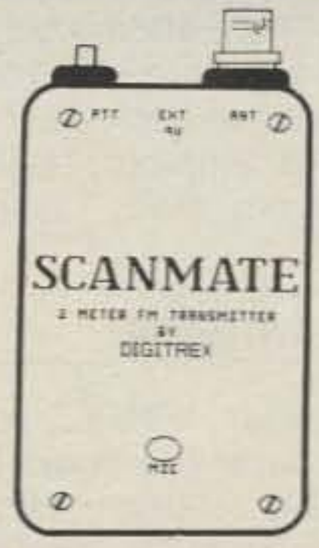

DIGITREX

SINCE 1976

1005 BLOOMER ROCHESTER, MI 48063

(313) 853-3326

CIRCLE 120 ON READER SERVICE CARD

Here is Mike Weir, VE3WDM, of Mississauga, Ontario, Canada. He is seen here holding his one-year-old son, Ben. Mike has been licensed since May 1989. He particularly enjoys working DX (distant) stations on the 10, 15, and 20 meter bands. His station includes an ICOM 735 transceiver, a Kenwood At-230 antenna tuner, an R-4 Cushcraft vertical, and a 40 meter dipole.

dio contact throughout the ordeal. The Caribbean islands had been struck by Hurricane Hugo before it approached Charleston. High frequency radios were used to phone patch important messages to cognizant Washington, DC officials. Commerical electric power ceased by 9:45 PM, and generators were used to keep the station on the air.

After Hurricane Hugo had passed, the MARS frequencies came alive with damage estimates, casualty reports, and calls for aid. The 1968th CS received requests for aid from the North Charleston Disaster Preparedness Operations Center and Sullivan Island (off Charleston's coast), which had no communications. Communicators were airlifted to Sullivan Island, where they established an effective communications network.

The April and May 1986 issues of *CQ* contain a detailed description of the Military Affiliate Radio System (MARS). My licensing course handout about MARS is available at no charge to anyone who requests it and provides the usual business size (#10) self-addressed stamped envelope. Please state what you want, and use my California address. If you are a relatively new amateur, I believe you would benefit from MARS training.

DX Handbook

Jim Creevay, W4UYZ, publishes the *DX QTH Locator Bluebook*. This publication is useful to all amateurs, and it is particularly helpful to the new amateur who is just starting to work DX. It includes an alphabetical list of countries, which is arranged in country name sequence, and is accompanied by their most common call sign prefixes. A grid locator map enables one to easily determine the geographic area in which a station is situated.

The main DX data list is 13 pages long, and it is arranged in call sign sequence. The columns list call sign, country name, continent, CQ zone, ITU zone, IRC (how many international reply coupons are required to cover the basic single unit postage cost), DXCC (whether or not ARRL DXCC credit applies), UTC (time difference shown in hours, plus or minus), location (referenced to included grid map), number of licensed amateurs, phone patch (whether or not it is permitted), reciprocal operating (whether or not these privileges exist), plus direct bearings and distance from Los Angeles, Miami, and New York.

Great circle bearings, relative to other cities, are available to *Bluebook* purchasers. If one wants this information relative to one of the 330 most common cities/areas Jim has standardly available, this data is available at $2.50 extra charge above the $3.50 (ppd) price of a *Bluebook*. If you live in/near a city that is not on Jim's standard list, as I do, a set of bearings from your location costs an additional $6.50.

The address is J/C Enterprises, Amateur Radio Publications Division, 4920 Mayflower Street, Cocoa, Florida 32927. His telephone number is 305-632-6809.

Amateur Radio Stamp Group Net

The November and December 1988 issues of *CQ* contain an article I wrote about amateur radio stamps. That article evoked a lot of response. A class handout version of that article is available to those who request it and provide a self-addressed envelope with triple first-class postage (65¢) attached. A superior version can be acquired by purchasing both issues ($2.50 each) from CQ, 76 N. Broadway, Hicksville, NY 11801.

If you are interested in exchanging the latest news about amateur radio stamps, you should participate in one of the nets conducted by DLØHSG. The frequencies and times (UTC) are 3.69 (1130–1230), 7.055 (1230–1330), 14.25 (1330–1430), 21.325 (1430–1530), and 28.545 (1530–1630) MHz. If severe QRM occurs, net frequency is shifted (up or down) a few kHz.

GM Transceiver Installation Brochure

General Motors is offering a booklet which contains tips about installing mobile radios and radio telephones in their late model automobiles. The title of their booklet is *Radio Telephone/Mobile Radio Installation Guidelines*. Copies of this brochure can be requested by writing to the Electromagnetic Compatibility Department, EMC Building 40, General Motors Proving Ground, Milford, Michigan 48024-2001. Improper installation can degrade performance of the engine, windshield wipers, entertainment system, electrical charging system, and driver information displays. The information in this brochure generally applies to vehicles of all types made by all automobile manufacturers.

Tesla Coil Builders Association

T.C.B.A. is an association of people who are interested in obtaining information about the construction, function, and theoretical analysis of Tesla coils. Harry Goldman will send a data sheet and an application to anyone who requests them and supplies a self-addressed, stamped envelope (#10 business size). Requests should be sent to the Tesla Coil Builders Association, R.R. 6, Box 181-Q, Amy Lane, Glens Falls, NY 12801. The T.C.B.A. newsletter is published quarterly. It has 18 pages of information about Tesla Coils. An annual subscription costs $20. Junior and senior high schools students may purchase their annual subscriptions at $12 (U.S.A. only) if their requests are submitted on school letterhead stationery, and their student status is confirmed by a teacher or principal. Harry's telephone number is 518-792-1003.

As an item of associated interest, I recently learned that Bill Evans sells Tesla coil plans. His booklet is 26 pages of photographs, instructions, and diagrams. His telephone number 818-845-3090. This book sells at $10 per copy ppd. It can be ordered by writing to Bill Evans, 3014-A West Victory Boulevard, Burbank, CA 91505.

Equipment Manuals

Al McMillan, WØJJK, has a huge assortment of manuals and bulletins about amateur radio communications equipment, accessories, and test equipment. If you need documents to support items, for which you presently have insufficient information, you can probably buy what you need from Al. His catalog lists about 1200 items manufactured by approximately 150 companies. If you are interested in purchasing such documentation, send one dollar to Hi Manuals, P.O. Box 802, Council Bluffs, Iowa 51502. The catalog provides all required information. No separate quotes are made; one must order by using the catalog data. Each catalog costs $2 (surface mail) or $3 (air mail) to amateurs outside the United States.

Al has a few other items of interest to amateurs. A list of about 100 manuals is available free to those who request one and supply a standard business size (#10) SASE; these are mostly non-ham items which Al dropped from his 20-page cata-

log. If you want a list of the parts he has available, for use in repairing old rigs, send a business-size SASE with your request. Last, but not least, he has a supply of the popular WRL U.S.A. maps which are being sold at $3.50 each (ppd, U.S.A.). These multi-colored maps measure about 3 feet by 5 feet. They enable you to quickly locate an amateur with which you are in contact, while working her/him on the air.

Used Equipment List

New amateurs are likely to purchase used equipment and accessories when they are going to set up their first station. If you are lucky, you may have a good local source of such items. Most amateurs seek used items in the classified advertisements in the major amateur radio publications, in the "For Sale" sections of club bulletins, or at swapfests. Other sources of used gear exist. One such source is the Communications Exchange Sheets (CES) published by Mike Filipiak (KO9Q), 2224 Cooper Avenue, Sheboygan, WI 53083. The CES is approximately 11½ inches wide by 17 inches high, and each issue contains several pages. The CES is intended to help new amateurs buy and sell items quickly, easily, and inexpensively. Want ads cost $2 each. For sale ads cost $5 each (on a pay when you sell basis) for items sold at less than $100. For sale ads cost $10 for items sold at $100 to $500. The cost of for sale ads for items sold at more than $500 is $10, plus two percent of the sale price. The subscription rate is $14 per year, which consists of two issues per month. A free copy of CES can be obtained by providing a self-addressed business (#10) envelope to Mike with 45¢ postage on it. CES is supported by its users; it requires cooperation to survive.

Printed Aids

Previous Novice columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business size (#10) self-addressed and stamped envelope to my California address. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements.

Photographs Wanted

Photographs of new amateurs 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.

73, Bill, W6DDB

WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Recapturing The Romance—More Classic Rigs

Push aside those fancy solid-state transceivers, fire up the soldering iron, and horse-tie the cook, gang. We are back with more classic rigs of yesteryear, and they are guaranteed to put some genuine regenerative squeals between your ears and pump some real RF amps into your coax.

Yes indeed, dear bretheren, none of that wimpy 12 volt stuff this month. We are talking open-air transmitters, soft glowing vacuum tubes, 20 Mule Team Borax rectifiers in mom's fruit jars, and old-time radio at its best! It promises to be a bug-zapping and skin-frying good time for all, so hold onto your easychair and read closely.

As usual our views and tales are overflowing available space, and we are packing information into every sentence. Likewise, I encourage you to reread my March 1989 *CQ* column on classic rigs for more specific details on collecting parts and assembling old-time gear. A substantial amount of information was presented in that column, and is also available in my new book *Golden Classics of Yesteryear* available from *CQ*'s Book Shop.

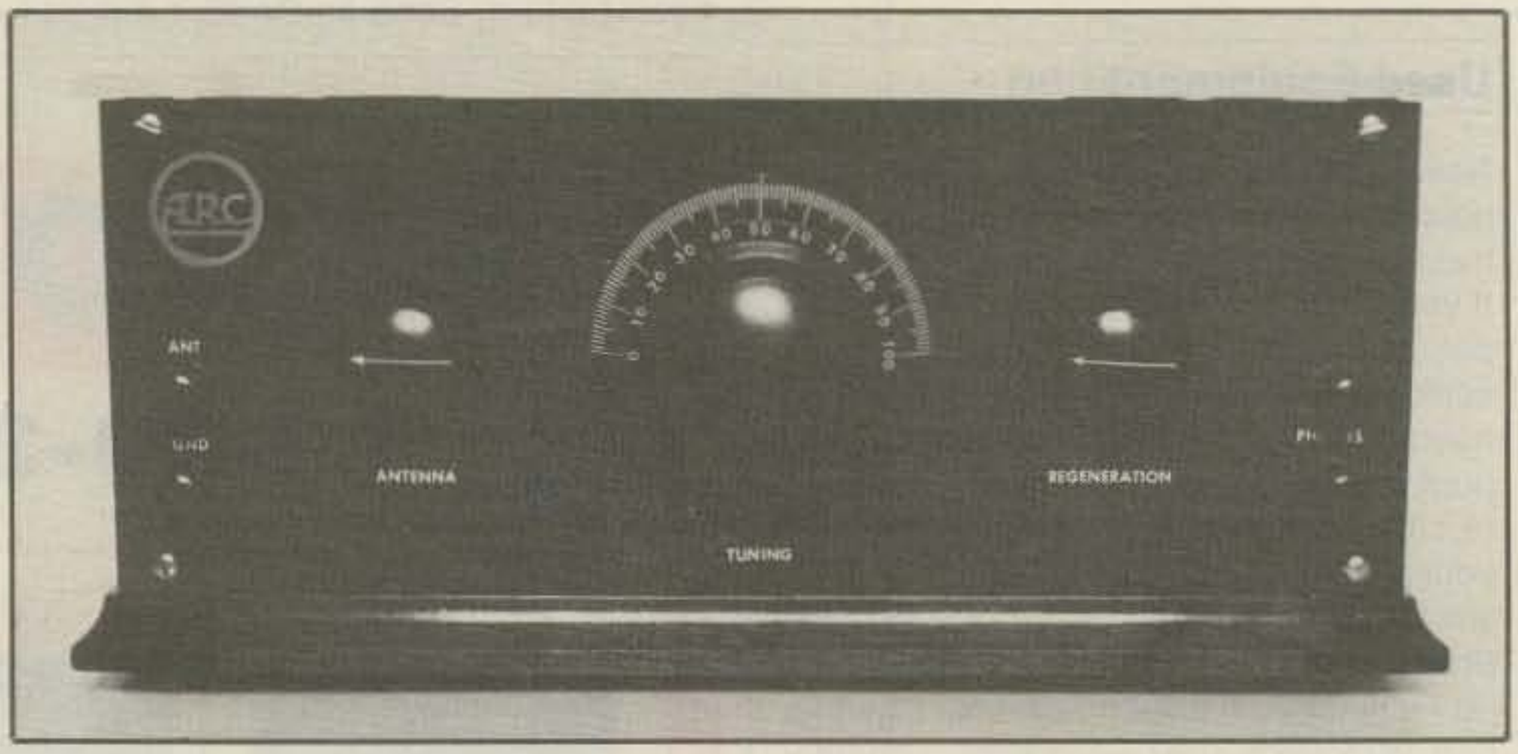

Fig. 1 - W8WVM's re-creation of the classic 1934 Globe Trotter receiver. Front panel is brown wrinkle, base is solid walnut, and performance is sheer gold. Photos cannot do this rig justice. It is beautiful!

1934 "Globe Trotter" Receiver

This two-tube classic was originally designed by W2DJJ and described in the *1934 Short Wave Radio Manual* that Lindsay Publications (321 S. Locust, Manteno, IL 60950) is now reprinting. Arnold Sayre, W8WVM, recently assembled one of these gems, and his masterpiece is shown in figs. 1 and 2. Before discussing Arnold's re-creation, however, let's look at the receiver's impressive DX-grabbing design (see fig. 3).

The Globe Trotter was built open-air style on a 9 inch square breadboard with batteries strapped directly to the board and number 30 tubes used in both of its stages. The AF transformer was any on-hand item with a 1:3 to 1:6 turns ratio. Some folks used transformers salvaged from old radios, while others used doorbell transformers. A most "forgiving" circuit indeed!

Condenser C1 is the antenna trimmer, C2 is the main tuning control, and C3 is the regeneration control. The RFC is a regular 1 or 2.5 mHy item. A medium-size 10 ohm rheostat, R1, is wired in series with the filament battery to drop 3 volts down to 2 volts for the number 30 tubes. Two 22½ volt batteries are used for the "B" supply. A tap "between" the two batteries provides 22½ volts for the detector, while both batteries deliver 45 volts to the amplifier. Since the amplifier tube's plate load is the earphones, old-time high-impedance types like the classic Baldwin "cans" must be used. You can experiment with a small 100K to 8 ohm transformer with modern earphones, but volume loss may prove excessive. Check with Antique Electronic Supply Company in Tempe, Arizona or search hamfest flea markets for high-impedance earphones and other parts from yesteryear.

All coils for this neat little receiver are

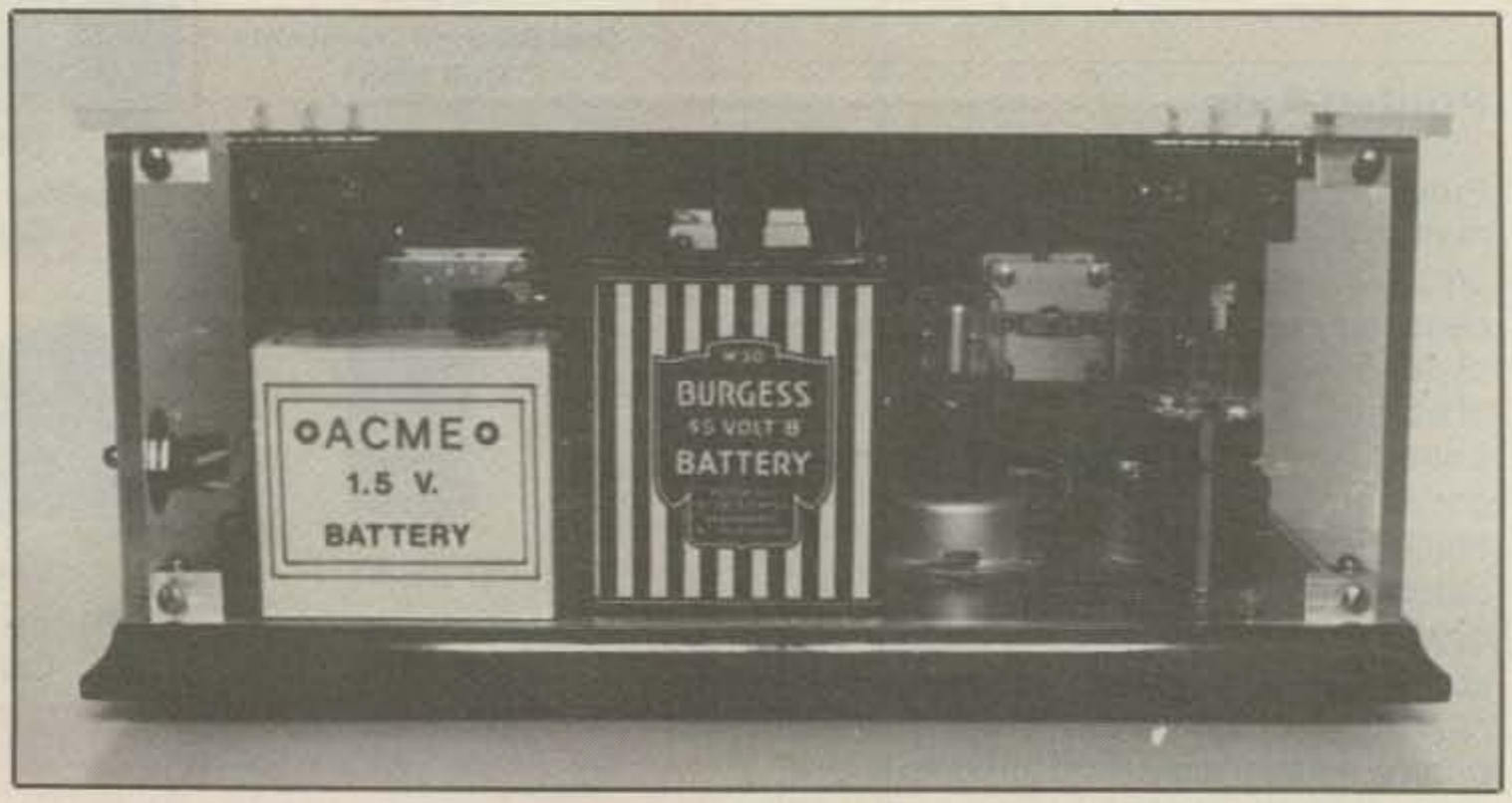

Fig. 2 - Rear view of W8WVM's Globe Trotter. Batteries are homebrew covers with replaceable "innards." Coil forms were on-hand items, and tube sockets are raised above the base with aluminum shells. Rig is enclosed in a clear plastic case with hinged top. Little portable works quite well after big-band music clears from its nostalgia-filled grids.

2028 Brandywine Court, Birmingham, AL 35216

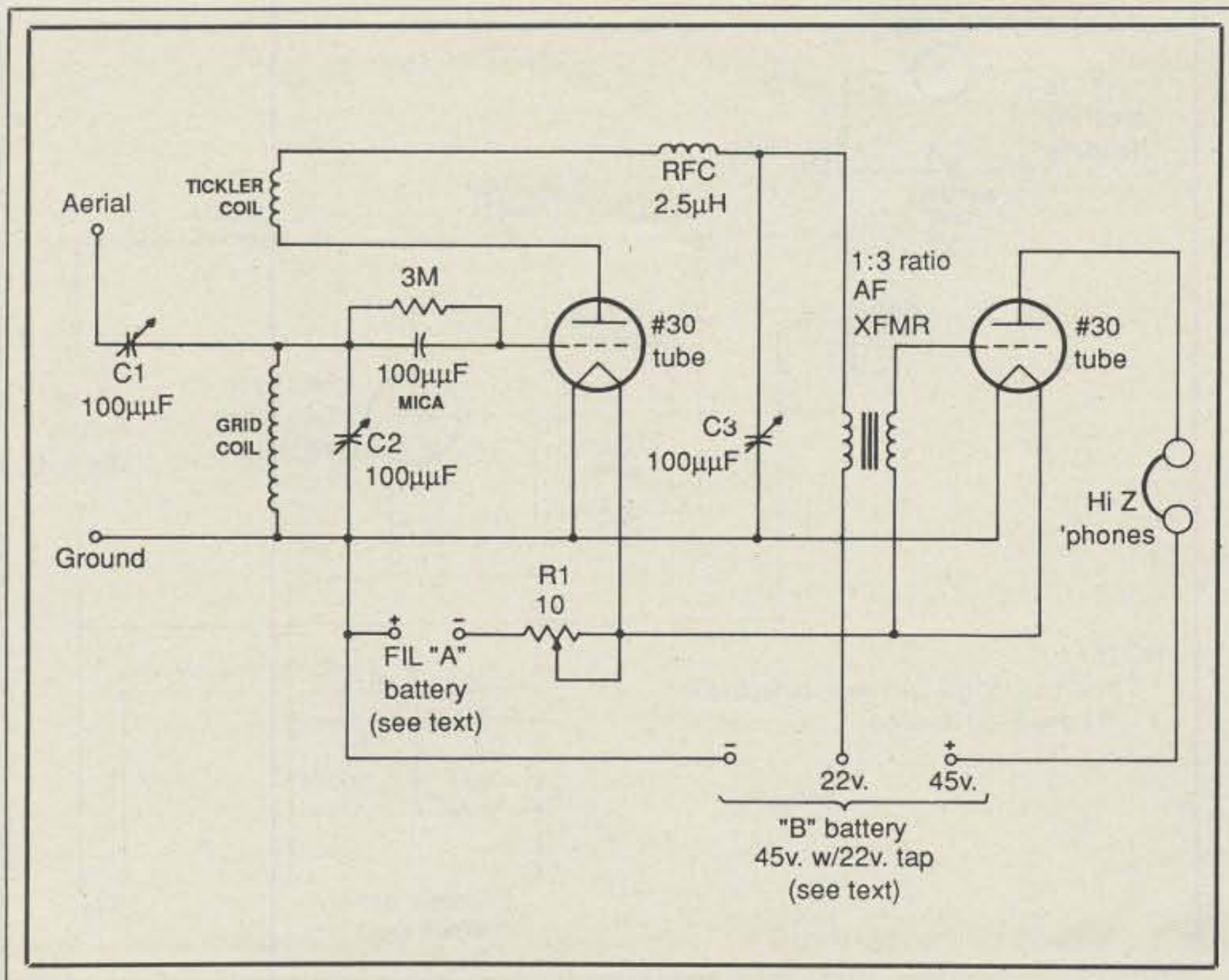

Fig. 3- Schematic diagram of the 1934 Globe Trotter receiver.

Band (meters)	Number of Turns Grid Coil	Tickler Coil
100–200	54T	20T
50–100	24T	13T
25–50	12T	8T
15–25	6T	7T

Fig. 4- Coil data for the Globe Trotter. See text for details.

wound on standard four-prong forms 1 ¼ inches in diameter and 2⅛ inches in length (see fig. 4). Homebrew forms can be made from tape-fattened tissue rollers and old tube bases. Paint them brown for authenticity. Number 24 double-cotton-covered wire was used in the original coils, but modern substitutions like number 20 or 22 enamel-covered copper wire may be required today. Space out the turns along the form to assure maximum bandspread, and wind the grid and tickler coils in the same direction on the form. Separate them ⅛ inch apart, with tickler near the bottom.

Your exact tuning range may vary slightly from original-era coils, but finding the band(s) is a natural part of building and using classic rigs! Simply advance the (completed) receiver's regeneration control until the earphones howl, then use a little Digitrex frequency counter or your modern rig's general-coverage receiver to check its radiated signal (regenerative circuits emit a weak signal on their receiving frequency. That signal can be used to determine its frequency range and calibrate its tuning dial.). Lay out the Globe Trotter with the antenna input on the left, main tuning condenser in the middle, and the amplifier stage on the right. If the set fails to oscillate, reverse the tickler coil's connections. Double check your wiring as you go, and the receiver should work without a hitch.

W8WVM assembled his version of the Globe Trotter on a 7½ by 14 inch solid walnut base that is beautifully finished with four hand-rubbed coats of Varathane™ varnish. The front panel is aluminum, painted wrinkle brown and labeled with old-fashioned cream decals. The large national "Velvet Vernier" dial was obtained from K2AW's Silicon Alley (see *CQ*'s advertiser's index). The left top "Antique Radio Company" logo was cut from sheet brass and set into a black phenolic disc. Arnold ran out of parts after building two of these receivers, so "ARC's" life was quite brief.

Looking at the receiver's rear (fig. 2), the coil and tube sockets are raised above the breadboard with aluminum shells. Those items were salvaged from old military gear. Type IG4 tubes were substituted for the Globe Trotter's original type 30 tubes because their filaments are easier to power from regular flashlight batteries, and the need for rheostat R1 is eliminated. Cloth-covered wire, obtained from Antique Electronic Supply, was used for wiring.

Batteries were home-fabricated by using an old Burgess battery wrapper, some white poster paper, and dry-transfer decals (for the ACME). These refillable shells are sprayed with clear acrylic and fitted with a removable bottom section. The "B" battery holds five 9 volt batteries and the "A" battery holds two "D" cells.

Arnold reports the receiver works quite well, volume is more than adequate,

Fig. 5- Famous Gil cartoon that inspired construction of its 1929-style transmitter. Look at that black board, top-mounted tube, upright RF choke, and flanking condensers with twin velvet vernier dials. A genuine classic for sure!

and like any 'regen set, it can be cantankerous to tune. True, indeed, Arnold. QRM reduction and selectivity depend on the gray area between the earphones! Work 30 countries on 30 meters with this receiver and our following "Gil Classic" transmitter and you have accomplished a feat to crow about!

The "Gil Classic" Transmitter

A couple of years ago fellow classic-rig buff K@JW sent me one of his new QSL cards sporting the famous Gil, W1CJD, cartoon shown in fig. 5. The transmitter's unique design immediately captured my interest, so I dug through stacks of old magazines until I located the original cartoon in February 1931 *QST* and the transmitter's article in August 1928 *QST*. That was the easy part, however. Finding authentic-era parts met with very little success. Fortunately, Dewitt Jones, W4BAA, came to my aid with a fantastic donation of old-time goodies looking for a good home. Thanks, Dewitt! This little rig is the first completed project from your box of gems.

The transmitter's circuit is a standard Hartley updated to 1930 standards with rigid construction and a hefty plate coil (see figs. 6, 7, and 8). Its two tuning condensers are mounted vertically rather than horizontally, and the tube socket is mounted on L brackets bolted to their frame. Filament bypass and plate/grid acorn condensers are mounted below and behind the tube socket with metal straps, and the plate choke is positioned vertically beside the left/main-tuning condenser. Glass curtain rods and their wood mounts, popular "five and dime" store items of the 1930s, support the copper plate and antenna coils to prevent vibration and assure a stable signal. An RF ampmeter is strapped to, but insulated from, the right/antenna-loading condenser for indicating output power (the old I^2R method).

The plate coil consists of ⅛ or ¼ inch copper tubing wound with an inside diameter of 2¼ inches and spaced or stretched to a length of 6 inches for 80 meters or 4 inches for 40 or 30 meters. A 12-turn coil and 400 mmFd—err . . . that's pFd for newer amateurs—condenser will cover 80 meters, 6 turns and 200 mmFd will cover 40 meters, and 5 turns plus 150 mmFd will cover 30 meters. The antenna coil is 5 turns for 80 and 40 meters, and 3 turns for 30 meters. It is also copper tubing like the plate coil. Operation above 30 meters is not suggested with this rig, as stability and in-band operation are unpredictable. One spin of the dial can whisk a signal from 12 to 16 megacycles. Whew!

Since circulating RF tank current can approach several amperes in this little rig, the plate coil and its tuning condenser must be firmly bolted together to minimize heat losses. Large bolts and wing nuts were used in the original version, but I "fudged" by simply flattening and drilling coil ends and using the condenser's existing bolts for mounting. Band changing is more difficult, but I only use the little critter on 30 meters.

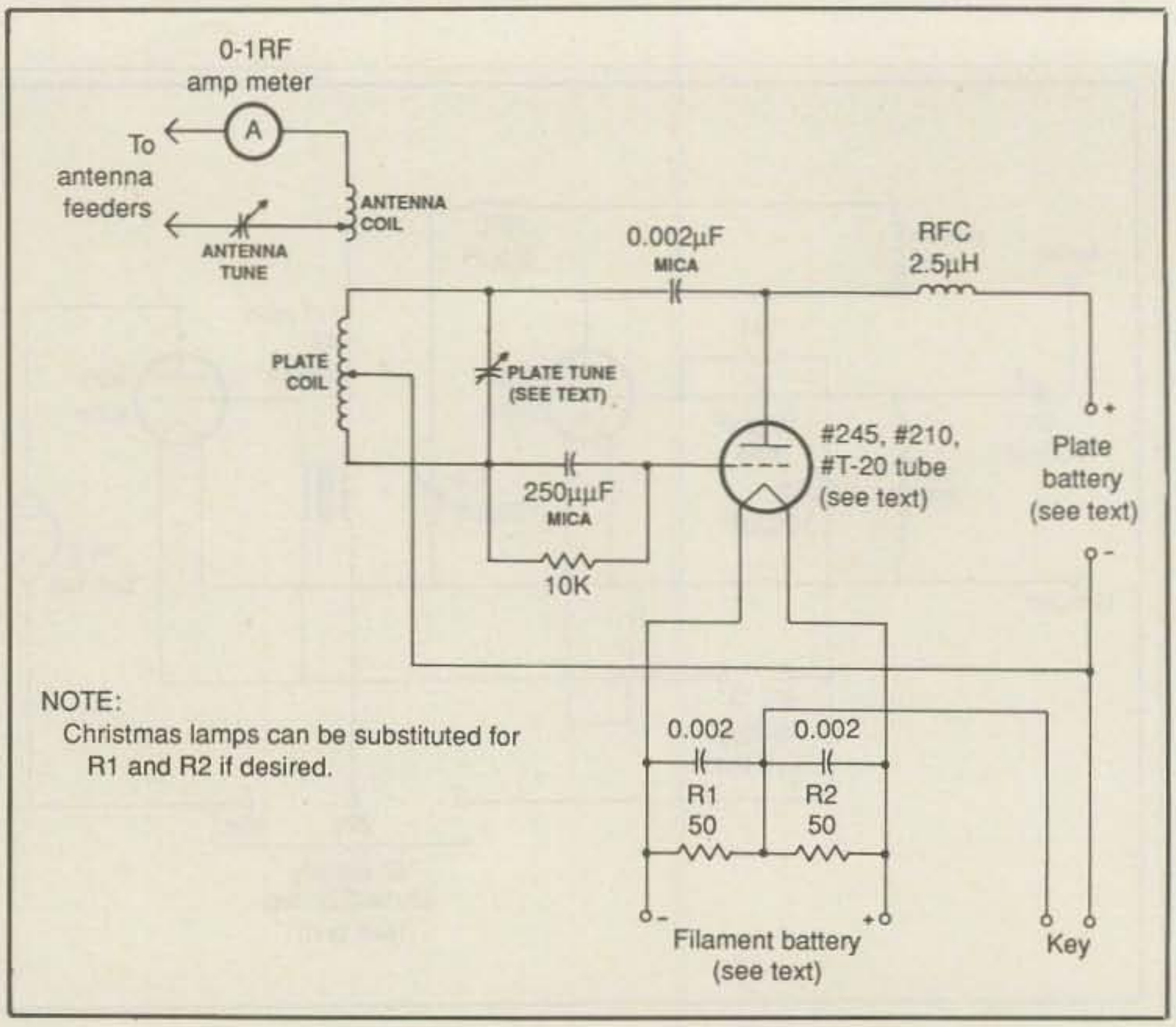

Fig. 6- Schematic diagram of the Gil Classic transmitter. Circuit is famous Hartley with heavy tank coil and separate antenna coil.

My home re-creation of the "Gil Classic" is fairly close to authentic original, but some sacrifices were unavoidable. The tuning condensers are *big* Hammarlund items rather than scarce-as-hen's-teeth Cardwells, the glass curtain rods are "faked" with plastic dowels, and I am

Fig. 7- My home re-creation of the Gil Classic transmitter beside its mating two-tube regenerative receiver. Note bug, Baldwin earphones, and pocket frequency counter for checking and zeroing frequencies. Now this is the way to work 30 meters in style! The operator, not the rig, makes the difference.

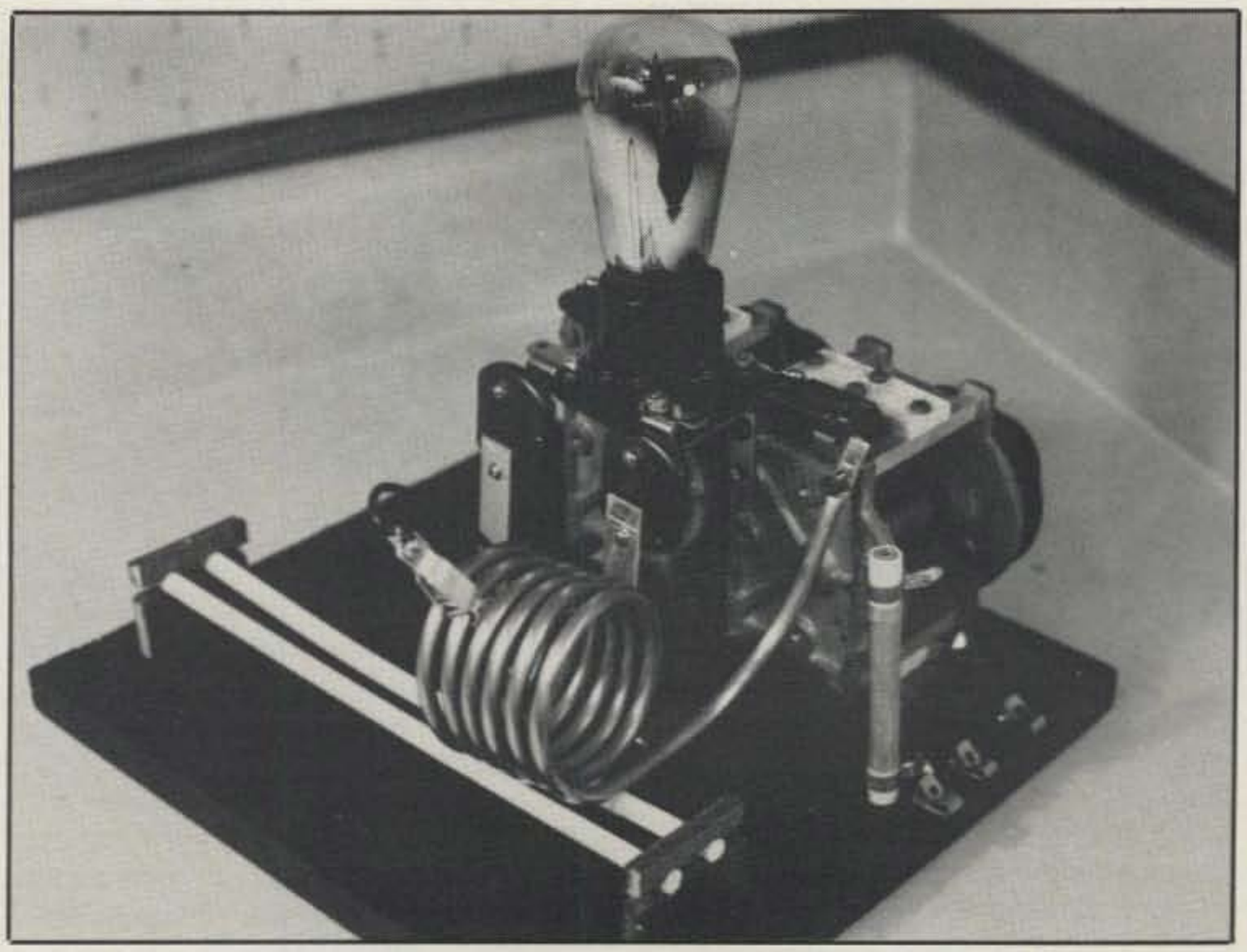

Fig. 8- Rear view of the Gil Classic. Curtain rods were used for coil supports during that early age. Photo was shot during assembly of the second version, and before the antenna coil was installed. My first version worked fine; it just looked ugly.

still searching for a 2 inch RF ampmeter. Some of those goodies will probably be secured by the time this article appears in print, if I am lucky.

Sharp-eyed readers may notice my transmitter in figs. 7 and 8 is not completely wired. That is because I initially built it on an old board to check its parts and fine-tune its operation on 30 meters, then I cleaned all parts to like new and began assembling the "finished product" on a new board. I shot the photos during that final assembly (with column deadline pressing!). This approach is very useful because most attention can be devoted to details, and "second versions" always turn out better than "first runs."

Several types of triode tubes such as the 210, 201, or T-20 work fine in this transmitter, but I prefer using an ever-popular type 245. This little 5 watt tube is usually easy to find, and it works well with plate voltages between 100 and 300 volts. A bank of fifteen or twenty 9 volt batteries series-snapped together makes a good "B supply", and a 3 volt dry cell with a series-added 2.5 ohm 10 watt resistor will power the 245's 2.5 volt filament. If you prefer an AC supply, use a transformer with at least 100 ma current rating plus 20 to 40 mFd of fitter capacitance to ensure good dynamic stability (no chirp). Also, avoid powering 245 filaments directly from an AC source. It promotes hum. Rectify and filter it!

If you would like to add some extra "sparkle" to this rig (not necessarily for on-the-air use!), consider homebrewing your own electrolic rectifiers for the AC supply. Yes, indeed! Now this is big-time radio in high style! Home-grown rectifiers were described to me by genuine old-timer W5OC as follows:

"First mix 20 Mule Team Borax and water into a semi-liquid solution, and pour it into some of mom's fruit jars. Insert a 1 or 2 inch aluminum plate on one side of the jar for a positive terminal, and add a lead plate on the opposite side for a negative terminal *(now you understand why I suggested tying up the cook—ed.)*. Connect the rectifier as usual between your transformer and filter condensers. Each rectifier is good for 50 volts. Use four series-wired jars for 200 PIV (or 16 jars if you build a full-wave bridge). Baking soda is a fair substitute if you cannot find Borax (a famous sponsor of TV's early "Death Valley Days"). These fruit-jar rectifiers emit a fantastic bluish glow that resembles an outdoor bug zapper following your keying. Combine that with arcing key contacts and a wild-swinging iron vane meter, and you have a real 1930-style rig visitors will love (or fear!).

On The Air

The Globe Trotter and Gil Classic are super fun units for occasional on-the-air QSOs today, but remember my philosophy of the operator rather than the rig making the difference. Thoroughly check the transmitter with your digital frequency counter and modern general-coverage receiver to ensure in-band operation and a clean note *before* connecting an

Fig. 9- W9WHM's recently restored 1939 Hammarlund Super Pro. This like-new gem is the kind of receiver everyone loves!

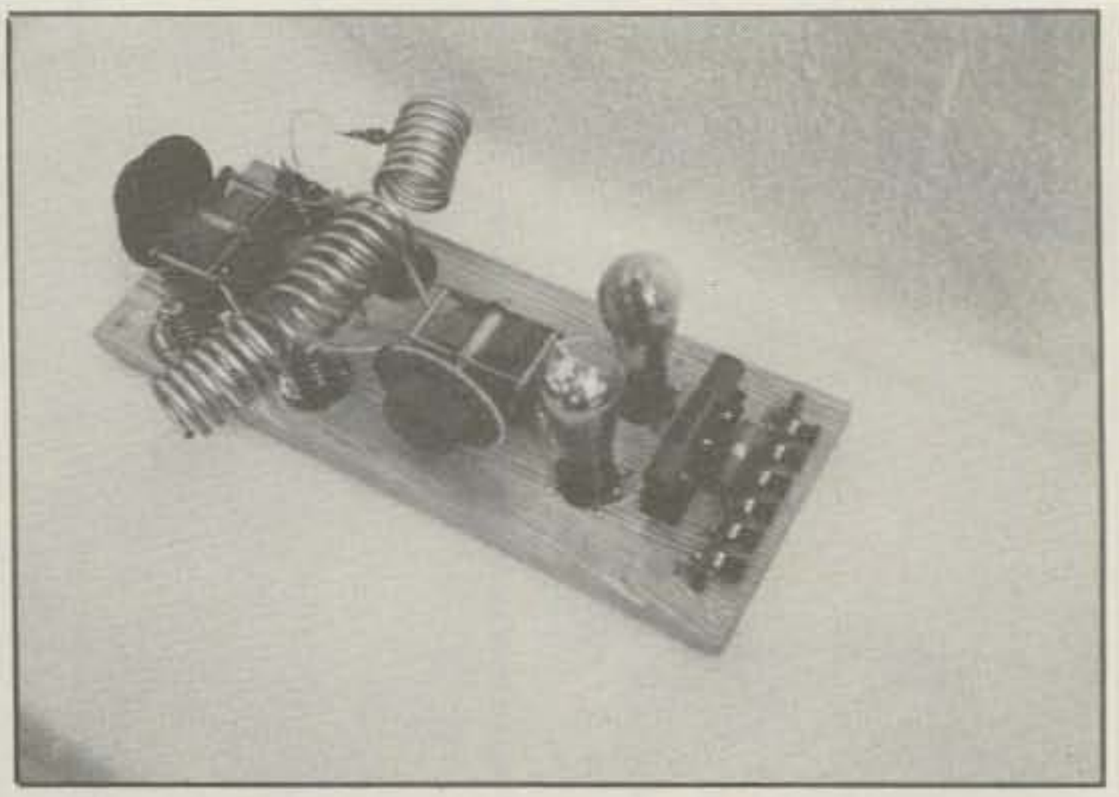

Fig. 10- WA5VLZ's homebrewed version of the classic push-pull TNT transmitter. This beautiful oscillator sports dual 245's and emits a good 1990-style signal.

outdoor antenna. Recheck it often. Copper coils and open-air condensers have no respect for band edges. *That is your responsibility!* Also, use a monoband dipole to minimize harmonic radiation. Follow those guidelines, use low power, and this little rig can turn some thrilling QSOs in 1990.

Operation of the Globe Trotter depends on a steady hand for tuning and your concentration for copying one signal QRMed by others. The receiver will also be blocked by your Gil transmitter, so forget conventional zero-beating techniques. I sidestep those entanglements by tuning a desired signal for a very low tone and mentally ignoring others. This step also assures the weak regenerative signal mentioned earlier is right on the received station's frequency. I read that frequency on a small frequency counter, then key the transmitter (its strong signal will capture the digital display), and set it to the same exact frequency.

As mentioned earlier, I also prefer 30 meters for enjoying classic gear. This band's light activity and barefoot-rig power limits means I can copy stations without ear-splitting heterodynes and my peanut whistles "get out" like a champ. Don't just take my word for that. Try 30 yourself and see!

Closing Views

Curtain time approaches once again, so let's move faster. Your attention is next directed to John Leary, W9WHM's beautifully restored 1939 Hammarlund Super Pro receiver shown in fig. 9. John takes these classic Hammarlunds from very rough condition, strips them all the way down, then performs a total refurbishing job to produce a like-new gem anyone would be proud to use on today's bands. Fig. 9's photo is the result of many months of effort. Notice the super-clean "innards," new front panel, and immaculate relettering. Visualize the warm amber glow of those dials at night, the outdoor antenna silhouetted against a full moon's light, and arcs flying from its mated transmitter's key—sheer amateur radio romance at its best! Congratulations on your terrific rig, John.

Remember the push-pull TNT oscillator/transmitter described in my *Golden Classics of Yesteryear* book and in this column last year? Niel Wiegand, WA5VLZ, built one with authentic-era parts, and it won second place in the Antique Wireless Association's recent "Matlack" contest. Niel's re-creation is shown in fig. 10. The breadboard is finished to perfection, the beehive insulators shine like new, and the copper coils have been polished to a high lustre with steel wool. As you will recall, this rig's output coils are adjusted until neon lamps on each side of your antenna glow equally. Yes, then you look out the window at night and visually monitor transmitted Morse. Jolly good show, Niel!

Numerous readers continue asking where they can find more information on classic rigs, OSCAR, mobiling, etc., and now there is an answer. Rich Rosen, K2RR, recently compiled a gigantic 1200-page reference to every article on every subject ever published in *CQ, QST, 73,* and *Ham Radio* magazines since 1945. This is not a reprint of articles, but a guide to magazine issues containing those articles. The guide is available in printed form, on microfish sheets, or on IBM-compatible disks. Check with Didah Publishing, P.O. Box 7368, Nashua, NH 03068-7368 for more details.

In conclusion, more classic rigs and keys views are in the works. Many of today's operators began their amateur radio life during the '40s and '50s, so we will move on up two decades to match your first gear. Drag out your old 6L6s and 955s, and I look forward to chatting with you on 20 SSB some Sunday afternoon soon.

Meanwhile, remember that Saturdays are antenna cleaning days. Lower those copper wires and give them a good polishing with steel wool. A clean antenna shines like a new penny. Everyone knows old, tarnished skywires lack DX effectiveness, so get cleaning!

73, Dave, K4TWJ

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(from page 6)

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VR200PI/YL, from Pitcairn Island Bicentennial Year, Pitcairn Island; Betty Christian, VR6YL; 0001Z Feb. 1 to 2359Z Feb. 28; 10 meter SSB Novice portion and 15 and 20 meter SSB, General portion of the bands. All VR200PI QSL's are direct only and should be sent to the award manager, Dr. G. O'Toole, KB6ISL, 9605 San Gabriel Ave., So. Gate, CA 90280-4725 with no. 10 SASE for confirmation.

• The following hamfests, etc. are slated for February:

Feb. 3, **Niagara Peninsula ARC Hamfest and Dinner/Dance,** CAW Hall, St. Catharines, Ontario, Canada. Contact NPARC, P.O. Box 692, St. Catharines, Ont. L2R 6Y3, or call 416-682-4844.

Feb. 11, **Mansfield, Ohio Mid-Winter Hamfest, Computer Show,** Richland County Fairgrounds, Mansfield, OH. Contact Dean Wrasse, KB8MG, 1094 Beal Rd., Mansfield, OH 44905 (SASE), or call 419-589-2415 after 4 PM EST.

Feb. 11, **Long Island, NY Mobile ARC Hamfest,** Electricians Hall, Melville, Long Island, NY. Contact Neil Hartman, WE2V, 516-462-5549.

Feb. 17, **Cherryland, Michigan ARC Hamfest,** Immaculate Conception School, Traverse City, MI. Contact Paul Nepote, KA8HIB, 802 Fern St., Traverse City, MI 49684 (616-947-2991).

Feb. 17, **Salem, Oregon 1990 Hamfair,** Polk County Fairgrounds, Salem, OR. Contact Salem Repeater Assn., P.O. Box 784, Salem, OR 97308.

Feb. 17, **Algonquin ARC Hamfest/Fleamarket,** Marlboro Middle School Cafeteria, Marlboro, MA. Contact Ann, KA1PON, 1-508-481-4988, or write to AARC, Box 258, Marlboro, MA 01752. (Wheelchair accessible.)

Feb. 17-18, **Sarasota, Florida Hamfest,** Robarts Arena, Sarasota, FL. Contact Hadley Carrigan, N4ODK, 101 N. Adams Drive, Sarasota, FL 34236 (813-388-2868).

Feb. 24, **Orange, Texas ARC Hamfest/Fleamarket,** National Guard Armory, Orange, TX. Contact Sherwood Buckalew, KA5VOT, 409-883-6111.

Feb. 24, **Hernando County, Florida ARA Hamfest,** Hernando County Fairgrounds Auditorium, south of Brooksville, FL. Contact Pat Brayton, WB4EXA, 904-796-4840 after 7 PM.

Feb. 24, **Fox Cities ARC Hamfest 1990,** Sabre Lanes, Menasha, WI. Contact Don Baker, NB9J, 621 W. 7th St., Kaukauna, WI 54130 (414-766-3886).

Feb. 24, **LaPorte, Indiana ARC Winter Hamfest,** LaPorte Civic Auditorium, LaPorte, IN. Contact LPARC, P.O. Box 30, LaPorte, IN 46350 (SASE).

Feb. 24, **Northern Vermont Mid-Winter Hamfest/Fleamarket,** Milton High School, Milton, VT. Contact Mitch Stern, WB2JSJ, 802-879-6589.

Feb. 24-25, **Great Lakes Division 1990 ARRL Convention,** Cincinnati Gardens Exhibition Center, Cincinnati, OH. Contact Stan Cohen, WD8QDQ, 513-531-1011.

Feb. 25, **Vienna, Virginia Wireless Society Winterfest,** Vienna Community Center, Vienna, VA. Contact Harry Kaklikian, W4ACN, 4941 Andrea Ave., Annandale, VA 22003 (703-978-4402).

Feb. 25, **Cuyahoga Falls, Ohio ARC Hamfest,** Akron North High School, Cuyahoga Falls, OH. Contact Bill Sovinsky, K8JSL, 2305 24th St., Cuyahoga Falls, OH 44223, (216-923-3830). (Wheelchair accessible.)

Feb. 25, **Livonia, Michigan ARC Swap 'n Shop,** Dearborn Civic Center, Dearborn, MI. Contact Neil Coffin, WA8GWL, Livonia ARC, P.O. Box 2111, Livonia, MI 48151 (SASE). (Exams given.)

Feb. 25, **Davenport, Iowa ARC Hamfest,** Davenport Masonic Temple, Davenport, Iowa. Contact Dave Johannsen, WBØFBP, 2131 Myrtle St., Davenport, IA 52804. (For ARRL exam info contact Al Broendel, N9OK, 2712 38th St., Rock Island, IL 61201.)

April 6, 7, 8, **1990 International DX Convention,** Visalia Holiday Inn, Visalia, CA. Hotel reservations block up early for this one, so make plans in advance. Hotel reservations can be made directly to the Holiday Inn, Visalia, 1-800-821-1127 (mention the DX convention for special rates). For pre-registration information, contact Don Minkoff, NK6A, 12567 Brooklake St., Mar Vista, CA 90066 (213-397-2984).

CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Contest Operating—Courtesy vs. Aggressiveness

Before beginning, I'm afraid that I have to admit my own guilt with nearly all of the following discussion. Unfortunately, the contest community as a whole is growing in its participation as well. The issue—our operating practices. I'd like to break up our operating techniques into several categories and leave you thinking about how they apply to you. Hopefully, you'll become as dedicated as I have become to helping clean up our operating habits in the midst of battle.

Calling . . . Calling . . . Calling

This is a special favorite of mine, and we've all done it. Recall those 80 meter LU pileups. And then there's that 28504 fracas with WB5XYZ/HR2. Sometimes contesters get carried away. We become so compelled to get that "double multiplier" that we call and call and call again. The fact is that many DX stations can't handle it. I spent some time this past month asking some casual DX stations about the troubles they encounter while operating. Unlike the fringe-oriented contester, most stations in rare DX locations have turned on the radio, unknowingly finding a DX contest in progress. The attempt they make to work guys under those conditions is largely to provide a service to the serious operator. In their minds, this activity could just as easily be replaced by a trip to the local beach.

The W9-Bravo Station Go Ahead

How many times have you heard a DX station say "the W9-Bravo station . . . 5936" followed by three or four stations in another call area dumping their in their calls? The excitement of the moment often gets the best of us. I equate this scenario to someone calling your number 34 at the service desk of a car dealership and experiencing six people with other numbers running to the desk to beat you. Skilled operators such as contesters are simply better than that.

Echo-Echo

Ah, yes, the last two letters of your callsign (or was it first three, year of birth, zip code?). Few know where this operating technique came from and many more know where they would like it to go. Although the temptation to go on a rampage here is extreme, the simple fact is that in nearly every case, signing the last two letters of your callsign in a pileup slows down the other operator. There is nothing more frustrating during a fast run than to have a 59+40 station cover a pileup with the pronouncement "ALPHA BRAVO," requiring you to ask for an unnecessary fill on his callsign. My good friend N6RJ, among others, has taken a fairly extreme position on this style of operating and simply won't respond to stations who don't sign what's printed on their license.

Now to be fair, there are times when a DX station requires you to operate in this manner. There is also the matter of DX nets (which I'll leave for VP2ML to comment upon in his DX column). And once in the 1972 *CQ* WW SSB contest it was rumored that someone heard "ALPHA RADIO" being broadcast (of course, I was WA2LQZ at the time so it had to be someone else!). My advice is simple. Just sign your callsign the way it was given to you. That's the way it was intended, just as you give someone your phone number, Social Security number, or last name.

2 Baldwin Street, Windham, NH 03087

Calendar of Events

Jan.	**26-28**	**CQ WW 160 M. CW Contest**
Jan.	27-28	UBA CW Contest
Jn.27	Feb.4	ARRL Novice Roundup
Jan.	28-29	1990 Winter Classic Radio Ex.
Feb.	3	Carnaval de Quebec CW
Feb.	3-4	Vermont QSO Party
Feb.	3-5	New Hampshire QSO Party
Feb.	4	North America CW Sprint
Feb.	10	Carnaval de Quebec SSB
Feb.	10-11	QCWA CW Party
Feb.	10-12	YL/OM SSB Contest
Feb.	11	North America SSB Sprint
Feb.	12-16	School Club Roundup
Feb.	17-18	ARRL DX CW Contest
Feb.	**23-25**	**CQ WW 160 M. SSB Contest**
Feb.	24-25	UBA SSB Contest
Feb.	24-26	Maine QSO Party
Feb.	24-26	YL/OM CW Contest
Mar.	3-4	ARRL DX SSB Contest
Mar.	9-11	Japan Int. CW DX Contest
Mar.	10-11	QCWA SSB Party
Mar.	10-11	Commonwealth Contest
Mar.	10-11	Wisconsin QSO Party
Mar.	17	YLRL East Meets West SSB
Mar.	17-18	BARTG Spring RTTY Contest
Mar.	17-18	Bermuda Contest
Mar.	**24-25**	**CQ WW WPX SSB Contest**
Apr.	11-13	YLRL DX-YL to NA-YL CW
Apr.	18-20	YLRL DX-YL to NA-YL SSB
Apr.	28-29	Swiss Helvetia Contest

Frequency in Use?

I recently read an article detailing the history of telephony (AM + SSB). In particular, the author speculated as to the content of the first phone message. Although none of us will ever know for sure, he was quick to point out that we can assume history's second transmission had to be "frequency is in use." Another favorite comes from Bill Gioia, K2EK, who defines "QRL?" as "WARNING, I will be calling CQ in approximately 30 nanoseconds."

How much do we really check to see if a frequency is in use? The approach to this point varies from one or two dits on CW to three to four honest attempts for ownership on SSB. The result is at least one ensuing battle each contest with someone who thought they were there first. There really are two kinds of operators to consider. There are the guys who expect a 10 kHz swath of clarity on 20 meters SSB. And there are others who respect the reality of crowded conditions (especially around band edges) and merely want a little breathing room. My experience has shown that most everyone will move if they feel there is any question of frequency ownership. Fewer of us are making that genuine attempt to check before we get started and more importantly sometimes hold the opinion of the "non-contester" with lower regard.

Fortunately, contesters are and will remain the most proficient group of operators amateur radio can offer. As we enter the second half of this year's contest season let's think about our balance of operating courtesy versus aggressiveness.

ARRL DX Contest Changes

Effective with the 1990 ARRL DX Contest, a new single operator assisted category has been created. The rules are nearly identical to the Single Operator Unlimited category created in last year's *CQ* WW Contest and are defined as follows:

"One person performs all operating, monitoring and logging functions. The

CQ Profiles: Fred Laun, K3ZO

This month I am proud to profile one of the contest community's finest, Fred Laun, K3ZO. If you have operated in almost any contest over the past 35 years you most certainly have worked K3ZO. Fred has sported a number of callsigns through the years, including WN9SZR, W9SZR, HI8XAL, HS3AL, HS5ABD, XV5AL, LU5HFI, HS1ABD, HK3NBB, and K3ZO/HK3.

Fred first learned about amateur radio at the ripe age of eight years old when in 1946 he heard W9FJT on an AC-DC portable radio. Intrigued by his discovery, Fred wrote a letter to the gentleman which was addressed simply to W9FJT, Fort Wayne, Indiana. W9FJT can probably be credited with sparking Fred's eventual interest in amateur radio, as he wrote back quickly recommending his parents purchase a "state of the art" Zenith Transoceanic."

Fred recalls that in those days most receivers had no BFOs, so he painfully taught himself CW by listening to ship-to-shore CW stations such as WSL and WCC until he learned all the letters. An article about W4KFC appearing in *Boy's Life* magazine piqued his interest even more, until he eventually met up with his elmer, W9OMM, who claimed that Fred's CW was better than his. That following Christmas vacation in 1952, WN9SZR was born.

Fred's first contest was the 1952 ARRL Field Day. The following fall, a WN5 station explained the ARRL SS to Fred where he managed to make a few QSOs on 80 meters, 11 meters (really!), and 2 meter phone. In 1955 Fred entered the University of Wisconsin. Two years later the club now known as W9YT was formed by the likes of Fred and N6ZZ, K6NA, K9CC, W3GG, and K9CAN among others. At last Fred had a competitive contest station at his fingertips!

Around 1960 Fred convinced W9EWC (who had the only Telrex Christmas tree in Wisconsin and a regular in SSB contests) to allow him to participate in the CW sections. Fred managed his first top-ten performance from that station and recalls with delight the close relationship he developed with Butch.

Fred's subsequent move to the Washington, D.C. area led him to join the Potomac Valley Radio Club and operate at some of the finest stations ever created, including W3MSK/W3AU and W4BVV. This combined with his operating experiences overseas while press spokesman for the United States Foreign Service truly rounded out his contest experience.

Fred, K3ZO, at his main operating position.

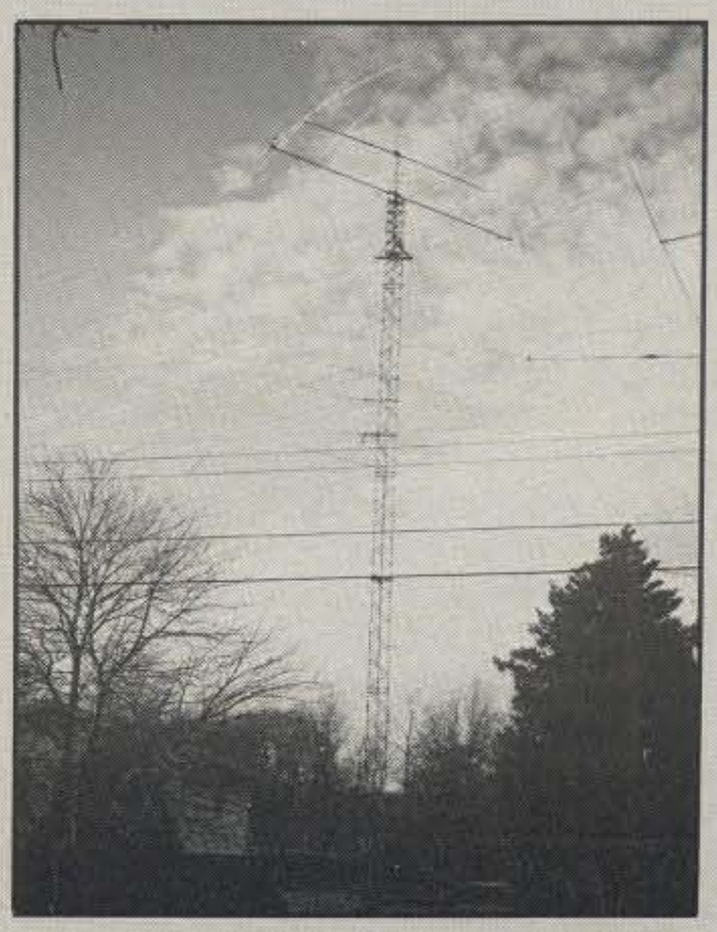
Today Fred enjoys contesting because it provides the only competitive operating form in amateur radio. Unlike many of us, Fred particularly fancies QSLing and finds contesting to be one way to generate a lot of QSL activity.

One of Fred's favorite stories is the time he put Thailand (HS) on 160 meters for the first time in the 1970 *CQ* WW 160 Meter Contest. Fred persuaded HS3NT, rector of The Northern Technical College, to shut down the college's broadcast station for the weekend so that he could use their antennas on 160 meters. Fred proudly recalls his 10 QSOs, including W7RM and W6NUT (now N6RA).

To K3ZO the contest community is a worldwide fraternity of interesting people. Fred feels that contesters around the world are much more frequently and substantially in touch with each other than the casual rag chewer. Over the years Fred has had the pleasure of being visited by over 100 DX stations, representing all continents, including the recent visits of UA9MA and UA9MC.

While it is technically interesting and in line with amateur radio's long history of contributing to the state of the art, increased "contest automation" is of great concern to Fred. He worries about the removal of human factors from contesting and doubts he would continue to enjoy its benefits when it gets to the point where human skill is not the most important factor. However, he applauds the recent establishment of packet radio in the PVRC and other clubs and feels it goes a long way to improving communications among club members.

Like many of us, Fred is concerned about the future of contesting. In Fred's opinion, the lack of interest by the youth is a major obstacle to contest growth. Moreover, he believes that all amateurs should support any measure that increases youthful participation in the hobby.



One of K3ZO's impressive towers sporting a 3-element 80 meter KLM at 140 feet.

Today Fred enjoys antennas (especially quads) and especially 6 meter DX on almost a daily basis. His station includes two TS-830s, Drake equipment, a Titan 425, Henry 2K-Classic, two SB-220s, and numerous other pieces of gear. In addition to his full-size 3-element 80 meter KLM, his impressive antenna farm includes various wire antennas, 3-element 40 meter Telrex at 91 feet, 6-element 20 meter Telrex at 150 feet, and a 4-element modified W6PU quad (33 foot boom) at 75 feet.

Having turned 52 years old on December 9th, Fred continues to show the spark of an avid contester. Married in 1986 to Somporn Nirabutra of Bangkok, Thailand, Fred is happily espoused to a woman who he claims made him turn his head from amateur radio for the first time. Fred's other hobbies (as if there was any real time for them) include chess and the memory of competitive swimming events in his younger days. If you haven't worked K3ZO in a contest, the formula is quite simple: Turn on your radio and he'll be there. Keep up the good work, Fred!

use of spotting nets and assistance through other alerting systems not physically located at the station (operating arrangements involving assistance through DX-alerting nets, etc.) are allowed. There are no restrictions on the number of band changes or the length of time spent on a band. (This new category is the same as Single Operator but allows the use of spotting nets, etc.)"

Although packet radio spotting was not specifically mentioned, the category was created in response to the overwhelming growth of DX spotting by this method. Don't feel left out if your area does not support a packet network, as spotting "the old fashioned way" with 2 meters applies as well.

Second, the ARRL Contest Branch is now accepting entries on diskette. The disks must be IBM compatible, MS-DOS formatted on 3½ or 5¼ inch media and contain information in a true ASCII based file. I encourage you to study the recently published ARRL DX Contest rules or contact the ARRL directly if you have additional questions

Washington, D.C.— *CQ* Contest Multiplier?

Dexter Anderson, W4KM, and others have asked me to raise the issue of in-

cluding the District of Columbia as a separate multiplier in *CQ*-sponsored contests (those contests using states/provinces as multipliers). This matter has been debated at length over the years, particularly with ARRL contests (e.g., ARRL DX and SS). The arguments for inclusion focus on several key points. From a jurisdictional perspective, there is nothing in common between Maryland and Washington, D.C. Furthermore, Washington, D.C. is considered in many ways to be a state-entity (issues birth certificates, license plates, levies income/sales taxes), thus worthy of equal status to other "state" multipliers. This is especially apparent when viewing the ARRL's treatment of Puerto Rico and the Virgin Islands.

However, there is an equally significant following that believe consideration for Washington, D.C. as a separate multiplier is driven by a small minority of contesters who desire to make their QTH rare by creating a low-population-density multiplier for everyone to work. Moreover, inclusion of D.C. in the multiplier list may require consideration for similar situations yet to be debated.

I encourage you to voice your opinion on this point. Please feel free to contact me with your feelings so that I can forward a consolidated response to the appropriate *CQ* Contest Directors.

Next Month

Next month's column is going to offer a detailed comparison of a winning 1980's DX Contest log with someone's of the 50s/60s. I think we will be impressed with how far contesting has come in recent years. As I pour over pages of 1989 contest logs, I keep asking myself, "How high can scores go?" Will USA single operators break 4000+ QSOs in years to come? Fortunately, I think there is still a little breathing room before Caribbean stations are chartering airplanes to W1-land in future *CQ* WWs.

Remember, the deadline for the May column is March 1st.

73s, John, K1AR

Carnaval de Quebec DX Contest

CW: 0000-2359Z Sat., Feb. 3
SSB: 0000-2359Z Sat., Feb. 10

In celebrating Canada's Carnaval de Quebec, the Club Radio Amateur de Quebec is sponsoring the Carnaval de Quebec DX Contest. The submitted rules were somewhat sketchy, but the basic details include worldwide participation. I suggest you write to the C.A.R.Q. for more information. Basically, the exchange is callsign and signal report on 80-10 meters (WARC bands excluded). A special souvenir plaque will be available to the first five amateurs working the special event station, CY2CQ. Mailing deadline for logs is April 15, 1990 and they should be sent to C.R.A.Q., VE2CQ, CP 2341, Quebec, QUE, G1K 7P5, Canada.

North American "Sprint"

CW: Feb. 4 SSB: Feb. 11
Sunday 0000Z to 0359Z (Sat. night)

This is the spring edition of the "Sprint" run by the National Contest Journal. As the name implies, it's a shorty, only four hours long.

North Americans will be contacting other North American stations as well as stations in other countries, single operator only. North American boundaries are as defined by the rules used in the *CQ* WW DX Contest.

Exchange: Call, QSO no., name, and QTH (state, Canadian area, or country).

Scoring: Multiply total QSOs by the sum of states, Canadian areas, and other North American countries worked for your final score (U.S. and VE not countries; KH6 not a state). There are eight Canadian multipliers: VE1/VO1/VO2, VE2-VE7, VY1/VE8. Non-North American countries do not count as a multiplier.

Frequencies: Three bands only: 80, 40, and 20 meters. CW—3540, 7040, 14040. SSB—3850, 7225, 14250. (Plus or minus QRM.)

Awards: A trophy to the highest scoring entrant. Certificates to the top scorer in each U.S. call area, Canada, and North American country. Also to the ten top scores, to each member of the winning team, and the highest scoring entrant on each team.

Team competition is limited to a maximum of 10 operators as a single unit. Precontest registration is required for each team before the start of the contest—with WN4KKN for the CW and K7GM for the SSB.

There are other detailed rules, a special QSY rule, disqualifying penalties, etc. I suggest you write to WN4KKN or K7GM if you do not have a copy of the *National Contest Journal*.

Entries must be received no later than 30 days after the end of each "Sprint."

The CW go to: Trey Garlough, WN4KKN, 7609 Hardy Drive, Austin, TX 78757.

SSB go to: Rick Niswander, K7GM, 910 W. Claremont, Phoenix, AZ 85013.

Dutch "PACC" Contest

1200Z Sat. to 1200Z Sun., Feb. 10–11

It's the world working The Netherlands on all six bands, 1.8 through 29.7 MHz, in the band sections recommended for contest operation by the IARU. The same station may be worked on each band, but on one mode only, phone or CW, for QSO and multiplier credit. Note that SSB QSOs are not allowed on 160 meters.

Categories: Single operator, multi-operator, and SWL.

Exchange: RS(T) plus a QSO number starting with 001. Dutch stations will add two letters to identify their province. There are 12 provinces: DR, FR, GD, GR, LB, NB, NH, OV, UT, FL, ZH, and ZL.

Scoring: Each QSO with a PA/PB/PI station counts one point. DX stations determine their multiplier by the number of provinces worked on each band (maximum of 72).

Final Score: Total number of QSO's times the number of provinces worked on each band.

Awards: Certificates to the top scoring station in each category in each country and call areas of JA, LU, PY, UA9/0, VE/VO, VK, W/K, ZL, and ZS. Also second- and third-place awards if returns justify.

SWL's must log the call of the Dutch station as well as the station being worked and both serial numbers. Scoring same as above. Indicate the multiplier in a separate column in your log only the first time it is worked on each band. Include a summary sheet showing the scoring, your name and address in block letters, and the usual signed declaration.

Mailing deadline is March 12th to: PACC Contest, Att: F. Th. Oosthoek, PA0INA, P.O. Box 499, 4600 AL Bergen op Zoom, The Netherlands.

QCWA QSO Party

CW: Feb. 10–11 SSB: March 10–11
0001Z Sat. to 2400Z Sun.

This is the 33rd annual QSO Party for the Quarter Century Wireless Association. It's a closed, fun party open to QCWA members only to renew old friendships and meet new members. Rules are the same as those used last year and were given in detail in the QCWA News. Following is a brief summary.

CW and SSB are separate activities and require separate log entries. The same member may be contacted on each band for QSO points, but the chapter multiplier is counted once only. The "AL" multiplier can be used once for each state, province, and DX country worked.

Exchange: QSO number, name, chapter (name or number), and state. If no chapter affiliation use "at large," or "AL."

Points: One point for each QCWA member worked on each band.

Multiplier: Each new chapter and one AL contact for each state, province, or DX country worked.

Score: Total QSOs multiplied by the sum of the different chapters and AL multiplier (counted once only).

Frequencies: CW—3545, 7045, 14045, 21055, 28055. SSB—3915, 7245, 14295, 21365, 28615. Plus or minus 15 kHz. Also 160 meters and 6 and 2 meters simplex.

Awards: Both for CW and for SSB.

Plaques to the top world-wide scorers. Certificates to the next four runnerups, and in each of the 6 continents.

Party QSOs can be applied for the many QCWA awards. Make your request on the summary sheet of your entry.

The standard QCWA log form has 20 contacts to the page. If you prepare your own, have columns for time in GMT, station worked, QSO number sent and received, name, chapter, state, band, RS(T) points, and multiplier.

Mailing deadline for both CW and SSB is March 26th. This year they both go to: Walt Brink, W3WPY, 919 Cloverfields, Kent Island, MD 21666-9363.

YL-OM Contest

SSB: Feb. 10–12 CW: Feb. 24–26
1400Z Sat. to 0200Z Mon.

It's the YLs working the OMs in this annual activity organized by the YLRL. All bands may be used, but cross-band contacts or contacts with stations on net frequencies do not count.

Phone and CW are separate contests and require separate logs. The same station may be worked once on each band. Use only 24 hours out of the 36-hour contest period and indicate breaks in your log.

Exchange: QSO number, RS(T), and state, province, or country.

Scoring: Each QSO is worth 1 point. Multiply total by the number of US states, VE provinces, and DX countries worked.

There is also a power multiplier of 1.50 for stations running 100 watts or less on CW, and 200 watts PEP on SSB.

Frequencies: CW—3555, 7055, 14055, 21135, 28195. SSB—3955, 7255, 14265, 21395, 28395. Plus or minus 15 kHz.

Awards: First-place cups to both YL and OM winners in each contest; second- and third-place winners will receive certificates. Top scorers in each US and VE call area and each DX country will also receive certificates, provided there are a minimum of ten contacts in the log.

All entries must be postmarked no later than March 15th. This year they go to: Dana Tramba, c/o Dandy's, 120 North Washington, Wellington, KS 67152.

School Club Roundup

1300Z Mon. to 0100Z Fri., Feb. 12-16

The School Club Roundup (formerly Operation SEARCH) is sponsored by the Council for the Advancement of Amateur Radio in the New York City Schools and the ARRL. The object of the event is to exchange QSO information between amateurs, especially school radio club stations.

Operating Period: 1300-0100Z, Monday-Friday. Operation is limited to 24 of the 60 total hours. Logs must clearly indicate on/off times. Off times must be at least 30 minutes.

Exchange: Your callsign, RS(T), station class (individual, club, school), and U.S. State/DXCC Country.

Classes: Individual/single operator (non-club), club or group (non-school), school club/group (grades K-12).

Scoring: Stations may be contacted once on each mode. Count SSB QSOs for one point; CW for 2 points. Final score is total QSOs times multiplier. Multipliers are defined as U.S. States plus DX countries. Multiply club QSOs by 2 and school stations by 5.

Awards: Certificates will be awarded to the top three entries in each class. A new certificate is available to anyone working 10 or more school club stations.

The mailing deadline is March 19, 1990. Logs should be sent to School Club Roundup, Lew Malchick, N2RQ, Brooklyn Technical High School, 29 Fort Greene Place, Brooklyn, NY 11217. Be sure to include a large SASE or sufficient IRCs for complete results.

ARRL International DX Contest

CW: Feb. 17–18 Phone: March 3–4
0000Z Saturday to 2400Z Sunday

There are several rule changes this year. I strongly recommend that you study the announcement in the December issue of *QST* for more details. Also send a large SASE (2 IRCs for DX) for sample log and entry forms.

All bands may be used, 1.8 through 28 MHz, but not 10, 18, or 24 MHz. Aeronautical or maritime mobile stations cannot be worked for contest credit. Following is a brief outline.

Categories: Single operator, both single and all band, and single operator assisted. Multi-operator, one transmitter and two transmitters. Also multi- operator, multi-transmitter. Also QRP, all band only (5 watts or less output). Multi one and two transmitter stations must remain on a band at least 10 minutes once a contact is made. Multi-transmitter stations no limit, but only one signal per band.

Exchange: RS(T) and state or province for W/VE; RS(T) and power input for DX stations (three-digit number).

QSO points: W/VE stations earn three points for each DX contact. DX get three points for each W/VE contact.

Multiplier: Each DXCC country worked on each band for W/VEs. DX stations use US states (48), District of Columbia (DC), and VE districts VE1–8, plus VO and VY1 for their multiplier (10). (Maximum multiplier of 58 per band.)

Final Score: Total QSO points times the sum of the multiplier from each band. Entries with 500 or more QSOs must include a QSO check sheet.

Awards: Certificates given in each category, in each country, and in each ARRL section, plus a wide selection of plaques. Also certificates to DX stations making over 500 QSOs.

Disqualification regulations will be strictly enforced and are listed in the official rules. Mailing deadline for all entries is April 4th, and they go to: ARRL DX Contest, 225 Main Street, Newington, CT 06111.

CQ WW 160 Meter SSB Contest

2200Z Fri. to 1600Z Sun., Feb. 23–25

Just a reminder that the SSB section of our 160 Meter Contest will be coming up the last full weekend of this month.

Extensive coverage has been given to this event, with complete rules in the November issue and a briefing in last month's Calendar. Therefore, it would serve no purpose to repeat them again. They are the same rules that have been used these past many years and are well known worldwide.

Mailing deadline for your entry in last month's CW contest is February 28th, and March 30th for this month's SSB section.

They can be sent directly to the 160 Contest Director, Donald McClenon, N4IN, 3075 Florida Ave., Melbourne, FL 32904. And, of course, they can always be sent to the *CQ* office. *CQ* 160 Meter Contest, 76 North Broadway, Hicksville, NY 11801. (Be sure to indicate CW or SSB on the envelope.)

Maine QSO Party

1900Z Sat. to 0300Z Mon., Feb. 24-26

This year's party is sponsored by the Southern Maine Contest Club. It is Maine stations working all other stations worldwide. The same station may be worked once on each band and mode. In addition to the usual single operator category, there is an additional class for 10 meters only (less than 200 watts).

Exchange: RS(T) and QTH. County for ME stations; state, province, or country for others.

Scoring: All stations credit 1 point/SSB QSO, 2 points/CW QSO. ME stations multiply QSO points by number of ME counties (16 maximum), states, provinces, and DXCC countries. Others simply use counties.

Final Score: Final score is calculated by multiplying QSO points times total multiplier.

Frequencies: CW—50 kHz up from bottom of band; SSB—3960, 7230, 14280, 21380, 28480, 50130.

Awards: Certificates will be awarded to the highest scorer in each ME county, state, and DXCC country.

Logs must be received by March 26, 1990. Be sure to include an SASE for final results. Send logs and comments to: SMCC, P.O. Box 3422, Portland, ME 04104.

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WASHINGTON READOUT

BY FREDERICK O. MAIA, W5YI

REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

Congress and Amateur Radio License Fees

Last fall the House of Representatives passed a massive deficit reduction bill which included the introduction of license fees for the amateur service, and just about every other radio service regulated by the FCC. The measure then went to the U.S. Senate for further deliberation.

Both the House and Senate were in agreement that fees should be levied whenever the FCC issues an amateur license—whether it be for a new, modified, renewal, or alien-reciprocal ticket. All classes of license were included—even club, RACES, and military recreation stations. The only disagreement seemed to be how much should be charged. The House version suggested $30; the Senate went with $35.

Tom Cohen, attorney for the Senate Commerce Committee's Communications Subcommmitee, said, "We are trying to treat everyone fairly and equally across the board who is using the spectrum or the FCC for the processing of spectrum licenses." Certain safety related services such as fire and police radio were exempted, however.

The American Radio Relay League wanted to have amateur radio excluded from the cost-of-regulation fees on the basis that amateurs do not use the spectrum for commercial gain and provide valuable public service in time of disaster and other public emergencies.

Senator Carl Levin of Michigan sided with the ARRL. Levin pointed out that the Senate Commerce Committee did not include certain other non-profit organizations in the fee schedule because of their public service nature. He called the fees on amateur radio operators " . . . unfair."

Amateurs became concerned that not only would volunteer examiners for the Technician and higher class licenses be collecting testing fees, but licensing fees as well. On the surface $30 or $35 for a 10-year-term license did not seem excessive. Certainly three bucks a year was not much for the privilege of accessing the many amateur bands we enjoy.

What no one stopped to think about was the massive impact licensing fees would have on amateur radio growth. Our primary objection to the licensing fees was not the $3.00 or $3.50 a year, but the nearly $200 an applicant who was making his way up through the amateur ranks would have to pay ($30 or $35 for a Novice ticket, then—considering the test and license modification fees—another $35 to $40 every time an amateur upgraded).

As most of you know, the W5YI-VEC organization (which I head up) conducts nearly a third of all testing sessions for which the FCC issues an upgraded amateur operator license. We have many examinees who are administered examinations on a monthly—even weekly—basis. We felt the modification fee would have a devastating impact on the self-education aspect of the amateur service. Considering the testing fee, every upgrade could cost $40!

We drafted a letter to Tom Cohen, Senior Counsel of the Senate Communications Subcommittee. We explained to him the amateur service incentive licensing system and the volunteer examiner program. "To require a modification fee every time an applicant upgrades his status will cause untold thousands of examinees not to upgrade—or improve their knowledge of electronics and communications. We feel this will have a chilling effect on the value of amateur radio as a high-technology educational tool, and our efforts to guide our nation's youth toward an engineering career," I said.

"At present, successful examinees are given a new ten-year term every time they improve (upgrade) their operator license. I propose that a new ten-year term not be given every time an applicant upgrades. Instead the license should retain the original date—i.e., ten years from the date of (new or renewed) fee payment. This would permit implementation of a fee schedule in the Amateur Service, which the Congress apparently feels important, yet not have the effect of precluding our youth from improving their electronic knowledge."

I explained that Japan has four times as many engineers per capita as the United States. They also have the most amateur operators of any nation in the world, and the majority are under 20 years old. "We believe there is a direct relationship."

"We feel it vital to our nation that the Congress not enact a fee on amateur license modifications which would dull enthusiasm. The amateur service is an excellent tool with which to educate our youth. We hams call it incentive licensing—more privileges, transmitter power, and frequencies in exchange for more proficiency and knowledge. Let's not do anything that will inhibit the marvelous self-education aspect of the amateur service," I wrote.

A couple of weeks later we received a reply from Ernest F. Hollings of South Carolina. Senator Hollings is Chairman of the Committee on Commerce, Science and Transportation. It read:

"Thank you for your recent letter concerning the proposed fees on amateur radio (ham) operators. I agree that hams often provide valuable public service in times of emergency and that many school children become introduced to science and engineering through their introduction to ham radio. Recognizing this, I have spoken with Senator Levin and have agreed to work with him to strike these fees from the current legislation. With kindest regards, I am, sincerely: Ernest F. Hollings, Chairman."

So it appears as if amateur radio fees are no longer being considered by the Congress.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101

Hearing Held on Spectrum Transfer

The Emerging Telecommunications Technologies Act of 1989 (ETTA—HR-2965) proposes to reallocate some 200 MHz—more or less—of spectrum from the Government arsenal to private commercial use. If vast amounts of new spectrum are made available to new business users, the result could be less pressure to reallocate amateur frequencies.

The House Telecommunications Subcommittee on Communications recently held a hearing on the bill, marking the first time in 30 years that Congress has held hearings on spectrum allocation matters. They generally leave such matters up to the FCC and NTIA.

The NTIA, National Telecommunciations and Information Administration, is the White House advisor on communications matters. NTIA oversees the use of federal government spectrum, while the FCC is in charge of private and commercial allocations. As a general rule, each

rules its own territory. Congress, of course, has the power to get involved in both areas, and that is exactly what they are doing.

The bill introduced by House Energy and Commerce Committee Chairman John Dingell (D-Mich.) orders Commerce to designate some 200 MHz of under-utilized government spectrum for new commercial applications such as high-definition television, viewer to TV studio links, pocket cordless telephones, and what not. While new technological efficiencies have yielded more frequencies, the FCC is fast running out of ideas on how to accommodate the host of new spectrum-based gadgets and proposals.

Dingell, realizing that the FCC has no more spectrum available to give out, is looking to government allocations. It seems they have plenty. Reportedly some 40 percent of their allotment goes unused by anyone. He said the government was holding back economic innovation and progress by holding back their frequencies at a time of increasing foreign competition.

Al Sikes, the current FCC chairman, used to head up the NTIA before migrating to the public sector. Like good soldiers, both he and NTIA's Obuchowski are backing the Bush Administration's position that any identified spectrum should be sold to the highest bidder to help reduce the federal deficit instead of giving it away.

Like oil, spectrum is a limited, natural, consumable, and valuable resource. Two-hundred megahertz would be worth billions! Both oppose a provision in HR-2965 that would bar auctioning of the spectrum. Sikes did say, however, that he was not reluctant to take a position independent of the administration.

NTIA maintains that government spectrum is also congested, and any reallocation to the private sector would be costly because the government would have to invest in new efficiencies, too. They would prefer government/non-government sharing rather than an outright transfer of spectrum. NTIA is in the process of studying government spectrum use. Prime users are the Departments of Defense, State, and Justice.

House Telecommunications Chairman Edward J. Markey (D-Mass.) said that the first hearing reinforced his view of the bill's importance, and he is scheduling another hearing to obtain testimony from the private sector and from local, state, and federal users. He said the bill had been " . . . put on the fast track."

New Rules Proposed for Use of 220-222 MHz Band

Reallocating radio spectrum from the government stockpile came too late for the 220-222 MHz segment. The 1.25 meter band is shared between the fixed, mobile, and amateur services. The FCC reallocated the lower 2 MHz exclusively to narrowband Private Land Mobile use on September 6, 1988. Amateurs are currently being permitted to occupy 220-222 MHz while the FCC determines just how the transition to private and government Land Mobile operation should take place.

While the Commission has not yet decided when amateurs must vacate this portion of the 1.25 meter band, they have issued a Notice of Proposed Rulemaking looking toward establishing the Land Mobile regulatory framework. The NPRM therefore is a Land Mobile (§Part 90) rather than an Amateur Service (§Part 97) proceeding. We thought you would be interested, however, in learning what the FCC has in store for what once was an amateur band.

The Commission said, " . . . their main goal in reallocating these frequencies was to provide unused spectrum for the development of spectrally-efficient narrowband technologies." Amateurs, of course, maintain that the spectrum was indeed well occupied by amateurs. Both the ARRL and the Department of Justice, who are concerned about domestic emergency communications, are contesting the reallocation in federal court.

Rules must be established before the Commission can grant licenses for land mobile services in the reallocated band. The Commission is therefore asking for public comment on the following proposals.

First, the Commission is proposing that two-hundred 5 kHz channel pairs be created, with the channeling plan consisting of channel groups to facilitate trunked technology and blocks of adjoining channels for individual frequency assignments. A trunked system automatically "hands off" communications to another vacant channel.

Second, the Commission plans to make most frequencies in the 220-222 MHz band available to any person or firm eligible under §Part 90. "Market forces" would determine how much spectrum would be utilized by the various types of users.

The Commission proposes, however, to designate some of the nationwide channels as "noncommercial" for use by licensees to meet their own internal communications needs. The Commission will bar commercial operations from the individual channels for five years. At the end of the five-year period private carriers will be free to apply for unoccupied frequencies or to be assigned existing systems.

Third, the Commission will set aside two blocks of ten adjacent channels and eight blocks of five adjacent channels for use nationwide. The ten-channel blocks and four of the five-channel blocks would be available only to noncommercial nationwide licensees for their internal use.

Two of the remaining five-channel blocks will be reserved for government use nationwide. Except for the nationwide channels, Government and non-Government users will share the spectrum on a co-equal basis. Non-Government nationwide applicants must meet certain entry requirements, including certifying that they will meet specified construction standards and are financially qualified to construct the system they propose. It is anticipated that United Parcel Service will apply for one of the two remaining non-Government nationwide five-channel blocks.

The Commission proposes to grant applications on a first-come, first-serve basis, using a lottery if necessary to assist in the licensing process. Each non-nationwide licensee will be afforded channel exclusivity using a 70-mile frequency reuse standard and will have a license term of five years.

Because nationwide licensees will need a significant period of time to implement their systems, the Commission has proposed a 10-year license term for nationwide licensees.

FCC Looks Into Third-Party Traffic

The hectic situation on 20 meters has reached the point where we could easily see an end to phone patches—even third-party communications. For some time Official Observers and the FCC have been monitoring what appears to be business communications between South Americans, recreational boaters, and missionaries on the high-frequency amateur bands. In addition, new amateur HF bulletin stations have appeared which seemingly broadcast without end. Amateurs are concerned that these communications are interfering with or precluding normal amateur operations.

A great deal of the third-party communications heard on the HF amateur nets is borderline—some flagrantly illegal. The rules clearly prohibit all business messages, and most international traffic if other authorized telecommunications services are available.

Some amateurs, like the Virgin Islands' Herb Schoenbohm, KV4FZ, of St. Croix have been pointing this out on the air waves in no uncertain terms. Schoenbohm has a group of supporters who agree with his views. The end result is an on-the-air circus-type dsipute which pits amateur against amateur. Many amateurs feel they are assisting humanity by volunteering their time to pass phone patches and traffic for Americans in foreign countries, missionaries, military servicemen, or ships at sea. But once the message goes beyond simple greetings, they cross the regulatory line. The con-

troversy and anger within the amateur community are now raging out of control. Everyone seems to have his own view of what is legal and what isn't, or who is right and who is wrong. It's a real mess.

It is obvious that many participants simply are not aware of the rules. Some phone nets were originally set up to handle phone patches to military vessels at sea and servicemen stationed overseas. Now they appear to be used as a call-in frequency to the U.S. for phone patches, many for business purposes or to avoid the high cost of Maritime Service calls.

Lots of boaters have been told by boat dealers that they can use amateur gear for both emergency and personal phone call use and that it is much cheaper than buying the maritime equipment. Phone patching has become commonplace on the 15 and 20 meter amateur bands. A missionary amateur net conducts church business on the air.

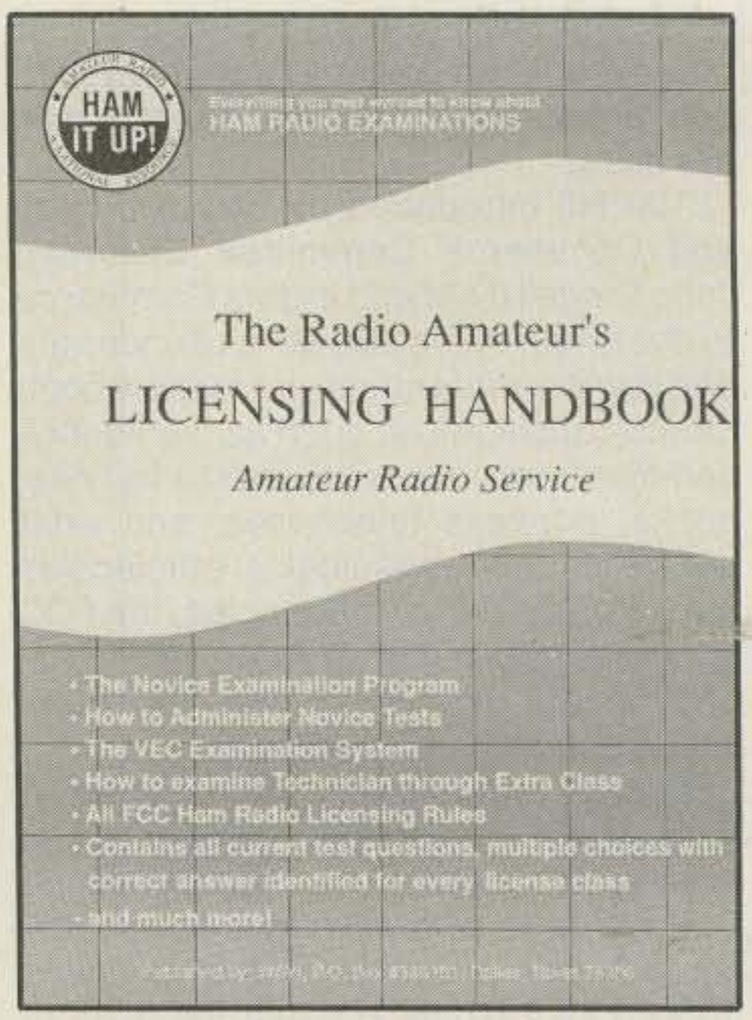
Then there are the regularly scheduled bulletin stations. W1AW, the ARRL's headquarters station, used to be the only amateur station that routinely broadcasted bulletins of interest to amateurs on many bands. The League even assisted the FCC in writing regulations in order to allow them to be able to legally pay the W1AW operator a salary. These rules generally require 40 hours of code practice and bulletin transmissions per week on all MF and HF bands.

Now there are others! While most stations limit their broadcasts to short-range VHF/UHF spectrum, K1MAN, Glenn Baxter's IARN, International Amateur Radio Network, Bulletin Service, has now joined W1AW. Many amateurs are vocal in their objections to his dozens of daily transmissions on various frequencies. Some say his rambling transmissions are not for the general amateur population, or are more like editorials of the station owner

The FCC has received letters from other nations expressing their thoughts on the dispute. The Commission has now had enough and is taking action. A fact-finding letter was sent out to many participants in HF third-party traffic handling. It was written by FCC Special Services Division Chief Bob McNamara.

The letter asked for information about bringing about a resolution of the unfortunate one-the-air 20 meter dispute. McNamara said he feared that enhancement of international good will—a fundamental principle of the rules for the amateur service in the United States—is being jeopardized as a direct result of the quarrel. He said he also was concerned that the experimental nature of the amateur service is being suppressed since the " . . . never ending debate is denying the purposes for which the frequencies were allocated."

Business transmissions are forbidden on amateur frequencies—whether individual or organization, whether for profit or not for profit, whether charitable or commercial, and whether government or non-government, McNamara pointed out. "All types of communications relating to business activities, including the advertising, soliciting, ordering, furnishing, delivering, accounting, or billing of any supplies, materials, or services are prohibited."



Available from W5YI, this new licensing manual covers all questions for the Novice through senior-level amateurs.

Furthermore, international third-party communications are limited to tests and remarks of a technical nature relating to tests and to insignificant personal remarks " . . . by reason of their unimportance, recource to the public telecommunications service is not justifiifed." McNamara said, "Considering these limitations, it is not apparent why there should be any significant amount of third-party communications transmitted in the amateur service."

While the FCC approach has usually been to allow the amateur community to resolve its own disputes, " . . . this approach has not been effective in this instance and we are looking to other alternatives." McNamara also said he was concerned about prolonged bulletin and telegraphy practice transmissions on HF spectrum.

The FCC received dozens of responses to its wide-ranging HF letter of inquiry. The responses contain wildly varying accounts of the situation. At one extreme, some commenters believe that no problem exists. Others plead for rule changes and rapid FCC enforcement to stem flagrant rule violations that threaten the total destruction of the service. The majority believe nets and patches are useful,

that the benefits outweigh the drawbacks, and that a handful of lids are ruining the fun for everybody else. Following are some excerpts from the responses.

"ARRL believes there is no room in the crowded amateur HF telephony bands for lengthy one-way transmissions on a regular quasi-broadcast basis. Information bulletins by definition must be confined to factual matters, not matters of opinion." . . . *C. Imlay, N3AKD, ARRL Counsel and J. Lindholm, W1AW, trustee*

"Asking if such transmissions are necessary or desirable is akin to asking if any radio or TV programming is needed in the public sector. The non-commercial nature of amateur programming is akin to public educational TV. I don't feel that [ARRL] bulletins are as useful as ours and I would welcome more competition." . . . *G. Baxter, K1MAN, International Amateur Radio Network*

"Thousands and thousands of our military people have kept in touch with their families on this net. Persons in distress in this hemisphere, whether on land or sea, have known for years that when they get in difficulty, they can come to our nets for help." . . . *W. Donner, KA8O, Maritime Mobile Service Net*

"All patching within the boundaries of the continental U.S. should be eliminated. International phone patching should be limited to ten minutes and be on allocated frequencies." . . . *H. Lehrman, W4PZV, ARRL Interference Reporting Observer*

"I do not believe that all amateurs should lose the pleasure and benefit of phone patches properly conducted within rigidly enforced existing rules, because of abuses carried on by a relatively small number of stations. We feel we may have been unjustly accused by a few ill-informed individuals, more by innuendo than by facts, simply because we are boaters . . ." . . . *C. Phillips, W1MDM, Waterway Net*

"The Commission's refusal to seriously enforce the law has opened the flood gates for spectrum anarchy to prevail on the amateur bands. To threaten those who are holding frank discussions on the issues is wrong, wrong, wrong. My advise to your agency, since it has been solicited, is to stay out of the Constitutional minefields of free speech . . ." . . . *H. Schoenbohm, KV4FZ, U.S. Virgin Islands*

"The Commission may easily ascertain that both foreign and domestic carrier services are being deprived of revenue amounting to several million dollars per annum, and that the primary beneficiaries are U.S. missionary and yachting interests." . . . *W. Gasell, WB8GDP*

"I submit to you that your office has been duped by all involved. I submit that the real issue is nothing more than a spat between wayward amateurs over use of a given frequency, and that your office has been provided with a highly distorted picture of the situation." . . . *W. Pasternak, WA6ITF, Amateur Radio Newsline, Inc.*

"In my opinion, no regulation would be preferable to more regulation. The FCC is obviously unable to enforce current regulations concerning malicious interference anyway." . . . *M. Endres, WH6J Seafarer's Net*

The FCC is now reviewing the comments from the multitude of amateurs who wrote letters commenting on the HF disputes involving third-party traffic and one-way transmissions. William Cross, FCC Personal Radio Branch, said, "With this HF inquiry we will try to determine if we do have a problem, or if this is a dispute that the amateur community should itself solve. If there is a problem, is there something we can do about it? It might be enforcement, rulemaking, clarification of existing rules, maybe making new rules . . . . We want to find a way to get 20 meters so that it's not anarchy. As a practical matter, it looks like 14300-14350 is where the problems are going on. We have an obligation to those operators who have access to these frequencies to return the frequencies to the Amateur Radio Service and see that these problems stop."

Radio Amateur Licensing Handbook

We have just published a 265-page manual that answers every imaginable question concerning testing and licensing in the Amateur Radio Service. This handbook is meant for everyone—from individuals who would like to become amateur operators or upgrade their present license, to senior-level amateurs interested in administering all levels of amateur examinations.

The handbook covers topics such as: Administering the Novice examinations, Mechanics of the VEC System which examines the higher class levels, Organizing an examination session, How to make up all theory and telegrapy examinations, Instant upgrade and examination credit procedures, All FCC ham radio licensing rules, How to complete the application Form 610, Processing the paperwork, Testing the handicapped, . . . and much more.

In addition, the handbook covers all current 1,932 test questions appearing in examinations for every licence class from the beginning Novice to the top-of-the-line Amateur Extra. All questions are listed complete with exact word-for-word multiple choices and correct answer identified. Moneyback guarantee. Cost is $9.95 plus $2.00 shipping/handling from: W5YI Publishing, P.O. Box 565101, Dallas, TX 75356.

73, Fred, W5YI

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

South Sandwich and South Georgia Islands?

DXers may be in for an unprecedented treat in 1990. Not only is propagation about as good as it has ever been in the history of amateur radio, but more rare countries are coming on the air now than at any time in the recent past. With Laos XW now on the air on a regular basis, and a successful 3Y5W Bouvet operation by the Club Bouvet team, plus operations from United Arab Emirates A6, Mount Athos SY2A, Annobon Island 3CØGD, Marion Island ZS8MI, Chad TT8GA/CW, and a planned Malpelo Island HKØTU DXpedition, the DXer's cup has been overflowing in recent months. And now two more of the most difficult countries in the world to work may be available to the Deserving this month.

As this writer discussed in December, the entire DX community loses when two major operations compete to put a rare DXCC country such as Bouvet on the air. Late last year the Club Bouvet team secured added financing from both the amateur community and scientific research organizations, and their 3Y5W DXpedition appeared certain to succeed. With four operators on the island for 10 days, they would be able to handle the bulk of the demand for Bouvet. (By the way, if you worked 3Y5W, how about sending along an extra $5 or so with your QSL request to help with the $100,000 in expenses, and to encourage this dynamic group to visit yet another rare spot?) Meanwhile, Tony DeParto, WA4JQS, and others were trying to organize funding for a major DXpedition to the South Sandwich Islands, which also lie in the South Atlantic between South Africa and Argentina.

With help from Rusty Epps, W6OAT, president of the Northern California DX Foundation, and the concurrence of the Indianapolis DX team that set up the 3YØB operation, all involved decided to pool their resources and attempt to put South Sandwich and South Georgia islands on the air instead of concentrating on Bouvet.

The South Sandwich islands lie about 2000 miles farther west from South Africa than does Bouvet. The group plans to spend a few days on Bouvet to accomplish some of the scientific objectives of the original plan and perhaps do some mop-up on any band or mode that the 3Y5W gang missed, and then steam west to South Sandwich. Leaving some of the DXpeditioners in that island group, the rest of the crew would continue another 500 miles west to the South Georgia group and operate there for a few days. They would then pick up the South Sandwich team and return to South Africa.

If all goes according to plan, DXers will have an excellent shot at confirming these two rare Antarctic islands.

P.O. Box 50, Fulton, CA 95439

Ralph Dage, W8PHZ, standing, with Victor Tkachenco, UA6LA, in Ralph's Michigan shack.

South Georgia

The South Georgia island group consists of one large island, San Pedro, surrounded by numerous smaller ones. The islands are covered with snow, ice, or bare rock, and lack trees or bushes of any kind. They lie about 1200 miles east of Argentina. South Georgia was reported by a Spanish ship in 1756, but Spain didn't file a claim. In 1775 Captain Cook, on the second of his worldwide explorations, landed on the island and claimed it in the name of King George III of England—hence the name. The main island was the site of whaling stations from 1904 to their abandonment in 1966. The island still teems with seals, penguins, and other sea birds, as well as herds of reindeer introduced by the whalers early this century.

South Georgia played an key role in the 1982 war between England and Argentina. An Argentine scrap-metal dealer contracted to salvage three abandoned whaling stations on the northern coast of the island. The dealer, Constantino Davidoff, thought he had obtained all necessary permits and informed the British consul in Argentina about his March 1982 operation. When his crew landed on the island, they raised the Argentine flag over their camp. The British Antarctic research team, stationed a few miles away at Grytviken, noticed the flag and reported by radio that the "Argentines had landed!" The British protested the "invasion" to Argentina and sent an icebreaker to escort the "invaders" off the island. Argentina responded by sending a navy ship to protect their countrymen. The dispute escalated, with each country sending more ships to the isolated island.

Finally Argentina had enough, and their military invaded the Falkland islands (or Malvinas islands, if you are from Argentina) on April 2. Their forces took South Georgia the next day. South Georgia remained in Argentine hands until April 25, when a British force retook the island. Meanwhile, the fighting continued on and around the Falklands until June. About 1000 people died in the war. *(Thanks to Jon Fisher, author of* Uninhabited and Deserted Islands, *for this history.—ed.)*

For more information about South Georgia, DXers should read the excellent article in the March 1989 issue of *National Geographic* beginning on page 340.

South Georgia has always been difficult to work on the amateur bands. VP8BUB has been stationed on Bird Island for more than a year, but his transmitter interferes with the computer the scientists use to process their data about the wildlife populations, and his operation has been severely restricted. I once had a daily sked with a scientist on a ship off South Georgia. Since ship-board operations do not count for DXCC, there was little interest on the bands, and I did scientific research in local college libraries for the operator. Despite regular schedules over a period of weeks, I was never able to convince him to run a long cable and set up an antenna on shore so that it would count for DXCC. With help from the Saturday Evening Post Foundation and the others involved, DXers will not have to suffer that frustration much longer.

South Sandwich

Even rarer on the amateurs bands is the South Sandwich island group. Steep cliffs and heavy surf make landing on any of the numerous small islands very difficult. Lying even closer to Antarctica than South

The WPX Program

Mixed

1419 . . . . . WA6BIL

SSB

2099	W3YN	2102	DF7YN
2100	IK4FNF	2103	K2EEK
2101	DF2KD	2104	WM0G

CW

2600	DK8NB	2604	YC3KDL
2601	OL5BPH	2605	AH6JF
2602	DL1FU	2606	K1EI
2603	N5GFX	2607	KI4UZ

VPX

260 . . . . . 325/VE

Endorsements

Mixed: 550 PA0ASD, VE3OMM, WM0G. 600 PA0ASD. 650 PA0ASD. 700 PA0ASD, NJ1T. 750 PA0ASD, W3FDU, NJ1T. 800 PA0ASD, W3FDU. 850 AB5C. 900 AB5C. 1100 HA5NK. 1150 HA5NK. 1200 HA5NK, AI6Z. 1250 AI6Z. 1750 KL7AF.

SSB: 350 JH8MWW, DF2KD, WM0G. 400 DF2KD, WM0G. 500 VE3OMM, DF2KD, WM0G. 550 DF2KD. 600 DF2KD. 650 DF2KD. 700 W2FDU, DF2KD. 750 IV3CVG, DF2KD. 800 IK7DBB, K3ZPG, AI6Z. 850 IK7DBB, IV3MJR, EA3AAY. 900 EA3AAY, WK4F. 950 WK4F. 1000 WK4F. 1050 DF7QD. 1150 AC3T. 1250 PY4VX. 1300 PY4VX. 1350 PY4VX. 1500 K5RPC. 1550 K5RPC. 1900 NJ0C.

CW: 350 OK3ZWX, OL5BPH, N5GFX, YC3KDL. 400 OZ-DR2044, OK3ZWX, YC3KDL. 450 LA3GI, OK3ZWX, YC3KDL. 500 OK3ZWX, YC3KDL, VE3OMM. 550 OK3ZWX, YC3KDL. 600 OK3ZWX, YC3KDL. 650 OK3ZWX. 700 OK3ZWX, VS6UW, NJ1T. 750 OK3ZWX, KS3F, NJ1T. 800 OK3ZWX. 850 OK3ZWX. 900 OK3ZWX. 950 OK3ZWX, AI6Z. 1000 OK3ZWX, AI6Z. 1450 PA0SNG. 1500 PA0SNG. 1750 W3TVB. 2650 N6JV.

10 Meters:	YU7DR, K2EEK, IK2ILH
15 Meters:	NJ1T
20 Meters:	N7JB, NJ1T
40 Meters:	WB4FOT
80 Meters:	WB4FOT
Asia:	WB4FOT, NJ1T, WN5MBS
Africa:	AB5C, YB3CEV, K9LJN
No. America:	WB4FOT, NJ1T, WJ7H, WM0G
Europe:	WB4FOT, KS3F, NJ1T

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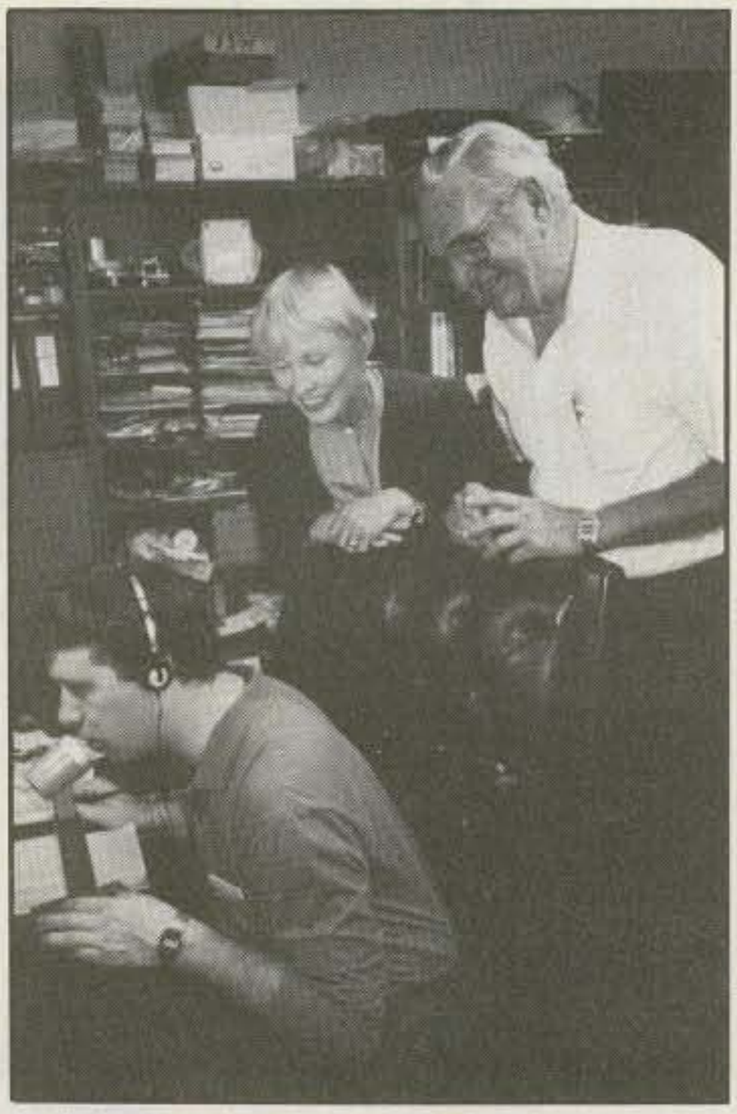
Award of Excellence Plaque Holders with 160 Meter Endorsement: I2UIY, W8ILC, W1BWS, NN4Q, G4BUE, LU3YL/W4, I4EAT, VE7WJ, W9NUF, N4NX, VK9NS, DE0DXM, VE7IG, K9BG, AB9O, FM5UD, SM0DJZ, DK5AD, SM6CST, I1JQJ, W3ARK, HI8LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE.

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.



Alex Chernyh, UL7PAE, at the mike, works Soviet amateurs from the Virginia shack of John Parrott, W4FRU, shown here with his wife Amy, N4VEM.

Georgia, the South Sandwich islands are even bleaker and more barren. Besides seabirds and penguins, only an occasional volcano breaks the monotony of ice and rock. The Argentines occupied Southern Thule island in the group during the Falklands/Malvinas war. The British captured the 10-man occupying force on June 19, 1982, ending the war. The short Argentine occupation was the only time the islands have had "permanent" inhabitants.

South Sandwich ranks 11th on *The DX Magazine*'s Most Wanted Countries list, not far behind Spratly 1S and Bhutan A5. A major DXpedition to this remote archipelago would be much appreciated by the Deserving DXers.

Glasnost At Its Best

Not many years ago a conversation between an amateur in the United States and one in the Soviet Union would be limited to an exchange of name, signal report, and weather. The thought of face-to-face meetings between US and USSR amateurs seemed a far-fetched dream. With the increased openness (Glasnost) in the USSR, all that has changed. The dramatically increased interaction between US and USSR DXers is an excellent example of amateur radio enhancing international good will. A few examples:

Victor Tkachenco, UA6LA: In October Victor spent two weeks with his long-time radio correspondent Ralph Dage, W8PHZ, of Southfield, Michigan. Victor included Niagara Falls, Washington DC, ARRL Headquarters, and the Henry Ford museum in his travels in the US. On a visit to a local supermarket with his daughter Elena, Victor asked if the market was open. When assured that it was indeed open, he remarked, "Where are the lines?"

Alex Chernih, UL7PAE: No stranger to world-wide travel, Alex visited the United States for the first time as a guest of John Parrott, W4FRU, former chairman of the DX Advisory Committee, in Suffolk, Virginia. Alex is the chief of the foreign trade department of a major steel producer in Kazakhstan republic, and thus has traveled out of the USSR more than an average Soviet citizen. Alex was the head of the team that operated 3W0A from Vietnam at the end of 1988.

The Zilan DX Club: The very active Zilan DX Club of Kazan hosted members of the Western Washington DX Club for two weeks in July 1988. The visiting US amateurs toured Moscow before flying on to Kazan city. There, as guests in the family homes of Zilan club members, the US DXers enjoyed unprecedented hospitality and generosity. Their Soviet hosts not only housed, fed, and chauffeured them around, but they also insisted on paying for all the souvenirs and gifts the US amateurs took back with them, including a large Russian samovar for each amateur.

The Western Washington DX Club plans to return the hospitality this spring, hosting a half-dozen Zilan DX club mem-

5 Band WAZ

As of November 1, 1989, 247 stations have attained the 200 zone level.

New recipients of 5 Band WAZ with all 200 Zones worked:

TG9VT	UA9CBO
KD7P/KH2	VE1NG

The top 23 contenders for 5 Band WAZ are:

1. K1VKO, 199
2. N4WW, 199
3. UQ1GXX, 199
4. W7OM, 199
5. W0JLC, 199
6. SP9PT, 199
7. K9YRA, 199
8. NY2E, 199
9. K5UG, 199
10. K8EJ, 199
11. N2MF, 199
12. K9TSQ, 199
13. SP6CZ, 199
14. K9GX, 199
15. AA4V, 199
16. K2UU, 199
17. YU2CBM, 199
18. HA8XX, 198
19. K7UR, 198
20. PY7ZZ, 198
21. K6SIK, 198
22. VE7DX, 198
23. W0PGI, 198

619 Stations have attained the 150 Zone level, as of November 1, 1989.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 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

343	TG9VT	345	WA4CTA
344	SM7DXQ		

15 Meter Phone

309	G4BWP	310	JR7IFU

20 Meter Phone

775	K6SPQ	777	K3ZPG
776	G4GWP		

40 Meter Phone

61	N6AW

10 Meter CW

71	WA4CTA

15 Meter CW

163	G4BWP	164	F6CDJ

20 Meter CW

344	KM1D	346	AA2X
345	VE2LJ	347	K7CU

40 Meter CW

114	JE7MQB

ALL BAND WAZ SSB

3429	LU1BAB	3436	N6OBX
3430	WZ6Z	3437	WA4SFF
3431	W6WBY	3438	WA2YEX
3432	VK2CKW	3439	KK4HD
3433	N7DES	3440	WD8CCC
3434	CT1DGK	3441	VK5AGM
3435	WA4OBZ	3442	DL7ABZ

Phone/CW

6659	PA3DBG	6672	WW7M
6660	JA7ASD	6673	WW7M (CW)
6661	JA1BNW	6674	SP9ADY
6662	W4MBD	6675	WB1ATZ
6663	W6WBY	6676	HA9RQ
6664	WC0Y	6677	I2HVE
6665	N6IBP	6678	HA0HW
6666	LA3GI	6679	W6UJX
6667	N3CRN	6680	I1GJC
6668	W7NBB	6681	PA3BBP
6669	NR9S	6682	WF8N
6670	WD6ERA	6683	XE1MD
6671	KL7N	6684	IK1LBM

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

bers. The Western Washington gang want to show the Soviets that American amateurs can be good hosts, too, and they want to provide the visitors with tours of New York City and ARRL Headquarters in Connecticut. To do so, they are looking for contributions from the US amateur community to cover out-of-pocket expenses for the visitors, and to assist with their travel expenses while in the US. If you want to help, send your contribution to US/USSR Exchange Fund, c/o Jim Hartwell, K7UDG, 12608 Machias, Lake Stevens, WA 98258.

DX Notes

Bob, W9LNQ, has another suggestion for a suitable outer envelope for confirming DX contacts. The Herlitz Co. #81135 Safe Guard envelope is 3⅞" × 7½" and holds the QSL card, IRCs, and return envelope without folding. The safe guard prevents curious postal workers from determining the contents of the envelope. Bob says these envelopes are available at K-Mart and other stores.

The West Coast RTTY DX Association has changed its name to the International RTTY DX Association to better reflect the worldwide nature of its "membership" and RTTY support. The IRDXA is unique in the amateur field, as it has no constitution, no by-laws, no officers, no meetings, no nets, and no other rules. It serves one purpose: "To provide RTTY equipment and training to DXpeditions and cooperative amateurs in DXCC countries not presently represented on RTTY mode." The group has an excellent track record, supporting RTTY activity from Pitcairn Island, Kingman Reef and Palmyra, Mellish Reef and Willis, Kure Island, Marion Island, and others. The group functions by soliciting donations of RTTY equipment and funds from interested DXers, and then providing the equipment and advice to appropriate operators. Any DXers who want to help the cause can send a donation to IRDXA at 356 Hillcrest Street, El Segundo, CA 90245. They'll put you on their mailing list for $5.00 a year, via the same address.

Prefix hunters should aim their beams south for the first three months of 1990, as the Argentine DX Group (GADX) cele-

CQ DX Awards Program

SSB

1722	N4JED	1728	EI6FR
1723	KI6PG	1729	WB5KYK
1724	IK6BOB	1730	YV1CP
1725	N4LGX	1731	WA5VGI
1726	VU2GUY	1732	DU1JZ
1727	WA4OBZ		

CW

767	G4ASL	768	IK6BOB

SSB Endorsements

320	W3GG/320	275	K4JLD/295
310	W9OKL/317	275	WA8YTM/292
310	KZ2P/316	275	YB3CEV/283
310	NJ2C/315	275	KI4FW/276
310	KQ9W/313	250	IK6BOB/266
300	I8IGS/300	200	YV1CP/228
275	WA4IUM/298	28 MHz	YB3CEV

CW Endorsements

310	K6LEB/319	275	WA4IUM/280
310	K3UA/312	275	WA8YTM/278
310	OK1MP/311	275	K4JLD/277
300	KQ9W/307	150	IK6BOB/155
300	W0HZ/303	150	KI4FW/150
275	K2OWE/302	3.5/7 MHz	G4ASL

Total number of active countries is 321. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

Manoi Agarwal, VU2WAP, is one of the most active Indian amateurs. (Thanks to John Tull, KD0JL, for the photo.)

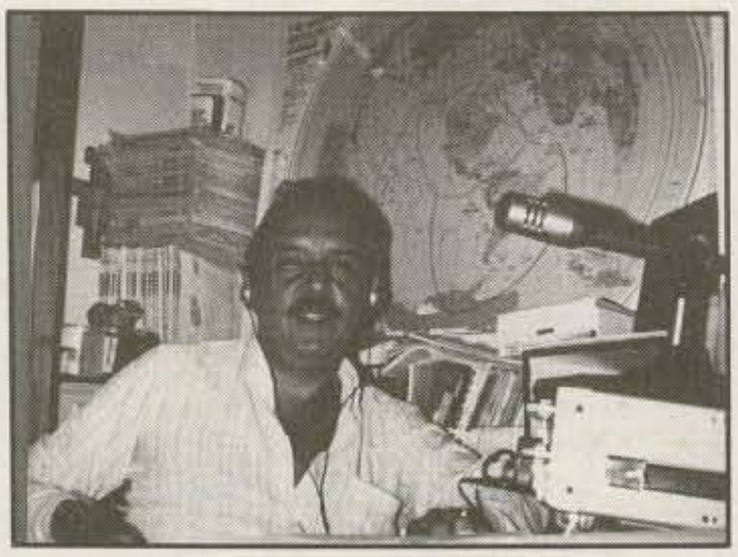
brates its first anniversary by putting 27 new prefixes on the air. Stations LQ1DX–LQ26DX and L73GADX will be active until the end of March. QSL all these special callsigns via GADX, P.O. Box 36, 1834 Temperley, Buenos Aires, Argentina.

This is also a good time to make your reservations for the 1990 International DX Convention in Visalia, California, April 6–8. Registration before March 23 is $40 and includes the Saturday evening banquet and the Sunday morning brunch. Send your check to Don Bostrom, N6IC, 4447 Atoll Avenue, Sherman Oaks, CA 91423. The convention hotel, the Holiday Inn in Visalia, booked up several months in advance, but some other area hotel may still have rooms. Try the Best Western at (209) 732-4561, Motel Astri (209) 627-2885, or the Sundance Inn (209) 732-6641. Be sure to attend the Friday evening cocktail party, sponsored by *The DX Bulletin* and meet *CQ*'s DX editor.

Finally, congratulations to the new officers of the Rochester NY DX Association: KM2P President, NQ2O Vice-President, WE2T Secretary/Treasurer, and KB2EMU, KB2SE, and W2HPF Board Members.

QSL Notes

Roland Brade, VK2GAL, reports that he has logs and cards for his prior operations: G3VIR, GI3VIR, GM3VIR,



HK3NTI can often be worked on 40 meter SSB, as well as on the higher bands. (Thanks to John Tull, KD0JL, for photo.)

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00 (U.S.) for each mode, with no fees required for up-dates.

MIXED

3822	YU2AA	2132	I6SF	1687	K2POF	1250	JA6GWU	966	K1BAZ/DV1
3520	F9RM	2123	N6CW	1685	YU2TY	1241	K7CU	950	F1HWB
3430	K2VV	2089	SM3EVR	1645	KL7AF	1236	I0AOF	947	YU2GIJ
2932	W2NC	2082	I2UIY	1639	K8LJG	1232	AI6Z	947	K9BQL
2845	K6JG	2079	W9NUF	1601	SM0AJU	1231	NE6I	932	YU1PJ
2751	VE3XN	2057	PY4OD	1583	W8UMR	1214	AI8S	929	VE3NUP
2701	W4BQY	2052	K9BG	1583	W4UW	1210	JA1WJ	911	I5ZTC
2694	N4NO	2039	HA0DU	1567	I1POR	1206	NV9S	902	YB0EMJ
2657	K6XP	2037	IN3ANE	1562	W6OUL	1206	K5DB	891	W9IAL
2618	N6JV	2022	K5UR	1561	DK5AD	1205	YU7DR	884	WA4WIN
2600	W9DWQ	1988	4X4FU	1514	WE2L	1190	DF6EX	859	OE1KJW
2558	N4MM	1964	DJ4XA	1498	YT7WW	1182	GM4OBK	840	YU3PG
2534	PY1APS	1912	W0SFU	1495	YU2CQ	1173	KC8CC	802	W5ASP
2496	WA8YTM	1903	YU2NA	1478	SM6CST	1166	WD9IID	799	JA7XBG
2403	K0BLT	1902	KF2O	1472	NN4Q	1155	PY2DBU	783	NJ1T
2403	N9AF	1895	KA5W	1468	K2OLG	1134	KS0Z	778	W4WKQ
2388	EA2IA	1856	I1EEW	1463	4N7ZZ	1107	YU3NU	773	KS3L
2373	I2PJA	1848	IT9TQH	1435	YU1SZ	1102	DF4ZL	750	RB5MP
2301	YU1AB	1841	I2MQP	1421	N8BJQ	1098	5H3RB	749	W4USW
2299	PA0SNG	1810	IT9QDS	1415	N2AIF	1081	K3UA	748	IK2BHX
2297	YU7BCD	1756	I2DMK	1403	AB9O	1058	WB3DNA	742	K5IC
2243	I8YRK	1753	N6AW	1402	WB8ZRL	1044	G4SDJ	728	K6UXO
2192	SM7TV	1743	SM6DHU	1400	AC2J	1041	CT1QF	715	NX9H
2185	YT7DX	1737	YT3AA	1292	I2EOW	1032	YU7RU	711	W6LC
2185	N2AC	1716	N6JM	1262	YU1GR	1008	W0JIE	639	DL6UQ
2135	YU7SF	1712	HA8XX	1256	W9IL	981	I2EAY		

SSB

3444	F9RM	1741	EA2IA	1376	PY4OD	1043	WA2FKF	818	WB6SRK
3218	I0ZV	1738	WF4V	1371	N5TV	1036	YB3CEV	805	W5ILR
2946	K2VV	1720	WA4QMQ	1332	CT1BY	1035	W0ULU	803	LU8DWN
2819	ZL3NS	1718	K5UR	1307	I1POR	1034	G4SDJ	801	N6CGB
2625	K2POA	1669	I1EEW	1301	KL7AF	1009	CX6BBZ	796	AI6Z
2560	K6JG	1635	W9NUF	1294	I2EOW	1005	W3GXK	783	K3UA
2471	VE1YX	1624	KF2O	1283	IK5ACO	995	WN5MBS	776	KB4HU
2371	I2PJA	1618	G4CHP	1265	KD9OT	993	KS0Z	759	HR1FC
2362	K6XP	1615	W3ARK	1232	SM6DHU	985	XE1XF	757	IK7DBB
2323	N4MM	1603	IT9TQH	1230	N6FX	981	DK5WQ	749	GM4OBK
2312	WD8MGQ	1602	CT1FL	1229	LU8ESU	962	WB6GFJ	744	IK0EIM
2300	I0AMU	1581	I5ZJK	1224	KE6KT	960	HK6BER	731	KB2DE
2251	W0YDB	1532	W4UW	1219	SM0AJU	950	F1HWB	700	IK7BDN
2162	CT4NH	1532	K5RPC	1206	I2TZK	950	KB0C	699	I7UNX
2093	I4ZSQ	1525	KC8YM	1200	AB9O	947	I2WZX	698	VU2SMN
2083	ZP5JCY	1522	CT4UW	1200	F6BVB	943	W6OUL	683	YC7DF
2077	I6ZJC	1521	KA5W	1192	YU7SF	939	IT9JKY	667	KA5YCM
2047	W4BQY	1515	DJ4XA	1190	CT1AHU	917	IK2DUU	661	K0PVI
2023	N4NO	1506	G4CPJ	1177	N2AC	908	N2AIF	652	IK2AEQ
2020	OZ5EV	1485	YU2NA	1163	NN4Q	902	K3IXD	648	K8MDU
1999	I8YZP	1450	XE1OX	1158	PY4VX	901	NK2H	644	NM5Y
1989	WA8YTM	1433	EA8AKN	1141	KC8CC	891	I3ZSX	641	CT1CIR
1966	I8YRK	1431	EA4KK	1132	WB8ZRL	879	NE6I	639	KA0ZFX
1907	I4CSP	1430	PY4OY	1114	I8WYD	860	WN5MBS	633	SM6CST
1902	W9DWQ	1418	EA3AQC	1102	AG2K	859	K8ZZU	632	KA5RNH
1851	NJ0C	1405	I8KCI	1084	I8LEL	854	IT9ONV	619	IK2ECN
1847	YU7BCD	1405	AC2J	1052	IK8GCS	838	K9BQL	613	K1BAZ/DV1
1846	I2MQP	1401	WE2L	1051	K8LJG	821	YC7DF	607	K5HT
1774	I2UIY	1394	HA8XX	1046	K2POF	819	CT1DIZ	600	IT9CUE

CW

2797	K2VV	1710	N4MM	1242	W1WAI	1019	HA5LZ	799	EA5AR
2613	WA2HZR	1657	VO1AW	1218	YU2NA	1012	HA8XX	781	G4UOL
2597	N6JV	1619	W9NUF	1215	VE1ACK	1001	VE4CX	763	OE1KJW
2405	ON4QX	1599	K5UR	1212	I7PXV	1000	DL2HBX	755	K1BAZ/DV1
2350	N4NO	1538	DJ4XA	1205	I8YRK	988	OK1CZ	755	NJ1T
2323	VE7CNE	1534	N4YB	1166	TI4SU	986	EA1AK	750	W0JIE
2235	W3ARK	1508	JH3CXL	1143	SM0AJU	968	NF5Z	731	YU3PG
2139	W9DWQ	1504	IT9TQH	1143	N2AIF	947	OZ5UR	704	K6UXO
2117	K6JG	1459	IT9VDQ	1135	LA9XG	915	SM5DAC	702	WE2P
2105	W4BQY	1457	KA7T	1134	EA7OH	868	K3UA	700	VS6UW
2019	YU7SF	1455	I2DMK	1134	K8LJG	865	EA1AK	685	W5AWT
2002	K6XP	1378	I2UIY	1134	W6OUL	860	GM4OBK	665	I1EEW
1950	N2AC	1354	SM6CST	1129	YU2CQ	848	I2EAY	659	W9IAL
1914	I1YRL	1337	K2POF	1112	YU3NU	845	NE6I	644	YU1PJ
1874	EA2IA	1327	N6FX	1095	DJ1YH	838	JJ1FSK	643	IS0FIC
1867	I6SF	1303	KA5W	1056	ZS6BCR	837	YU2GIJ	622	RB5MP
1852	YU7BCD	1261	SM6DHU	1051	OH3TQ	829	G4MVA	619	PY4WS
1836	WA8YTM	1251	KL7AF	1051	G4SSH	821	WB8ZRL	603	KA9GZM
1831	LZ1XL	1245	F6HKD	1045	G4VQO	815	JA2GCW	602	4X6DK
1773	PY4OD	1243	W9PWM	1024	NN4Q	807	KA1CLV	600	JA7XBG
1746	4X4FU	1242	KF2O						

GW3VIR, HB9/G3VIR, EI2VCE, MP4BFV, and ZC4RB. He can also confirm *his operation only* of VS9MB in 1963. Write to him at P.O. Box 452, Riverwood, New South Wales 2210, Australia.

The **HBAWQ/p** operation in the European DX Contest in September can be confirmed via DL6SAM.

Calos Moreira, CT1AHU, can confirm **CR4AHU, CR6AHU,** and **CT1AOZ.** Address: P.O. Box 2763, 1119 Lisboa Codex, Portugal.

Larry Fields, N6HPX, can confirm his 10 meter SSB contacts as **VQ9LF** via 10B 25th St. WBB, Olongapo City, Philippines.

QSL **UI8IAQ/UI2C** and **UI8IAY/UI1C** via Valery N. Volkov, UI8IAJ, P.O. Box 71, Samarkand 703000, Uzbek SSR, USSR, with SAE and two IRCs.

QSL **HC8/WS7I, HC8/WV7Y,** and **HC8/WA7EGA** via Betsy, WV7Y/KE7PL, P.O. Box 644, Spokane, WA 99210. QSL the **HD8EX** operation in the *CQ* WW RTTY test via Association DX-EX, Box DX, Cuenca, Ecuador. Betsy may also be able to help with slow cards from Box DX.

The special event stations **ED1FSF** and **EE1FSF** in early October were celebrating the Festival of San Froilan, the patron saint of the town of Lugo. QSL phone contacts via EA1CYV, and CW QSOs via EA1JO, with SAE and IRCs.

The **HI5UD** operation in early December can be confirmed via HI8LC, P.O. Box 88, Santo Domingo, Dominican Republic.

Jack, **YJ8AB**'s QSL manager is Neil Foster, KC4MJ, whose pre-1989 address is no longer valid. Use the 1989 address: 3185 Friar Tuck Way, Atlanta, GA 30340.

Russian stations **RB4JWS/UI1, RB5LVV/RB1, EW8TJ, 4J5JYC, UZ3WWZ/RB1,** and **UB4JZ/UT8J** can all be confirmed via Serge Lebedew, UB4JX, P.O. Box 37, Alushta City, Crimea, Ukraine 334270, USSR.

Martti Laine, OH2BH, says any US or Canada DXer who needs a **XF4L** card can drop him a note at P.O. Box 3901, Madera, CA 93639, with an SASE.

QSL the Oct. 7-8 Trindade operation of **PY2TG/PYT** direct to Victor Bednarski, PY2TG, P.O. Box 11510, CEP 05090, S o Paulo SP Brasil.

QSL the 1987 ARRL CW DX contest operation of the club station **9L1SL** via N4DW. Dave doesn't have any other 9L1SL logs.

LY2WW reports a delay in printing QSLs. They will respond via the bureau when they get cards.

The cards for the **YB21AR** special event station have been delayed. QSL manager YB4FNN asks for your patience.

QSL hint of the month: If you send Russian QSL cards direct to the QSL bureaus of the individual republics, enclose a couple of extra SAEs and IRCs. The bureau may send back additional cards for you or your friends. *(Thanks, WA8LLY.)*

QSL Managers

3B8FP to KN2N
3C0GD to SM0AGD
3C1AG to SM0AGD
3C1EA to EA4CJA
3D2PL to N6DMV
3D2VB to OH3GZ
3D2XV to VK2BCH
3G6MBQ to CE6OS
3X1SG to ON7GV
3Z9CW to SP1ADM
4K1F to UA1DJ
4M5A to YU4AJ
4N1K to YU1XA
4U1WB to KK4HD
4X1AD to KC4MJ
5B4WW to 5B4TI
5C2CW to F2CW
5H3NL to I4AWG
5H3TW to K3ZO
5J0DX to HK4HHG
5N89NND to N5GAP
5N9GM to I8YIU
5U7QL to YASME
5V7DP to KA1DE
5W1ML to OH4ML
5W1RY to OH1RY
5W1VB to OH3GZ
5Z4BI to W4FRU
5Z4MR to N4GNR
6W1QB to DL3NP
6W6JX to F6FNU
6Y5DA to VE4JK
7J7AAS/1 to KQ1F
7P8DP to W8JBI
7S4BX to SK4BX
7X2AX to F6IFF/FE6IFF
8P9HR to K4BAI
9H1EL to LA2TO
9J2BO to W6ORD
9K2KF to 9K2EC
9K2RA to LA8RFA
9M6/NN3N to KL7GRF
9M6OO to N2OO
9M6ZR to WA2HZR
9M8AX to JA5DQH
9N1MM to N7EB
9Q5DX to KQ3S
9Q5XX to KC4NC
A22EC to DF3EC
A22FN to W1LUQ
A35ML to OH4ML
A35VB to OH3GZ
A61AC to KA5TQF
A61AD to WB2DND
AH2BE/KH9 to KA6V/7
AP2SQ to W3HNK
AZ5D to LU8DZE
BV2A to K2CM
BV2DA to DL7FT
BV2FA to DJ92B
BZ1FB to KF7SH
C56/G3OXC to G3OXC
C6A/AA5AU to AA5AU
CI0MDI to VE7DP
CM5CB to KA2YEG
CN2DX to F6EEM
CN2YT to F2YT
CN8FC to WA4QMQ
CO6CD to W3HNK
CQ0TM to CT1TM
CR5CQK to CT1CQK
CS1BOP to CT1AHU
CY0SAB to VE1CBK
DF3EC/Z2 to DF3EC
DF3EC/ZS9 to DF3EC
DJ2/OH4RH to OH4RH
DK8FD/VP9 to DK8FD
ED8JUC to EA8ACL
EK9AYW to UA9YAB
EL2CX to N2AU
EL2FO to KN4F
EL2WK to G3OCA
FJ/DL7FT to DL7FT
FK8FS to JA5DQH
FK8FU to NA5U
FM4EE to F1HUT
FM9A to F6FNU
FO0BEF to FE1JCN
FO0FB to WB6GFJ
FO5BI/P to F6HSI
FP/U3LMD to VO1FB
FR5QT to F5QT
FR9A to F6FNU
FS5T to AI7B
FT4ZE to F2CW
FY/F6AUS to F6AUS
FY/F6BUM to F6BUM
FY0P to FY5AN
FY5EW to F6BFH
FY5YE to W5JLU
GJ6UW to G3XTT
H44/OH4ML to OH4ML
H5ABP to ZS6OT
HA5KKC to HA5MY
HC2GE to HC2FG
HC8K to KT1N
HI1UD to HI8LC
HI3JH to F6FNU or direct
HK0BKX to WB9NUL
HL5BDS to HL1ASS
HL9EP to K0VZR
HR1LW to JA1LW
HR6CBA to WA9YHW
HU1A to YS1MAE
HV3SJ to I0DUD
HX0URA to F1HWB
HZ1AB to K8PYD
HZ1HZ to N7RO
IH9/IV3BMV to IV3BMV
IH9A to IV3YYK
IM8A to IK8DOI
IP4T to I4YSS
IU3A to I3MAU
IY0A to I0JBL
IY2A to I2MQP
J3/K8CV to K8CV
J3/W8KKF to W8KKF
J37AH to W2GHK
J37DX to W8KKF
J73D to W2OB
JA1XGI/JD1 to JA1XGI
JA4GXS/JD1 to JA4GXS
JD1/JA7OWD to JH1AJT
JD1YAA to JA1WU
JI1VLV/JD1 to JI1VLV
JT0DX to HA6KNB
JW1MFA to LA1MFA
JW6WDA to LA5NM
JX7DFA to LA2KD
JY9IU to HB9AHA
JY9SR to W3FYT
K4PI/PJ7 to K4PI
K4SXT/DU3 to WB4KZW
K7SS/PTI to K7SS
KA5UWN/KH2 to WD5GIV
KB5ENR/KH3 to KA5WOO
KC4AAC to KE9AS
KE2KU/V47KP to K2DOX
KG4DD to WD8QCU
KG4SG to KK8X
KH6JEB/KH7 to KH6JEB
KH8/SM7PKK to SM7PKK
KH9/AH2BE to KA6V
KN0E/KH3 to K9UIY
KX6OI to KX6BU
LU1ZA to LU2CN
LU2ZC to GACW
LX/DK2OY to DK2OY
LX2FT to OZ4FT
LZ1KOZ to LZ1YE
N2NT/UP9 to K3UA
N7ET/DU7 to N7ET
NH9/N8BJQ to N8BJQ
NT8X/EA7 to EA7CZR
OD5MM to HK9CYH
OD5PL to HB9CRV
OD5VT to HB9CRV
OH0/OH3VV to OH3VV
ON5NT/5N0 to ON5NT
OY3QN to OZ1ACB
P29CG to WB9SVK
P29KN to WA4SFQ
P29PL to VK9NS
P40V to AI6V
P40MA to W7JX
PA63DOP to KA8TGK
PI64GV to PI4GV
PJ1B to N2MM
PJ2/NX1L to N1CIX
PJ2/OH1TD to OH1TD
PJ2/OH4RW to OH4RW
PJ2/OH6RI to OH6RI
PJ2/WA6VNR to WA6VNR
PJ2U to NK4U
PJ4/N6IG to N6IG
PJ4R to W6EJ
PJ7/KN4B to KN4B
PJ9W to OH6NU
PY0F/PY1DFF to PY1DFF
PY0FF to W9VA
R0Y/RA9YX to UA9YX
RA1QQ/RA0Q to RA1QX
RI1OA to UI8OAA
S0RASD to EA1JG
S92LB to DJ6QT
S9AGD to SM0AGD
SM0OIG/YN to SM0KGR
ST2/PA0GAM to PA0GIN
SV9/DK1QA to DK1QA
T28RW to ZL1AMO
T30NAB to JO1ORA
T77V to W3HNK
TA3/DL5YCQ to DL5YCQ
TA3F to DL5YCQ
TE2Y to TI2LCR
TH9A to F1FWB
TI100D to TI4SU
TI2DU to KC7YN
TJ1RP to VE2CH
TK5EP to F6ESH
TL8A to F6FNU
TL8WD to DL8CM
TP40CE to F8FQK
TR8CJ to G3ORC
TR8RLA to NV7J
TT8/FD1MXQ to FD1MXQ
TT8GA to F2CW
TU2BB to N2HOS
TU2JT to F6CXV
TU2UI to TU4DB
TX1A to F6EXV
TX9LEP to HB9CUY
TZ6PD to KB6ORK
TZ6VV to N0BLD
U0K/UV1POL to UA0KCL
UA0BAN to RB5FO
UA0BDU/UA10 to RA3SD
UA10IL to UA9MA
UA3PAM/JT to RW3PW
UD6DKW to W3HNK
UF6FDR to UF6FFF
UF7FWR to UF6DG
UH3H/UZ3TWA to UA3TT
UI8IAY/UI1C to UI8IAJ
UJ9JWU to UJ8JJ
UZ1ZZZ/A to UA12X
V29A to W4FRU
V47K to WB2P
V47KH to K3IPK
V47QQ to W9QQ
V63AD to WA7VVA
V63AO to KC6IN
V63DX to JA7HMZ
VK0GC to VK9NS
VK9AE to KD2EU
VP2EXX to KC8JH
VP2EZD to JA2MNB
VP5D to W3HNK
VP5JM to W3HNK
VP5T to WB3BNA
VP5VAD to W1GAY
VP8BUB to G4YLO
VP8VK to G4RFV
VP9/DK8FD to KC8JH
VP9AD to W3HNK
VQ9DM to N5DM
VQ9QM to W4QM
VS6DO to WA3HUP
VY9CC to VE3KE
XE1L to WA3HVP
XF4L to ON2BN
XL3HI to VE3HI
XL3NXQ to VE3NXQ
XT2PS to DL1HH
Y40DDR to Y54TO
YC0IPD to YC0TSU
YL2RG to VQ1GXX
YS1OD to WN5K
YU6AR to YU1EXY
YU8HL to Y32PH
YV5/KF5YE to KA5YSY
ZB2LX to ON2KI
ZC4WP to G0BHA
ZD7JM to G3JKB
ZD7VC to WT8S
ZD8RP to G0BNA
ZD8VJ to G4ZVJ
ZD8Z to N6TJ
ZK1CQ to ZL1AMO
ZK1RS to ZL1AMO
ZK1TB to W7TB
ZK2VB to OH3GZ
ZM2GH to ZL2GH
ZS3/DJ2SX to DJ2SX
ZS3UN/OH7NRW to OH7XE
ZV7AA to PT7AA
ZV7SY to PT7CQ
ZY0FA to PT7AA
3B9FR to POB 31 via France
3DA0AH to P.O. Box 2726, Mbabane
3DA0BK to Box 122 Eveni
4J5G to Box 33, Genichesk 326610
4K0F to Box 9, Khersky 678830
5H0TSA to P.O. Box 1945, Dar es Salaam
5N29FEA to Box 65 Zaria
5N82HN to Box 293, Kano, Nigeria
5Z4BP to Box 73029, Nairobi
5Z4FH to Box 51105, Narobu, Kenya
6W1AAD to Box 971, Dakar
7P8EL to Box 251, Maseru
7X2DS to Box 105, Rouiba, Algeria 35300
7X5VVK to Box 341, Butan CP 05000
AP2JZB to P.O. Box 8507, Jarachi
BY1QH to Box 2654, Beijing
BY4SZ to Box 51 Suzhou PRC
BZ1OK to Wang, Box 2916, Beijing, China
BZ4RCC to Box 1827, Nanjing PRC
BZ4RDX to Box 1827, Nanjing
CE0DFL to Marco, Box 7, Easter Island, Chile
CE0FFD to P.O. Box 4, La Isla de Pascua
CE0OGZ to Box 4178, Valpariso
CN0S to P.O. Box 88, F-35170 Bruz, France
CN2AQ to Box 40, Tangiers
CO2OM to Box 4910, Havana 4
EL7X to P.O. Box 538, Bong, Liberia
J73GE to Box 455, Roseau
LY1BYC to P.O. Box 15, Kurshenia, 235420, Lithuania Republic, USSR
RH8AX to Box 414, Ashkabad 744008
RJ3K/UW9QW to P.O. Box 401, Shadrinsk 641800
RV9FQ to P.O. Box 577 Perm
SV5TS to Box 7, Paradissi, Rhodes 85106 via Greece
T5GM to P.O. Box 1608, New York, NY 10163-1608
TA1AL to Box 17, Bakirkug, Istanbul
TF3GN to Halldor Christensen, Alfheimum 21, Box 1058, Reykkavik
TF6MM to P.O. Box 24 IS780 Hofn
TG0FRACAP to Box 115, Guatemala City, Guatemala
TG9YV to P.O. Box 362, Guatemala City
UA0KAT to Box 44, Perek 686610
UA3TT/RH0H to Box 18, Gorky 60300
UI8CD to P.O. Box 4507, Tashkent
UL7BX to Box 925, Tselinograd 473000
UM8MHW to P.O. Box 947, Frunze, 720005
UM8MIG to POB 1500, Frunze 720083
UM8MK to POB 1777, Frunze 720023
UM8MM to Box 1100, Frunze 720020
UO5OKW to Box 4057, Kishinev
UT0J/UB4JIW to Box 13, Simferopol
V31KU to P.O. Box 947, Belize, Belize
XW8KPL to P.O. Box 310, Vientiane, Laos
YA5DD to Box 111, Kabul 1118
YI0BIF to Dr. Fanis Kubba, P.O. Box 7282, Baghdad, Iraq
YI1BGD to Ali, Box 7075, Baghdad
YN3CC to Box 2971, Managua
ZP6XDW to Box 73, Caacups

PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

According to the National Geophysical Data Center at Boulder, Colorado, this month could go into the record book as the month in which sunspot cycle 22 reached its maximum intensity, with a smoothed sunspot count on the order of 190. This is not official, and other experts are not in agreement, but the peak of sunspot cycle 22 is close at hand, if it has not yet occurred. It will be at least another six months before we have a more positive indication if in fact the peak did occur during February 1990.

The latest available sunspot data is for the month of October 1989. According to the Royal Observatory of Belgium, the monthly mean value was 159, with daily values ranging from a low of 97 on October 27th to a high of 209 on the 5th and 16th. This results in a 12-month running smoothed sunspot number of 153 centered on April 1989. The monthly mean 10.7 cm solar flux level for October was reported as 209 by the Algonquin Radio Observatory in Ottawa, Canada.

A smoothed sunspot number of approximately 190 is forecast for February 1990. If this materializes, it will be the most intense level of solar activity observed since May 1958.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for February 1990

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 1, 13-14, 22, 27	A	A	B	C
High Normal: 2, 9, 12, 15-16, 18, 20-21, 26, 28	A	B	C	C-D
Low Normal: 3, 7-8, 11, 17, 19, 23	A-B	B-C	C-D	D-E
Below Normal: 4, 6, 10, 24-25	B-C	C-D	D-E	E
Disturbed: 5	C-E	D-E	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.

E—No opening expected.
3dB per S-Unit.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be excellent (A) on the 1st, good (B) on the 2nd, good-to-fair (B-C) on the 3rd, fair-to-poor (C-D) on the 4th, poor-to-nil (D-E) on the 5th, etc.**

Flash Report from 1989 CQ WW DX CW Contest

Based on solar flux levels and geomagnetic conditions reported worldwide during the CW Contest weekend of November 25 and 26, the 1989 contest may well have been the best ever observed! On Saturday, November 25 the solar flux reached the 221 level, while the worldwide (planetary) geomagnetic A-index varied between 4 and 5 for Above Normal conditions. Conditions were much the same on Sunday, November 26, when the solar flux level climbed a bit higher to 238, and the planetary A-index varied between 8 and 10. This also represents generally Above Normal conditions, although they may have dropped to High Normal on some paths.

February Conditions

DX propagation conditions will continue to be excellent on *five* bands during the *daylight* hours of February. *Fifteen* meters is likely to be the best band from shortly after sunrise until just after sunset, with *10, 12, 17,* and *20* meters not far behind. The *6* meter band should be an extra DX bonus this mnonth during the hours of daylight. Be sure to check this band for unusual DX openings, particularly when conditions are expected to be High Normal or better. Look for openings towards Europe and the east before noon, towards the South Pacific and the west during the late afternoon, and towards Central and South America throughout most of the daylight hours. The best times to listen for *6* meter DX openings are shown in the DX Propagation Charts by a **.

During the period from sundown to midnight as many as *seven* bands may be available for DX. *Fifteen* meters should hold up well past sundown for DX openings towards Central and South America, the Pacific area, and the Far East and Asia. *Twenty* meters should remain open to most areas of the world during this period, but with signals strongest from southerly and westerly directions. Good DX towards the east and the south should also be possible on *30, 40,* and *80* meters, with some openings in the same directions also possible on *160* meters.

Between midnight and the sunrise period it should be a toss-up among *20, 30,* and *40* meters for worldwide DX honors. Good DX openings to most areas of the world should also be possible on *80* meters. Be sure to also check *160* meters for some unusual DX openings during this period.

Beginning late in February and continuing through March and early April, expect considerable improvement in DX conditions between the northern and southern hemispheres. This will result from the effects of the spring equinox period, as the sun crosses the equator in its apparent travels toward northern skies. These improved inter-hemispheric conditions should be noticeable on all bands *6* through *160* meters, and on circuits mainly between the United States and South America, southern and central Africa, Australasia, Antarctica, and parts of Asia. Equinoctial propagation conditions tend to maximize during the sunrise and sunset periods, and over both short- and long-path openings.

This month's Propagation Charts contain band-opening predictions for major DX paths for the period February 15 through April 15, 1990. A short-skip propagation forecast for February appeared in last month's column.

VHF Ionospheric Openings

As mentioned earlier in this column, expect unusually good DX conditions on the *6* meter band during the hours of daylight, with F-layer openings to many areas of the world from the United States. Another form of *6* meter propagation, *trans-equatorial scatter (TE),* usually peaks during the equinoctial period. Some TE openings should be possible during February between the southern tier states and South America. The best time to check for such openings is between 7 and 10 PM local time. Some TE openings may also be possible on *2* meters at the same time.

No significant meteor showers are expected during February. Radio storminess expected during the month should produce some widespread auroral activity, with increased chances for short-skip openings on both *6* and *2* meters, for distances up to approximately 1300 miles. Check the Last Minute Forecast at the beginning of this column for those days dur-

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155BAS: 5-el, 15 M. beam
105BAS: 5-el, 10 M. beam
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18ATV/WBS: 80-10 M. vertical
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HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location, The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. Appropriate *standard* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level for each 10dB loss, it will lower by one level.

6. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

ing February that are expected to be Disturbed or Below Normal. These are the days on which unusual ionospheric short-skip openings on the VHF bands are most likely to occur.

73, George, W3ASK

February 15-April 15, 1990
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (4) 13-14 (2) 14-15 (1) 09-11 (1)**	06-07 (1) 07-08 (2) 08-11 (3) 11-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-03 (1) 03-06 (2) 06-09 (3) 09-11 (2) 11-13 (3) 13-18 (4) 18-22 (3) 22-00 (2)	17-18 (1) 18-19 (2) 19-22 (3) 22-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-00 (2)* 00-02 (1)*
Northern Europe & European USSR	08-09 (1) 09-10 (2) 10-11 (3) 11-12 (2) 12-13 (1)	07-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-14 (1)	00-02 (3) 02-03 (2) 03-05 (1) 05-07 (2) 07-09 (3) 09-14 (2) 14-18 (3) 18-21 (2) 21-00 (1)	17-19 (1) 19-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 20-01 (1)*
Eastern Mediterranean & Middle East	08-09 (1) 09-11 (2) 11-12 (3) 12-13 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-13 (4) 13-14 (2) 14-15 (1)	04-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-20 (3) 20-22 (2) 22-02 (3) 02-04 (2)	18-20 (1) 20-23 (2) 23-00 (1) 20-23 (1)*
Western Africa	07-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-18 (2) 18-19 (1) 08-12 (1)**	06-09 (1) 09-11 (2) 11-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-21 (1)	02-06 (2) 06-13 (1) 13-15 (2) 15-17 (3) 17-00 (4) 00-02 (3)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 22-02 (1)*
Southern Africa	07-08 (1) 08-10 (2) 10-11 (3) 11-13 (4) 13-14 (2) 14-15 (1) 11-13 (1)**	06-10 (1) 10-12 (2) 12-14 (3) 14-17 (4) 17-18 (2) 18-19 (1)	05-07 (2) 07-14 (1) 14-15 (2) 15-17 (3) 17-20 (4) 20-21 (2) 21-23 (1) 23-02 (3) 02-03 (2) 03-05 (1)	18-20 (1) 20-23 (2) 23-00 (1) 21-23 (1)*
Eastern & Central Africa	09-11 (1) 11-13 (2) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1) 09-11 (1)**	07-09 (1) 09-11 (2) 11-13 (3) 13-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-23 (4) 23-02 (3) 02-03 (2) 03-05 (1)	19-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Central & South Asia	08-11 (1) 19-21 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-13 (1) 19-20 (1) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-19 (1) 19-21 (3) 21-22 (2) 22-00 (1)	19-22 (1) 04-06 (1)
Southeast Asia	10-13 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-21 (2) 21-22 (1)	05-07 (1) 07-09 (2) 09-11 (1) 14-17 (1) 19-20 (1) 20-23 (2) 23-01 (1)	05-07 (1)
Far East	09-11 (*) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 15-16 (1) 16-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-13 (1) 17-19 (1) 19-22 (2) 22-00 (3) 00-02 (2) 02-03 (1)	05-08 (1)
South Pacific & New Zealand	08-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 16-18 (1)**	07-08 (1) 08-10 (2) 10-13 (1) 13-16 (2) 16-19 (3) 19-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	11-19 (1) 19-21 (2) 21-23 (3) 23-03 (4) 03-05 (3) 05-07 (2) 07-09 (3) 09-11 (2)	00-01 (1) 01-02 (2) 02-05 (3) 05-07 (2) 07-08 (1) 01-03 (1)* 03-06 (2)* 06-07 (1)*
Australasia	09-11 (1) 14-15 (1) 15-16 (2)	08-09 (1) 09-12 (3) 12-15 (1)	06-08 (2) 08-10 (4) 10-12 (2)	02-04 (1) 04-05 (2) 05-06 (3)
	16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 17-19 (1)**	15-16 (2) 16-19 (3) 19-21 (2) 21-22 (3) 22-23 (2) 23-00 (1)	12-15 (1) 15-17 (2) 17-21 (1) 21-23 (2) 23-02 (3) 02-03 (2) 03-06 (1)	06-07 (2) 02-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (2) 09-16 (4) 16-18 (3) 18-19 (2) 19-20 (1) 09-11 (1)**	05-06 (1) 06-07 (2) 07-11 (4) 11-13 (3) 13-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	03-05 (2) 05-06 (3) 06-09 (4) 09-10 (3) 10-14 (2) 14-16 (3) 16-00 (4) 00-03 (3)	18-19 (1) 19-20 (2) 20-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-10 (3) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1) 09-12 (1)** 15-17 (1)**	06-07 (1) 07-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	15-16 (1) 16-17 (2) 17-18 (3) 18-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 05-07 (2) 07-09 (1)	19-21 (1) 21-00 (2) 00-03 (3) 03-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound, Amarctica	16-17 (1) 17-19 (2) 19-20 (1)	12-16 (1) 16-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-05 (2) 05-06 (1) 06-08 (2) 08-09 (1)	23-01 (1) 01-05 (2) 05-06 (1)

Time Zones: CST & MST
(24-Hour Time)
CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-10 (1) 10-12 (2) 12-13 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	00-06 (1) 06-09 (2) 09-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-20 (3) 20-00 (2)	17-19 (1) 19-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Northern Europe & European USSR	08-09 (1) 09-11 (2) 11-12 (1)	07-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-14 (1)	07-10 (2) 10-13 (1) 13-15 (2) 15-18 (3) 18-20 (2) 20-22 (1) 22-02 (2) 02-07 (1)	19-22 (1) 22-00 (2) 00-02 (1) 22-01 (1)*
Eastern Mediterranean & Middle East	09-10 (1) 10-11 (2) 11-12 (1)	07-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-14 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-18 (3) 18-20 (2) 20-23 (3) 23-01 (2) 01-02 (1)	19-22 (1) 20-22 (1)*
Western Africa	08-09 (1) 09-11 (2) 11-12 (3) 12-14 (4) 14-16 (3) 16-17 (2) 17-18 (1) 08-10 (1)**	06-08 (1) 08-10 (2) 10-13 (3) 13-16 (4) 16-17 (3) 17-19 (2) 19-20 (1)	04-06 (2) 06-12 (1) 12-15 (2) 15-17 (3) 17-23 (4) 23-01 (3) 01-02 (2) 02-04 (1)	18-20 (1) 20-23 (2) 23-01 (1) 21-00 (1)*
Southern Africa	07-08 (1) 08-10 (2) 10-11 (3) 11-12 (4) 12-13 (2) 13-14 (1) 11-13 (1)**	07-09 (1) 09-11 (2) 11-12 (3) 12-16 (4) 16-17 (2) 17-18 (1)	05-07 (2) 07-13 (1) 13-15 (2) 15-16 (3) 16-19 (4) 19-20 (3) 20-22 (2) 22-00 (3) 00-02 (2) 02-05 (1)	19-20 (1) 20-21 (2) 21-22 (1) 20-21 (1)*
Eastern & Central Africa	09-11 (1) 11-13 (2) 13-16 (4) 16-17 (2) 17-18 (1) 13-15 (1)**	08-09 (1) 09-12 (2) 12-16 (3) 16-18 (4) 18-19 (2) 19-20 (1)	12-14 (1) 14-16 (2) 16-19 (3) 19-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Central & South Asia	07-09 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1)	05-07 (1) 18-20 (1)
Southeast Asia	09-10 (1) 10-12 (2) 12-14 (1) 16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-17 (1) 17-21 (2) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-18 (1) 18-21 (2) 21-23 (1)	04-07 (1)
Far East	15-16 (1) 16-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	09-11 (1) 14-16 (1) 16-17 (2) 17-19 (4) 19-20 (3)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-16 (1)	02-04 (1) 04-06 (2) 06-08 (1) 05-07 (1)*

		20-21 (2) 21-22 (2)	16-20 (2) 20-22 (1) 22-00 (3) 00-02 (2) 02-03 (1)	
South Pacific & New Zealand	10-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-20 (2) 20-21 (1) 11-14 (1)** 17-19 (1)**	08-12 (1) 12-14 (2) 14-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 22-23 (3) 23-01 (2) 01-02 (1)	17-19 (1) 19-21 (2) 21-23 (3) 23-04 (4) 04-05 (3) 05-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (1)	22-00 (1) 00-01 (2) 01-06 (3) 06-07 (2) 07-08 (1) 00-02 (1)* 02-05 (2)* 05-07 (1)*
Australasia	09-11 (1) 14-15 (1) 15-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 16-18 (1)**	07-08 (1) 08-11 (3) 11-14 (1) 14-16 (2) 16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-00 (1)	05-07 (2) 07-08 (3) 08-10 (4) 10-12 (2) 12-14 (1) 14-16 (2) 16-21 (1) 21-23 (2) 23-01 (3) 01-04 (4) 04-05 (3)	02-04 (1) 04-06 (3) 06-07 (2) 07-08 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of of South America	07-08 (1) 08-09 (2) 09-10 (3) 10-16 (4) 16-18 (3) 18-19 (2) 19-20 (1) 09-11 (1)**	06-07 (1) 07-08 (2) 08-10 (4) 10-13 (3) 13-19 (4) 19-20 (3) 20-21 (2) 21-23 (1)	06-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-23 (4) 23-02 (3) 02-05 (2) 05-06 (3)	18-19 (1) 19-20 (2) 20-00 (3) 00-02 (4) 02-03 (3) 03-04 (2) 04-06 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 09-11 (1)** 14-16 (1)**	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-20 (4) 20-22 (3) 22-00 (2) 00-01 (1)	13-15 (1) 15-16 (2) 16-18 (3) 18-01 (4) 01-03 (3) 03-05 (2) 05-07 (3) 07-08 (2) 08-09 (1)	19-20 (1) 20-00 (2) 00-02 (3) 02-03 (2) 03-04 (1) 21-03 (1)*
McMurdo Sound, Antarctica	14-16 (1) 16-19 (2) 19-20 (1)	13-16 (1) 16-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	16-19 (1) 19-20 (2) 20-04 (3) 04-05 (2) 05-07 (1) 07-08 (2) 08-10 (1)	22-02 (1) 02-04 (2) 04-06 (1)

Time Zone: PST (24-Hour Time) WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Europe & North Africa	08-09 (1) 09-11 (2) 11-12 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-13 (2) 13-14 (1) 19-21 (1)	00-06 (1) 06-09 (2) 09-11 (1) 11-14 (2) 14-16 (3) 16-19 (2) 19-22 (1) 22-00 (2)	19-20 (1) 20-22 (2) 22-00 (1) 20-22 (1)*
Central & Northern Europe & European USSR	08-09 (1) 09-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (1) 19-21 (1)	05-06 (1) 06-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	19-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Eastern Mediter-ranean & Middle East	08-09 (1) 09-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (1) 20-22 (1)	05-06 (1) 06-09 (2) 09-12 (1) 12-16 (2) 16-18 (1) 18-22 (2) 22-02 (1)	18-21 (1)
Western & Central Africa	08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	01-06 (1) 06-08 (2) 08-12 (1) 12-15 (2) 15-17 (3) 17-21 (4) 21-00 (3) 00-01 (2)	18-22 (1)
Eastern Africa	09-12 (1) 12-14 (2) 14-15 (1)	08-11 (1) 11-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	06-08 (1) 12-14 (1) 14-16 (2) 16-20 (3) 20-22 (2) 22-23 (1)	18-20 (1)
Southern Africa	07-08 (1) 08-11 (3) 11-12 (2) 12-13 (1)	06-09 (1) 09-12 (2) 12-15 (3) 15-16 (2) 16-17 (1)	04-06 (1) 06-08 (2) 08-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-21 (1) 21-23 (3) 23-00 (2) 00-02 (1)	18-21 (1)
Central & South Asia	07-09 (1) 17-18 (1) 18-19 (3) 19-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 16-17 (1) 17-19 (2)	16-18 (1) 18-21 (2) 21-23 (1) 02-03 (1) 03-05 (2)	05-07 (1) 18-20 (1)
Southeast Asia	08-09 (1) 09-11 (2) 11-12 (1) 14-15 (1) 15-16 (2) 16-18 (4) 18-19 (2) 19-20 (1) 16-18 (1)**	07-08 (1) 08-10 (4) *0-12 (3) 12-17 (1) 17-20 (3) 20-21 (2) 21-22 (1)	23-01 (1) 01-03 (2) 03-06 (3) 06-07 (2) 07-09 (3) 09-11 (2) 11-14 (1)	00-02 (1) 02-05 (2) 05-07 (1)
Far East	14-15 (1) 15-16 (2) 16-18 (4) 18-19 (2) 19-20 (1) 15-17 (1)**	08-10 (2) 13-14 (1) 14-15 (2) 15-17 (3) 17-20 (4) 20-21 (3) 21-22 (1)	04-06 (2) 06-07 (1) 07-08 (3) 08-09 (4) 09-10 (3) 10-11 (2) 11-19 (1) 19-21 (2) 21-23 (4) 23-00 (3) 00-03 (2) 03-04 (3)	00-02 (1) 02-05 (2) 05-06 (3) 06-07 (2) 07-08 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)**
South Pacific & New Zealand	09-10 (1) 10-12 (3) 12-16 (2) 16-20 (4) 20-21 (3) 21-22 (1) 10-12 (1)** 18-20 (1)**	07-08 (1) 08-09 (2) 09-11 (3) 11-17 (2) 17-18 (3) 18-22 (4) 22-23 (3) 23-01 (2) 01-02 (1)	06-07 (3) 07-09 (4) 09-10 (3) 10-11 (2) 11-17 (1) 17-19 (2) 19-20 (3) 20-01 (4) 01-04 (3) 04-06 (2)	19-21 (1) 21-22 (2) 22-23 (3) 23-05 (4) 05-06 (3) 06-07 (2) 07-08 (1) 22-01 (1)* 01-05 (2)* 05-06 (1)*
Australasia	11-13 (1) 13-14 (2) 14-16 (3) 16-19 (4) 19-20 (3) 20-21 (1) 16-18 (1)**	06-07 (1) 07-09 (3) 09-11 (2) 11-13 (1) 13-15 (2) 15-17 (1) 17-18 (2) 18-21 (4)	12-20 (1) 20-22 (2) 22-00 (3) 00-04 (4) 04-06 (3) 06-08 (4) 08-10 (3) 10-12 (2)	00-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (2) 09-10 (3) 10-16 (4) 16-17 (3) 17-18 (1) 09-11 (1)**	21-22 (2) 22-23 (1) 05-06 (1) 06-07 (2) 07-09 (4) 09-14 (3) 14-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	05-07 (4) 07-09 (3) 09-14 (2) 14-16 (3) 16-22 (4) 22-00 (3) 00-03 (2) 03-05 (3)	18-20 (1) 20-01 (3) 01-04 (2) 04-06 (1) 19-21 (1)* 21-03 (2)* 03-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-09 (3) 09-11 (2) 11-14 (3) 14-17 (4) 17-18 (2) 18-19 (1) 09-11 (1)**	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-20 (4) 20-23 (3) 23-00 (2) 00-01 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-01 (4) 01-02 (3) 02-06 (2) 06-08 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 22-02 (1)*
McMurdo Sound, Antarctica	13-14 (1) 14-18 (2) 18-19 (1)	14-16 (1) 16-17 (2) 17-19 (3) *9-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-02 (4) 02-04 (3) 04-05 (2) 05-07 (1) 07-08 (2) 08-09 (1)	22-02 (1) 02-04 (2) 04-06 (1)

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the 2KD Standard

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1500 W PEP nominal output SSB and CW. 1000 Watts ICAS, RTTY, and FM, covering the 3.5 to 30.0* MHz frequency range. Nominal gain: 15 to 20 times input drive. Tube complement consists of one remarkable new Eimac 3CX-1200 D7 ceramic triode. It uses a Pi-L plate circuit with a silver plated tank coil for maximum efficiency and attenuation of unwanted harmonics.

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3KD PREMIER

The same superb specs as the Classic, BUT with the addition of 160 meter operation and QSK break in keying. Both the Premier and the Classic desk models are no nonsense. . .no compromise amplifiers that will please the most discerning amateur for many years to come.

2KD CLASSIC

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*10 meters available on export models only

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Looking for a way to work your local FM repeater. . .
to occasionally check in to your club net. . .
to get on packet. . .
or to work faster packet without the expense and complexity?
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- DB-9 data connector with direct-buffered connections to varicap and detector.
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For more information contact the factory. To purchase, contact your favorite Kantronics dealer.

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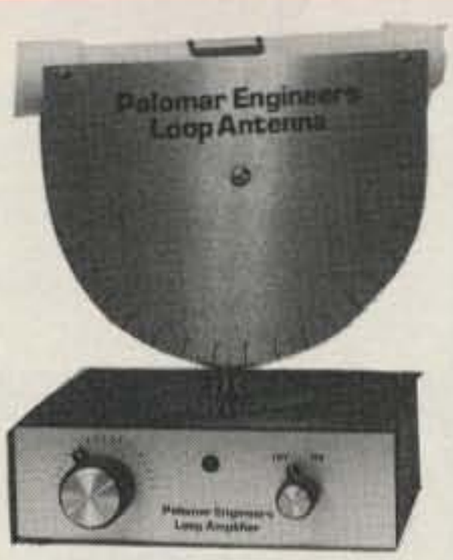
LOOP ANTENNA



Loops pick up far less noise than other antennas. And they can null out interference. Palomar brings you these features and more in a compact desktop package. The wideband amplifier with tuning control gives 20 db gain. Plug-in loops have exclusive tilt feature for deep nulls. Loops are available for 10-40 KHz, 40-150 KHz, 150-550 KHz, 550-1600 KHz and 1600-5000 KHz.

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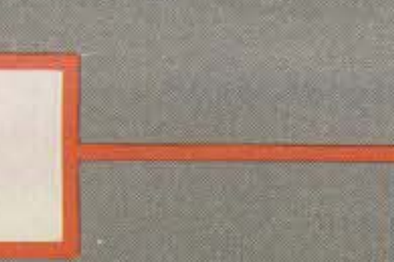

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Memory Channels	49	48	10
VFOs	2	1	1
Memory Channels Store Any Offset	49	10	10
Wide Receiver Frequency Range (MHz)—VHF	140-173	138-174	141-163
Wide Receiver Frequency Range (MHz)—UHF	430-450	440-450	438-450
Built-in CTCSS Encode/Decode	Included	Option	Encode Only
Memory DTMF Autodialer	10	None	None
CTCSS Paging	✓	Option	—
Programmable Battery Saver	✓	✓	✓
Backlit LCD Display	✓	✓	✓
Backlit DTMF Keypad	✓	—	—
APO, Automatic Power Off	✓	✓	—
1 MHz Up/Down Stepping	✓	✓	✓
Vinyl Case	✓	Option	Option
Scan For CTCSS Tone	✓	—	—
Built In VOX	✓	—	—
Clock	—	✓	—
Odd Split, Any Tx Or Rx Frequency In Any Memory Channel	49	10	1
Suggested Retail Price	$406.00*	$439.95*	$349.95*

DUAL-BAND HANDHELD SPECIFICATIONS	YAESU FT-470	ICOM IC-32AT	KENWOOD TH-75A
Memory Channels	42	20	20
VFOs Per Band	2	1	1
Wide Receiver Frequency Range (MHz)—VHF	130-180	138-174	140-164
Wide Receiver Frequency Range (MHz)—UHF	430-450	440-450	438-450
Built-in CTCSS Encode/Decode	Included	Option	Encode Only
Memory DTMF Autodialer	10	None	None
Dual Receive With Balance Control	✓	—	✓
CTCSS Paging	✓	—	✓
Cross Band Full Duplex	✓	✓	✓
Programmable Battery Saver	✓	✓	✓
Backlit LCD Display	✓	✓	✓
Backlit DTMF Keypad	✓	—	—
Alternating Band Scan	✓	✓	✓
Cross Band Repeater	✓	—	—
Power Output on 2 Meter and 440	2.3W	5.0W	1.5W
APO, Automatic Power Off	✓	—	✓
1 MHz Up/Down Stepping	✓	✓	✓
Memory Channels Store Any Offset	42	20	20
Vinyl Case	✓	Option	Option
Odd Split, Tx Or Rx, Any Frequency In Any Memory Channel	42	20	2
Suggested Retail Price	$576.00	$629.00	$549.00

YAESU

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Data and prices obtained from latest available manufacturers' brochures & printed material. October, 1989.

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