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Amateur Radio

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NOVEMBER 1994



1945

Our 50th Year

1994

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On the cover: Bill Hein, AA6TT, Tiffany, CO.

RADIO AMATEUR'S JOURNAL

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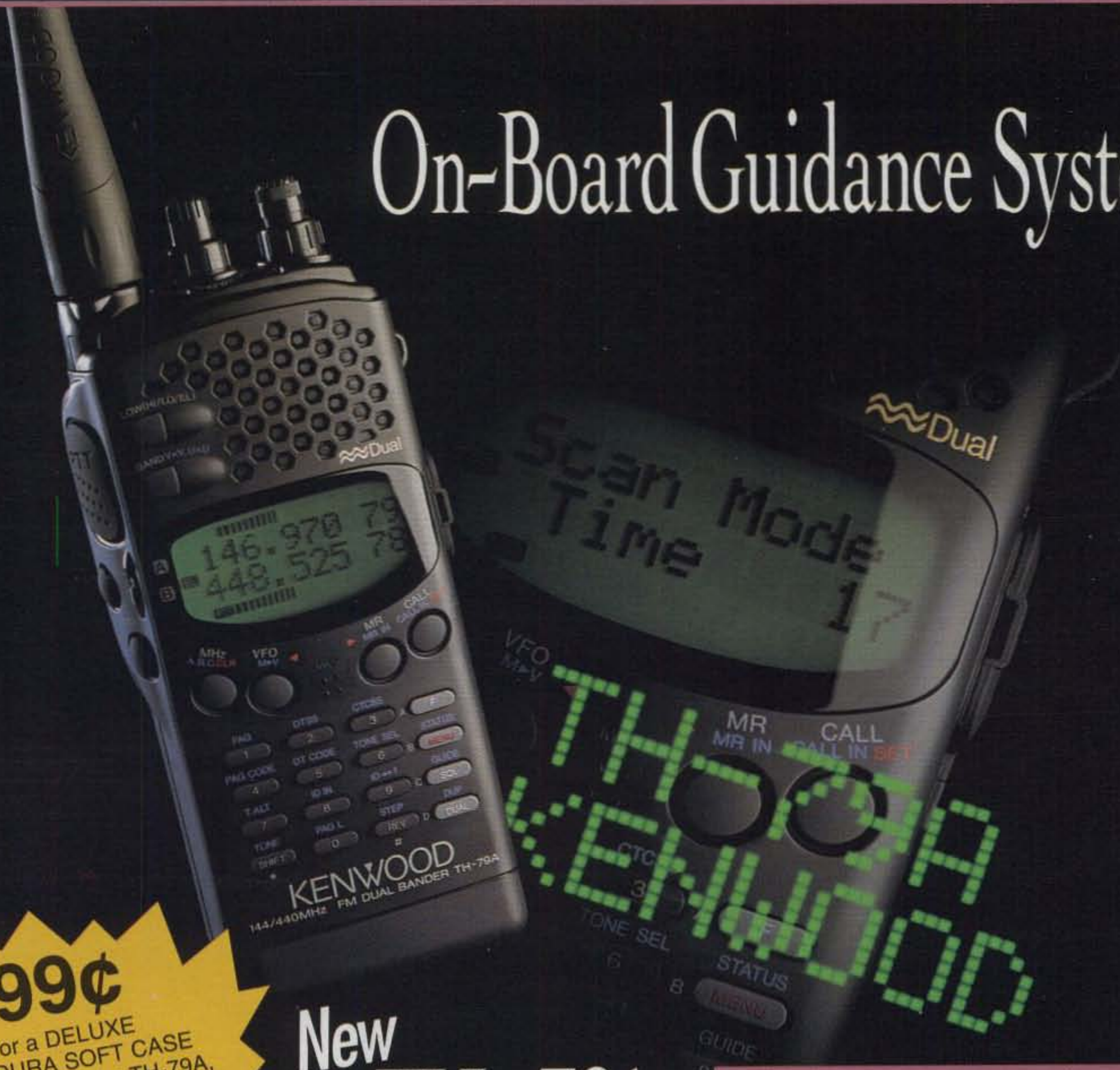
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Information at your fingertips. Everything you need to know about operating the new TH-79A FM dual-bander (144MHz/440MHz) can be viewed in its unique dot-matrix LCD with alphanumeric display. No need for the manual. In addition to this innovative guide function, the TH-79A sports a user-friendly menu system, providing easy access to the many powerful features of this slim-line handheld transceiver. Such as 82 non-volatile memory channels with ID, DTSS and page functions, and a DTMF memory function for auto-dial operation. Full-crossband duplex operation is available, as is the ability to receive two frequencies on the same band (VHF+VHF or UHF+UHF) simultaneously. And thanks to the FET power module, long hours of operation are possible on one charge. With the TH-79A, transceiver technology enters the 21st century.

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- 2.7W output (144MHz), 2W output (440MHz) from MOS FET power module and supplied 6V battery; 5W output using optional PB-34
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*Specifications guaranteed for Amateur bands only.

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TM-241A FM MOBILE TRANSCEIVER

Features

- 144-148 MHz TX, 118-174 MHz RX
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- Modifiable for MARS/CAP use (permits required)

Pure and simple, the concept reads like this: "rock-solid performance with straightforward operation, at an affordable cost". And Kenwood's TM-241A (144MHz) FM mobile transceiver symbolizes this perfectly. Great looks and rugged construction are just the beginning. The TM-241A's user-friendly controls make mobile QSOs a snap, and a powerful 50-watt amplifier lets you work simplex with confidence or hit those distant repeaters. Reception specs are equally impressive: intermod characteristics have been improved* to reduce interference from strong adjacent band signals. Plus, there are 20 multi-function memory channels for programming combinations of frequency, sub-audible tone, and repeater offset.

So, if you're looking for true mobile performance, go back to the basics and reach for Kenwood's TM-241A.

These specifications guaranteed for Amateur band only.
*Current K&K2 versions with serial number 5080000 or later.

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**The Radio
 Amateur's Journal**



ON THE COVER: No, Bill Hein, AA6TT, doesn't use all that equipment himself. It's actually a world class multi operator setup. To get a glimpse of what the outside of Bill's Tiffany, CO, QTH looks like, see April in the 1994 CQ Amateur Radio Calendar. (Photo by Larry Mulvehill, WB2ZPI)

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ZERO BIAS

EDITORIAL

Nestled between Thanksgiving and Chanukah this month is the one amateur radio operating activity whereby it's okay to go against your parents' admonition of never speaking with your mouth full. The CQ World-Wide DX CW Contest will let you graze through all the leftover turkey from Thanksgiving while maintaining or increasing your contact rate. Only your fingers do the talking. Of course, if you have a voracious appetite, the only thing you'll hear in your earphones is the sound of your own chomping—definitely not too good for picking out marginal signals. There's still some time to practice eating and operating before the Big One to adjust your Chomp Quotient, that fine edge between gustatory satisfaction and aural discrimination—a honing of the senses, if you will.

If you celebrate the holiday of Chanukah as your period of gift giving, and if there's the outside possibility of a new key or keyer waiting, you might be able to whine or wheedle it out of the powers that be a few days early, in time for the contest. If it's Christmas that you celebrate, well, better luck next year.

Obviously, propagation conditions are not going to be optimum this year. They are going to be equally optimum for all of the participants, however, so there is a level playing field with regard to conditions. Tactics, on the other hand, will require a deft touch to pick up every possible scintilla of advantage. While we all know or have a good idea of what it takes to win something like the CQ World-Wide, most of us will fall short of that goal. However, there are enough categories and variables to make winning a certificate within reach of a really good effort. It's not quite that simple, but it can be done. If you check the results of last year's contest, you quickly can see what it takes to win a trophy, plaque, or certificate. You also can see what you have to do to match or beat last year's scores.

For most of us, winning isn't everything. For some, though, it is the *only* thing. Most of us enjoy getting caught up in the excitement of competition—making contacts and trying to test the limits of our own endurance. However, when you stop to consider all of the individual calls that take part in the CQ World-Wide, plus factor in all the groups and clubs which represent even more participants, then you have perhaps the biggest concentrated participatory event in the world. Can you picture the equivalent of plus or minus 300,000 people showing up to take part in the Indianapolis 500 or to run a marathon? If you look at the rarified air of the winner's circle, you'll see definite refined

skill, aptitude, training, technology, and yes, lots of dollars, just like the Indianapolis 500. However, unlike the Indianapolis 500, with the CQ World-Wide you can run an old Ford Falcon against the biggest race car and do a credible job.

One of the more interesting aspects of CQ contests, and I guess a lot of the other contests, is the level of activity mentioned above. Suddenly, as if by magic, it seems that almost everyone in the world with an amateur radio license is on the air at the same time. While this might annoy some people who resent all of this sudden activity, on the other hand it could be an everyday experience, if these people all chose to be active on a daily basis. One person's annoyance is another's boon. Unlike almost any other competition in which there is a clear-cut winner and a few runners-up (the rest get nothing), with an amateur radio contest everyone gets something. There is ample opportunity to work all sorts of DX, states, counties, prefixes, islands, continents, zones, and numerous other combinations of achievement award requirements. You can be involved only to the point where you give a few friends a contact just to help their totals grow. Every bit of participation helps someone, if not yourself.

This year we sort of stretch out the traditional holiday season of Chanukah and Christmas, when part of the celebration includes exchanging gifts. While I know that it's crass to focus in on exchanging gifts, I also know that most of us are, to put it mildly, imperfect. I also know that it's not the greatest thing in the world to tear through some gift wrapping and have to feign surprise and delight at finding a new set of Barney the dinosaur pajamas, especially at your age. Maybe if you're lucky, your Aunt Harriet will remember that you're an amateur and crochet a protective cover for the microphone (or key) that you probably don't use any more.

It's Wish List Time, especially if you hope to get any new amateur gear this year. Obviously, you should try to be sort of realistic as to what is possible and what is perhaps out of the question. A few of our columns this month describe a number of goodies that will find a welcome home with most of us, as well as a tremendous selection of "must haves" proffered by our advertisers. I know that I've got my eye on a couple of things for my shack, and it's just a matter of tactfully and discretely leaving some subtle hints, pictures, and catalogs lying around conspicuously where they're sure to be seen. Of course, there's nothing wrong with the direct approach and just telling people what you would like, but that's a little to

easy. The simplest approach, and one that I've used effectively for many years, is to realistically rationalize that you've been really good all year and that you deserve something nice that is sure to make you happy. Buy it yourself, bring it home, and wrap it in some decorative holiday paper, and then wait until the appropriate day to surprise yourself by opening up the exact right thing you've always wanted and now have. If you're from the generation that tends to feel guilty when you buy yourself something (without asking permission), just add a greeting card from some fictional relative, such as Uncle Chuck or Aunt Flora.

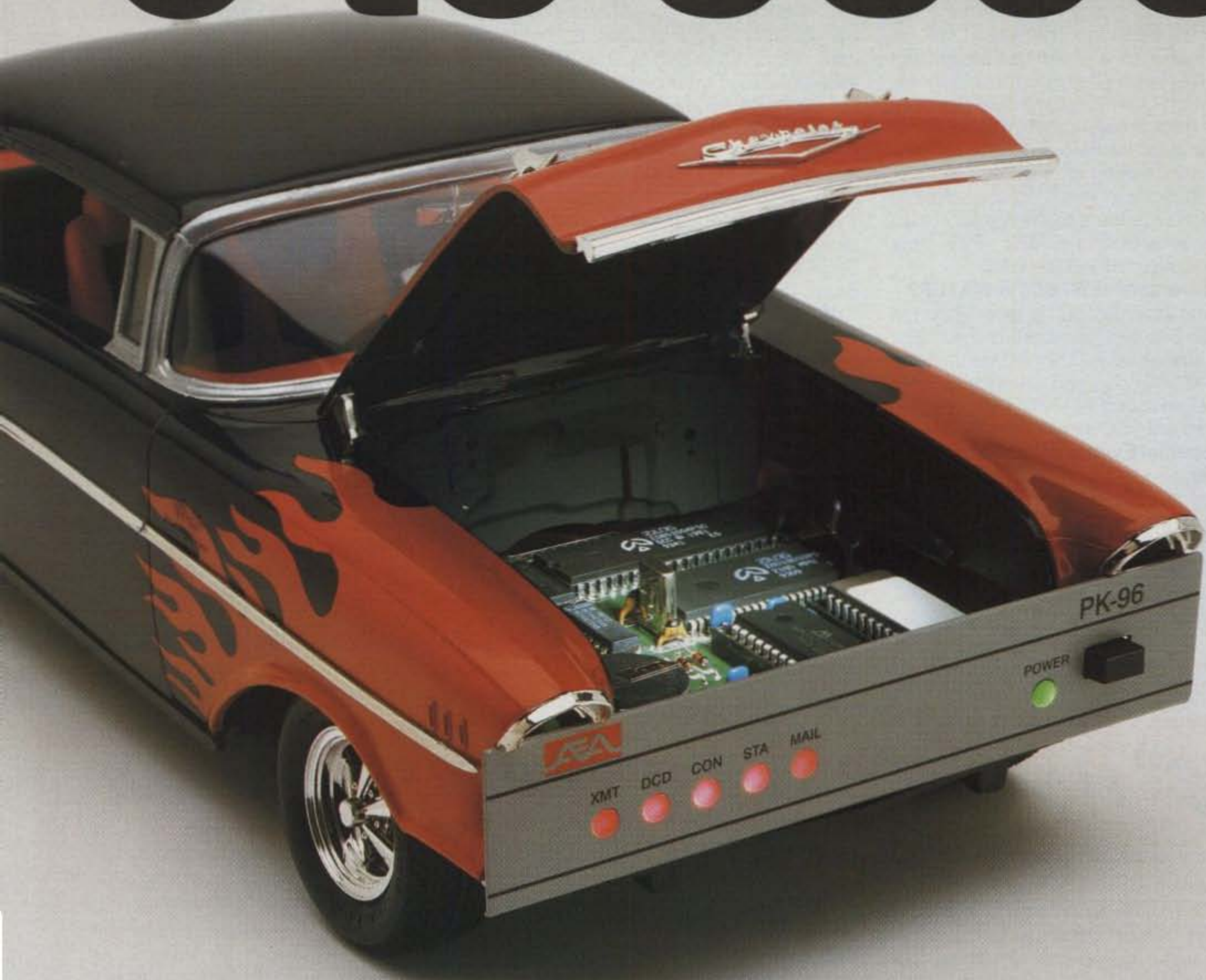
For those of you who dislike both contests and Morse code, there isn't going to be too much to do on Thanksgiving weekend except enjoy the warmth and conviviality of family and friends, which is pretty good in itself. Obviously, if you can't stand that either, you might take the opportunity to curl up with a good book on speleology. Most of us will try to make the most out of the weekend and enjoy as much as possible—both the holidays and the contest.

While the CQ World-Wide can't be compared in importance to the other two celebrations, the three almost concurrent events do share the precept of triumph. The Pilgrims triumphed over the harsh winter and adverse conditions of a new land. The Maccabees triumphed over Antiochus and regained what had been taken. And, in a very, very, small measure of similarity, some amateurs will triumph over others in the contest. They are all celebrations, and parties, and all are invited to share in the festivities and rejoice in the experience.

This month we've got some great building projects for CW operators to get you in the proper frame of mind for the contest. I don't know if you have enough time to complete any of them, but there certainly is enough time between November and the next CW contest (either the CQ 160 Meter in January or the CQ WPX in May). We've also added a new CQ award to mark our Golden Anniversary this January. Check page 92 for complete details and rules for the "CQ Gang" Award, and keep your calendar free for the first two weeks in January. It's easy, it's fun, and everyone can take part in helping us celebrate our 50th anniversary in amateur radio publishing. There's an attractive certificate available with room for endorsements, so there's something for everyone, including the curmudgeons who will have something new to complain about. In the meantime, enjoy yourself and have fun with the hobby.

73, Alan, K2EEK

0 to 9600



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Satisfy your need for speed with the new PK-96 9600 baud packet controller from AEA.

This high-performance machine comes standard with 1200 baud AFSK tone signaling, as well as 9600 baud K9NG and G3RUH compatible direct frequency modulation. The PK-96 makes an excellent terrestrial or satellite data controller. It can be used for high-speed data links to eliminate bottlenecks and increase system capacity.

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ANNOUNCEMENTS

• **Award Honors KH6IJ**—The family of Kata-shi Nose, KH6IJ, has contributed \$2500 to Honolulu's Emergency ARC to fund an award in his memory. The award will be given annually to a Science Fair entrant whose project pertains to communications. With this seed money, augmented with contributions from amateurs wishing to honor KH6IJ, the award will be a permanent tribute to an outstanding amateur and educator. Contributions to this fund are appreciated, and may be sent to the Katashi Nose Memorial Award, c/o EARC, P.O. Box 30315, Honolulu, HI 96820-0315.

• **60th Anniversary of W7BCT & WA7UFS**—In August Jim (W7BCT) and Ramona (WA7UFS) Barrows celebrated their 60th wedding anniversary. Other amateurs in the family and friends who attended were K7BVT, N7VHV, and WA7ZND. The couple retired from the FCC in 1971.

• **These Special Events are scheduled for November:**

2-land, from 30th anniversary of Drumlin ARC and as tribute to Silent Key members, New York; 1400–2200Z Nov. 26–27; General lower portion 15, 20, 40, 80 meters, and 6 meters. Send 9 x 12 SASE to Drumlin ARC, c/o WA2AAZ, P.O. Box 601, Newark, NY 14513.

WT3H, from Veteran's day celebration, grounds of the V.A. Medical Center, Leb-

anon, Pennsylvania; The Lebanon Valley Society of Radio; 1300–2200Z Nov. 11 & 12; in 80, 40, and 20 General phone subbands, and Novice subbands. For certificate, send QSL and a 9 x 12 SASE to Veteran's Day Station, V.A. Medical Center, Lebanon, PA 17042.

WA4HMX, from Veteran's Day Special Event, McGuire's Veterans Hospital, Richmond, Virginia; Old Dominion Chap. 10X and Central Virginia Contest Club; Nov. 11–13; phone on all bands. For certificate send QSL with contact number and 9 x 12 SASE to Dow Pierce, WA4HMX, 124 Barteet Road, Richmond, VA 23224.

WD0EHW, from 140th anniversary of oldest civilian post office in Kansas, Marysville, Kansas; Marshall County ARC; 2100Z Nov. 11 through 0100Z Nov. 12; General 20, 40, 80 meter subbands. For certificate send QSL and 9 x 12 SASE to Melvin Seematter, WD0EHW, 210 Calhoun, Marysville, KS 66508.

W0SOE, to commemorate world's first all female yacht racing team aboard the America 3, Wichita Boathouse, Wichita, Kansas; Nov. 5 from 10 AM to 5 PM and Nov. 6 from 1– 5 PM; lower portions of General phone subbands on 20 and 15 meters and Novice phone subband 10 meters, propagation permitting. QSL with SASE to KD0AY, 1603 Fairview, Wichita, KS 67203.

C6AFT & C6AHM, from Treasure Cay, Bahamas, IOTA NA-080; from Oct. 25 to Nov. 3, also in CQ WW SSB Contest as single op. single band. C6AHM will sign outside the contest (she will work the pile-ups, perhaps off a list, as she is handicapped; patience will be appreciated). QSL both to the home calls (AA5NT and N5TVL) and include SASE or SAE.

N9RJ/KP2 (N9RJ, N9KZJ, WB9CEP, W9CGI), from St. Thomas, US Virgin Islands; Nov. 13–20; 80, 40, 20, 17, 15, 10, 6 meters (no WARC on 19/20 TH). Send QSL and #10 SASE (stateside, and APO/FPO) or SAE and IRCs (foreign stations, or one green stamp okay) to WB9CEP.

VF7L, from Sir James Douglas proclamation anniversary, Fort Langley, BC, Canada; Fraser Valley ARA; Nov. 19, 20, 21 from 1700–2300Z; General portion 20, 15, 10 meters. For certificate send QSL and 9 x 12 SASE or \$1.00 to Fraser Valley ARA, Box 50, Fort Langley, BC Canada V1M 2S6. QSLs will be issued via QSL bureaus.

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

Nov. 5, **Enid Hamfest**, Garfield County Fairgrounds, Enid, Oklahoma. Contact Tom Worth, N5LWT, 2302 Eucalyptus Ave., Enid, OK 73701 (405-233-8473). (Exams.)

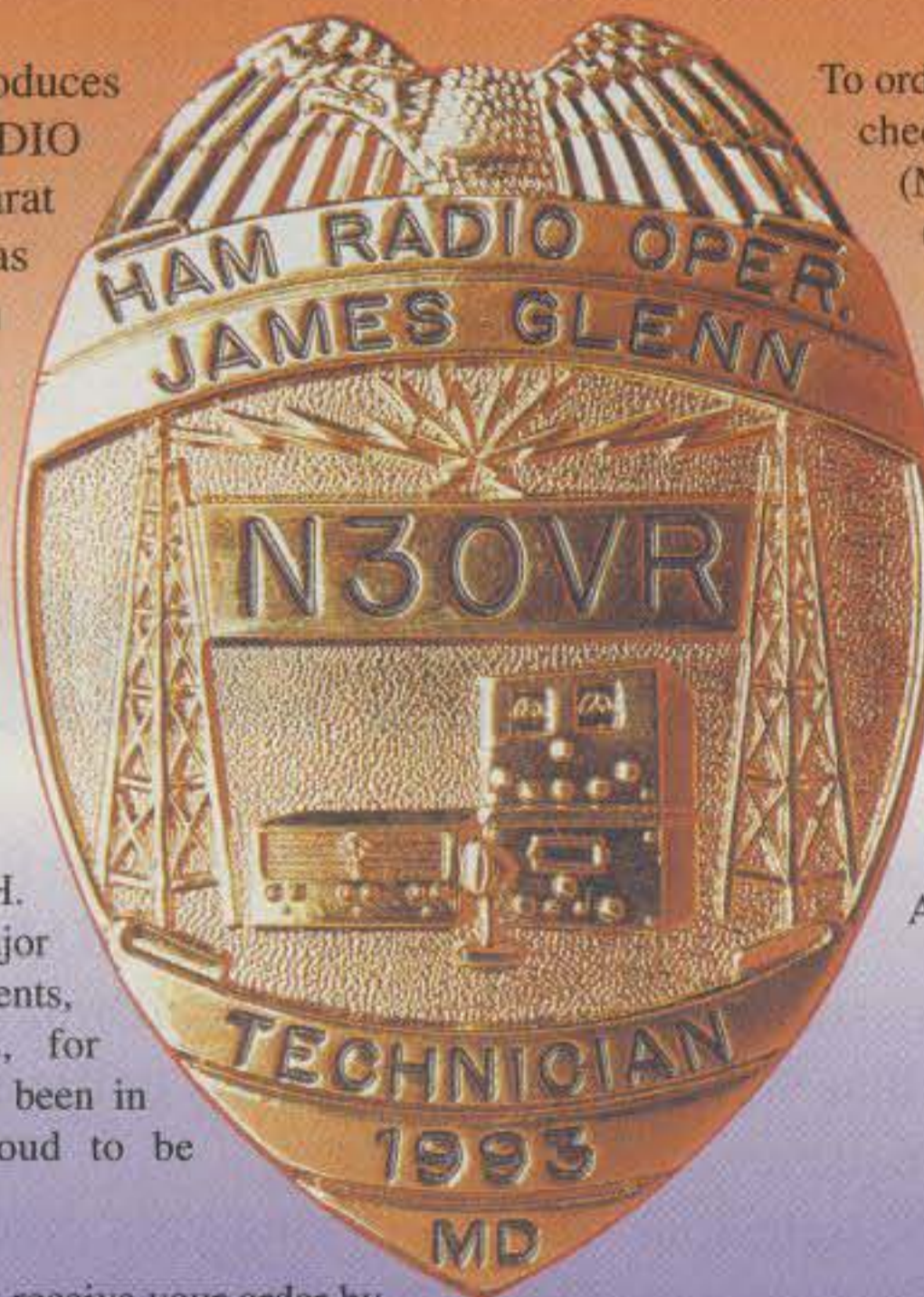
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NEW HAM RADIO OPERATORS ID BADGE

WEST ELECTRONICS proudly introduces nationally the NEW HAM RADIO OPERATORS ID BADGE. This 24karat GOLD ELECTROPLATE badge was originally designed as a gift for Jim Glenn. When his fellow HAMS saw THE BADGE every one wanted one for themselves. As you can see, the first line on JIMS badge is HAM RADIO OPER., Some suggestions were made, in order to personalize the badge to put A.R.E.S., or MARS, or even a club name, on that line..

The BADGE is manufactured by the V.H. Blackinton CO INC. It is one of the major suppliers to the POLICE and FIRE departments, Government and private organizations, for BADGES and metal ornaments, and has been in business since the 1850s We are proud to be associated with them in this venture.

For CHRISTMAS GIFT orders we must receive your order by November 5th. We cannot guaranty delivery for Christmas after that date. Of course you can always give yourself a gift anytime. Or one for your best friend, or your wife and/or girlfriend. (Thats your problem) It also makes a great gift for a new HAM or an operator who has an upgrade, or for one who is retiring form, his day job.



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ST-1



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- Software included with the ST-1 is a completely resident program (TSR), so your computer isn't tied up when tracking.
- Software such as InstantTrack, QuickTrack, RealTrack, PG_AEA, PB and PG are compatible with the ST-1.
- Allows unattended operation on Packet satellites (PACSATS).

KK-1



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ARX-270

CS-270M

AR-270B

AR-270

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MODEL	A270-10S	
Frequency, MHz	144-148	430-450
Forward Gain, dBd	10	10
No. Elements	5	5
Front to Back Ratio, dB	20	18
SWR 1.2:1 Typical		
2:1 Bandwidth, MHz	≥4	≥10
Power Rating, Watts PEP	350	350
3dB Beamwidth, Degrees		
E Plane	52	52
H Plane	60	60
Boom Length, ft (m)	6.17 (1.9)	
Longest Element, in (cm)	40.3 (102.4)	
Turning Radius, ft (m)	6 (1.8)	
Mast Size Range, in (cm)	1.25-2 (3.2-5.1)	
Wind Load, ft ² (m ²)	.725 (.07)	
Weight, lb (kg)	1.8 (.81)	

MODEL	AR-270		AR-270B		ARX-270U/N	
Frequency, MHz	144-148 / 430-450		144-148 / 430-450		144-148 / 430-450	
Gain, dB	3.7	5.5	5.5	7.5	9	12
SWR 1.2:1 Typical						
2:1 Bandwidth, MHz	>4	>15	>4	>15	>4	>20
Power, Watts FM	250	250	250	250	200	200
Horizontal Radiation						
Pattern, Degrees	360	360	360	360	360	360
Height, ft. (m)	3.75 (1.13)		7.7 (2.3)		16.5 (5)	
Mast Size Range, in	1.25-2 (3.2-5.1)		1.25-2 (3.2-5.1)		1.25-2 (3.2-5.1)	
Radial Length, in (cm)	6.75 (17.1)		20 (51)		20.5 (52.1)	
Wind Load, ft ² (m ²)	0.27 (0.03)		0.47 (0.044)		0.95 (0.088)	
Weight, lb (kg)	2 (0.9)		2.4 (1.09)		5 (2.3)	
Construction style	High strength aluminum		High strength aluminum		Fiberglass enclosure	

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KI6BP presents an intriguing project for QRPers and everyone else who enjoys the fine art of homebrewing.

How To Build Your Own 20 Meter CW Receiver

BY M. A. (MAC) CHAPMAN*, KI6BP

Many QRP receivers fail to perform well on 20 meters because they either can't select signals from the pack or they distort from strong nearby stations. On those few occasions when the band is quiet, many have poor, small signal gain. Here is a homebrew receiver that overcomes those problems and seriously challenges big station performance.

System Details

Fig. 1 is a diagram of the receiver, a single-conversion design using the popular 9 MHz IF with cascading crystal filters. The VFO and RF bandwidths are slightly wider than the CW portion of 20 with a near flat tuning response. To avoid guessing, the design incorporates a Howes DFD4¹ digital counter that displays the exact tuned frequency. The counter works by counting the VFO and displaying data in the format .125.3, meaning 125.3 kHz. The MHz part of the VFO frequency simply "spills off" the counter. Small jumpers program the counter to offset the VFO count and display the actual tuned frequency. For low noise and high signal handling, the down conversion mixers are passive followed by strong class-A amplifiers. Detected audio passes through a 2.7 kHz and a 300 Hz filter before final amplification. To capture small signals, the overall system gain is above 140 dB.

The RF Stage

The RF stage in fig. 2 is a MOSFET (Q1) four-pole filter design with low noise, high signal handling, and good image rejection. The filters set the bandwidth a little wider than the VFO tuning range. This makes resonator adjustment sensitive to overcoupling. The schematic shows the calculated critical coupling value be-



The completed project.

tween filter resonators; however, a fixed 6.8 pF NPO will simplify alignment without a big bandwidth increase. If you use a trimmer between coils to peak your RF stage, you will need a sweep generator for alignment. If you use a fixed capacitor between coils, you can align the RF stage with a single frequency. With a fixed

capacitor just slightly larger than the critical value, the loaded resonator Q sets the bandwidth.

The Q1 drain is intentionally mismatched to reduce stage gain and lighten the tuned circuit load. Lightly loaded, the output tuned circuit Q is high, which keeps the bandwidth small. For stability,

TABLE 1
RF TRANSFORMERS

-T-	CORE SIZE	TURNS	WIRE SIZE	USE
T1	T50-6	18P+3S	#28	RF IN
T2	T50-6	4S+18P	#28	DRAIN
T3	T50-6	18P+3S	#28	RF OUT
T4	F37-43	10 BIFILAR	#28	Q2 OUT
T5	F37-43	15P+5S	#28	MATCH
T6	T50-7	24P+14S	#28	U1 OUT
T7	T37-43	16P+3S	#28	Q3 OUT

NOTE: P=PRIMARY, S=SECONDARY
SECONDARY TURNS ARE OVER COLD END OF PRIMARY WINDING.

Table 1—RF transformers.

*3615-21 Vista Bella, Oceanside, CA 92057 (COMPUSERV # 71773,3254)

the amplifier incorporates beads in both the Q1 drain and gate leads. For simplicity, the drain supplies the gate 2 bias voltage. This 100K drain-to-gate resistor might look like signal feedback, but it's not. The amount of signal lost to the gate is almost zero because the drain AC load is much smaller than the 100K resistor. The advantages are simpler resistor installation and shorter leads around the MOSFET. Finally, the output signal passes through a simple pi-filter to reduce the 19 MHz image and helps match the DBM mixer (FL1) in fig. 3A.

Mixer, IF, and Detector

Figs. 3(A), (B), and (C) show the IF scheme. The IF starts in fig. 3(A) with the first mixer (FL1), a passive, low noise, and high intercept DBM. The mixer IF port (FL1-2) ends in a pi-filter to reduce unwanted mixer products.

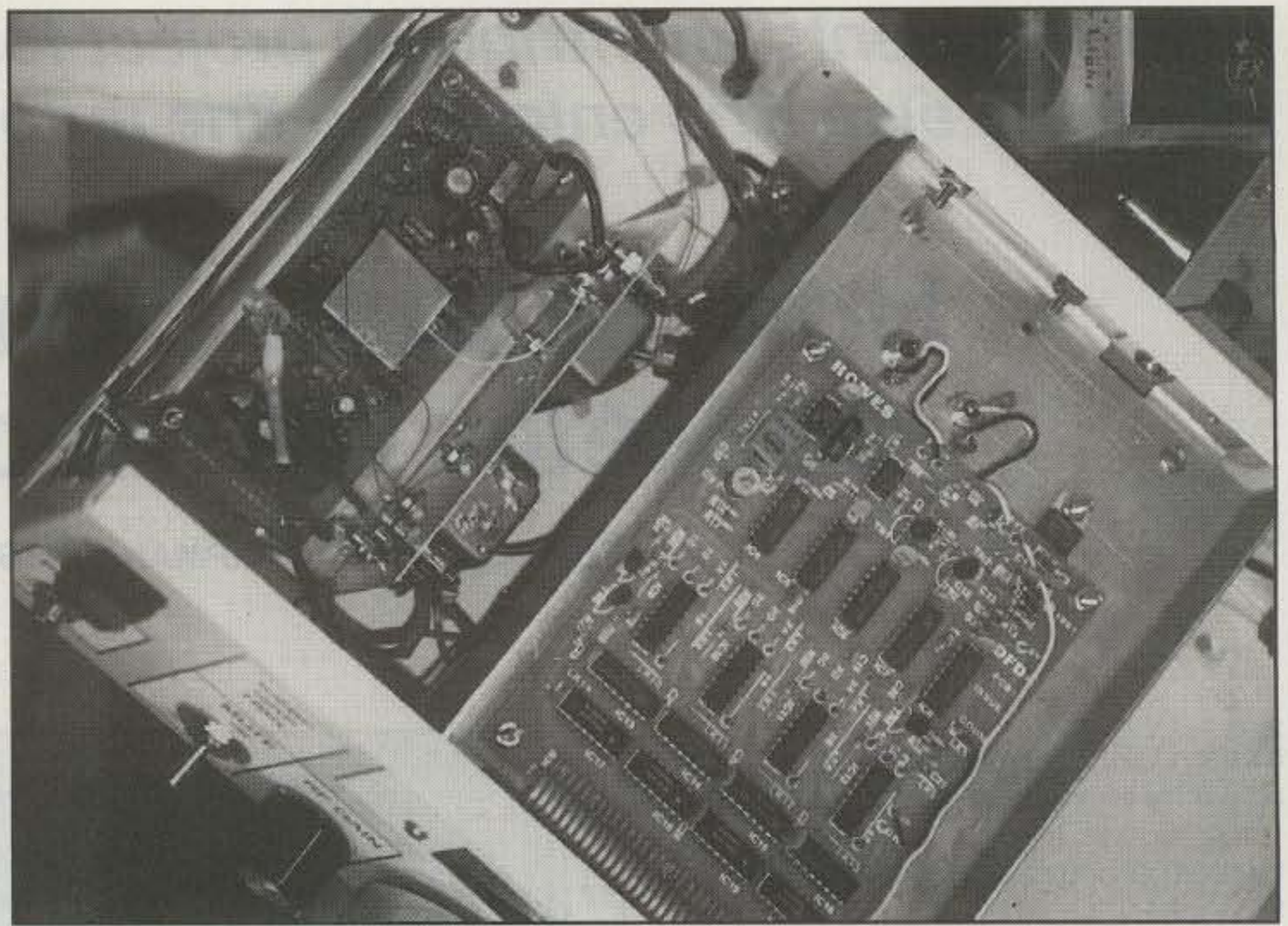
The post mixer amplifier (Q2) is a strong linear amplifier. Its collector current is about 40 ma, giving it the ability to handle large signals before distorting. This is desirable because the amplifier simply boosts everything entering the IF, and does not have AGC control. The 6 dB pad puts a fixed nonreactive load on Q2 for stability.

Fig. 3(B) shows the AGC-controlled filter-amplifier stage. This voltage amplifier (U1) is the familiar MC1350P IC with an output transformer (T6) shunted by a 1.6K resistor. Because of the amplifier high voltage gain, the 1.6K resistor pads the output for stability. The input matches the KVG² 0.5 kHz crystal filter (FL2), and its output matches the second crystal filter (FL3) in fig. 3(C).

The post filter amplifier (Q3 in fig. 3(C)) input matches the second filter (FL3). Its output transformer link matches the DBM mixer (FL4). This mixer acts as a product detector. Like the first mixer, FL4 ends in a pi-filter to reduce unwanted image and mixer products before audio amplification. A diplexer design suggested by KK7B³ is an ideal DBM audio termination; however, this less complex pi-filter design is simpler and does an equally good job.

Since the net IF gain is high (about 65 dB), to avoid self-oscillation, a stiff ground plane with small shields separates each stage. For overall shielding the three IF amplifiers mount in a separate aluminum box.

The VFO in fig. 4 is the popular series-tuned Clapp circuit with a C-C-L output stage. Two easily tuned trimmers help the Q6 collector match a range of load conditions. Only the fixed C-C-L inductor Q changes with collector load variations. Since the tuning range is small, these Q changes have little effect on the VFO output level. The C-C-L arrangement has



Interior view. Looking down from the top, the Howes counter is in the center. A ribbon cable interconnects the display and the logic board. The IF section with its cover removed is on the left. The two crystal filters are visible on the right side of the IF chassis. The VFO, AGC, and audio boards are under the Howes counter.

another advantage. Often, the local oscillator swamps a mixer, causing converted signal distortion. The two C-C-L trimmers can detune the signal without adding distortion to match the DBM for good mixer conversion. The C-L-C circuit or pi, often used as a VFO output filter, lacks this advantage.

For stability, the BJT amplifier (Q6) uses emitter feedback and a collector bead. Similar circuits often use a collector resistor for stability, but this adds thermal noise that beads avoid. A pi-filter follows the C-C-L circuit to reduce harmonics. The output signal is symmetric and free of any

visible distortion. A small capacitor couples the output to a FET buffer/splitter (Q7) that provides VFO signals to the counter and an external transmitter.

Tuning Range Comments: You can increase the VFO tuning range with a larger capacitor. This circuit uses an Oak Hills Research #AV03, a double bearing capacitor. You could use #AV04 (5 pF–40 pF) for a tuning range of about 375 kHz. Both capacitors have a built-in 8:1 vernier drive. If a wider VFO range is used, the RF stage should be stagger tuned to match the bandwidth.

This VFO tuning range is about 150

TABLE 2
RF INDUCTORS

-L-	CORE SIZE	TURNS	WIRE SIZE	USE
L1	T50-6	18P TAP 8	#28	GATE
L2	T50-6	12P	#28	PI
L3	T44-2	13P	#28	PI
L4	3.9mH DIGI-KEY #TK4407, TOKO 10RB, AUDIO PI			
L5	30T ON 0.5-IN DIA ON HOMEMADE CERAMIC FORM OR 28T ON T50-7, #28 WIRE -TOROID			
L6	T68-2	34P	#28	C-C-L
L7	T50-2	18P	#28	PI
L8	T37-43	15T	#28	DRAIN
L9	T68-7	37P	#28	C-C-L
L10	T50-6	15P	#28	PI

NOTE: P=PRIMARY, TAPS ARE UP FROM COLD END

Table II—RF inductors.

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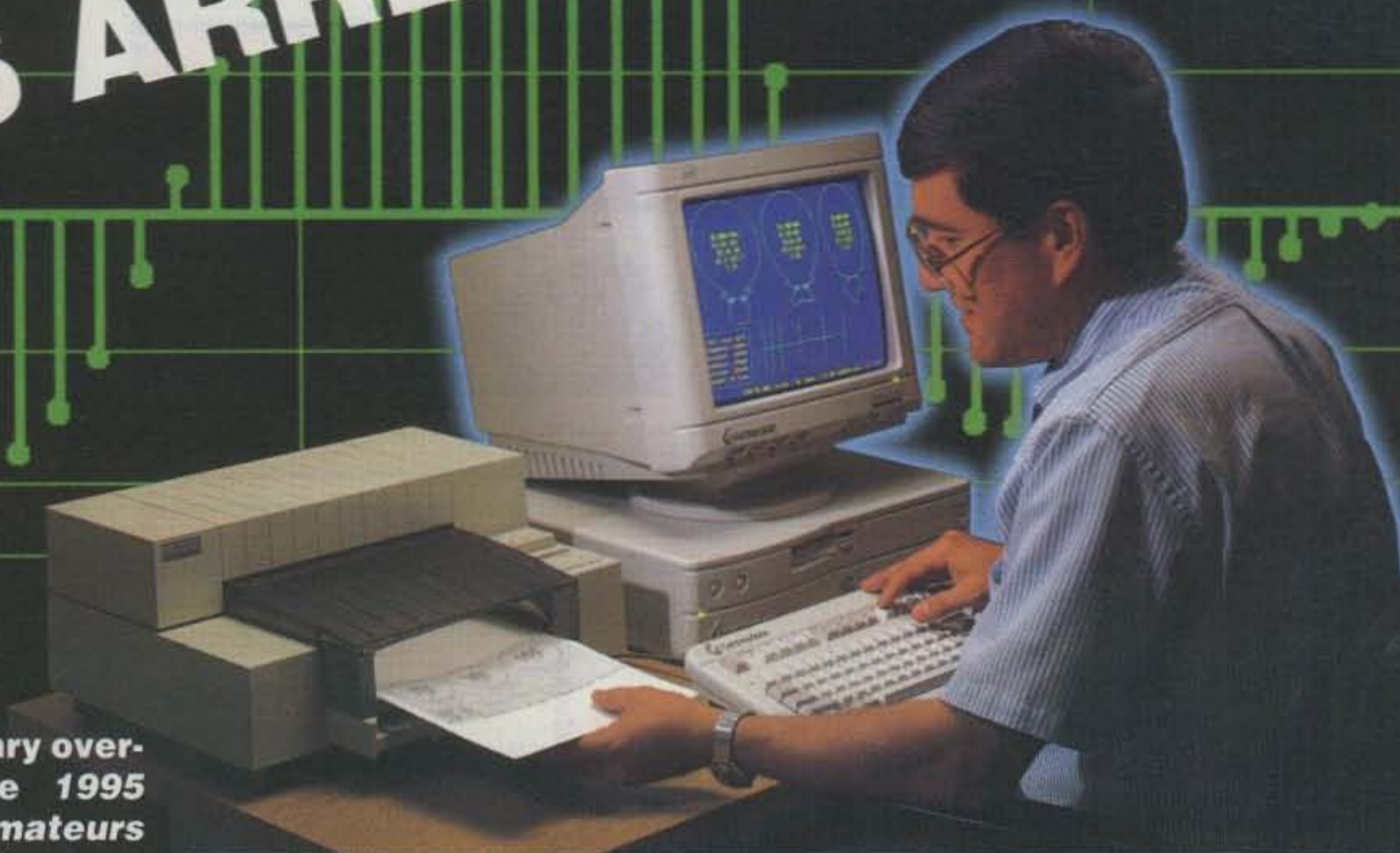
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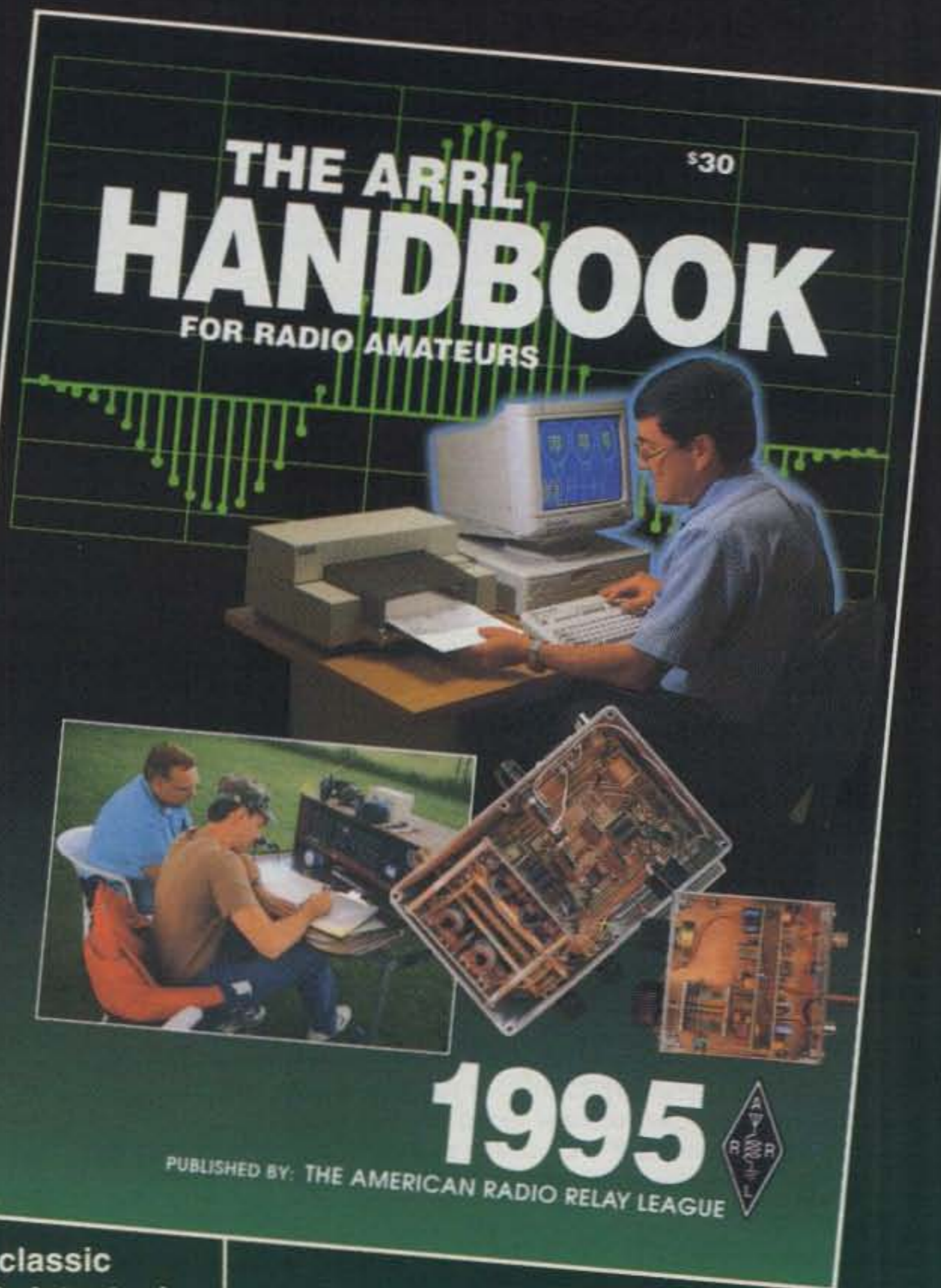
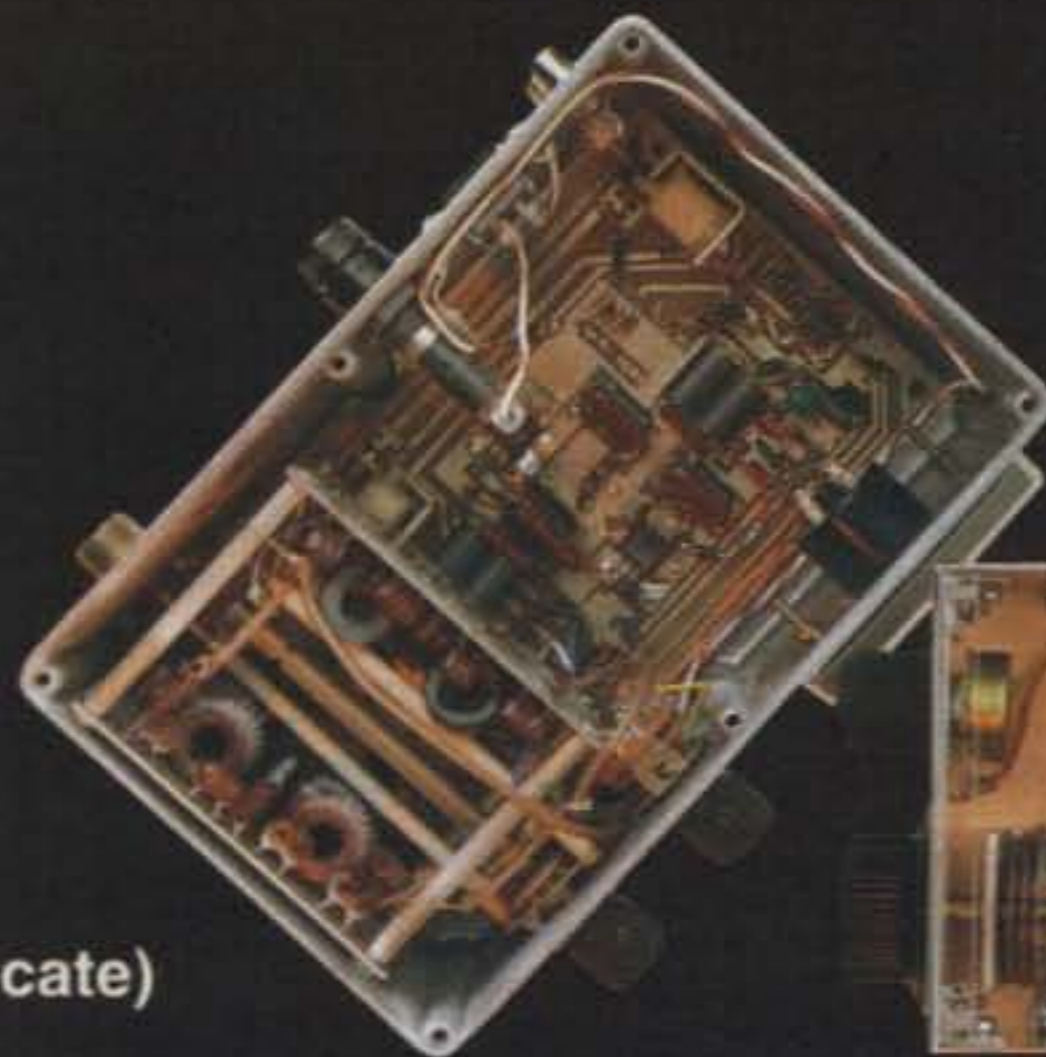
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JST-245

160-10 Meters PLUS 6 Meter Transceiver



Fifteen reasons why your next HF transceiver should be a JST-245...

- 1** All-Mode Operation (SSB,CW,AM,AFSK,FM) on all HF amateur bands and 6 meters. JST-145, same as JST-245 but without 6 meters and built-in antenna tuner.
★ JST-145 COMING SOON ★
- 2** MOSFET POWER AMPLIFIER • Final PA utilizes RF MOSFETs to achieve low distortion and high durability. Rated output is 10 to 150 watts on all bands including 6 meters.
- 3** AUTOMATIC ANTENNA TUNER • Auto tuner included as standard equipment. Tuner settings are automatically stored in memory for fast QSY.
- 4** MULTIPLE ANTENNA SELECTION • Three antenna connections are user selectable from front panel. Antenna selection can be stored in memory.
- 5** GENERAL COVERAGE RECEIVER • 100 kHz-30 MHz, plus 48-54 MHz receiver. Electronically tuned front-end filtering, quad-FET mixer and quadruple conversion system (triple conversion for FM) results in excellent dynamic range (>100dB) and 3rd order ICP of +20dBm.
- 6** IF BANDWIDTH FLEXIBILITY • Standard 2.4 kHz filter can be narrowed continuously to 800 Hz with variable Bandwidth Control (BWC). Narrow SSB and CW filters for 2nd and 3rd IF optional.
- 7** QRM SUPPRESSION • Other interference rejection features include Passband Shift (PBS), dual noise blanker, 3-step RF attenuation, IF notch filter, selectable AGC and all-mode squelch.
- 8** NOTCH TRACKING • Once tuned, the IF notch filter will track the offending heterodyne (± 10 KHz) if the VFO frequency is changed.
- 9** DDS PHASE LOCK LOOP SYSTEM • A single-crystal Direct Digital Synthesis system is utilized for very low phase noise.
- 10** CW FEATURES • Full break-in operation, variable CW pitch. built in electronic keyer up to 60 wpm.
- 11** DUAL VFOs • Two separate VFOs for split-frequency operation. Memory registers store most recent VFO frequency, mode, bandwidth and other important parameters for each band.
- 12** 200 MEMORIES • Memory capacity of 200 channels, each of which store frequency, mode, AGC and bandwidth.
- 13** COMPUTER INTERFACE • Built-in RS-232C interface for advanced computer applications.
- 14** ERGONOMIC LAYOUT • Front panel features easy to read color LCD display and thoughtful placement of controls for ease of operation.
- 15** HEAVY-DUTY POWER SUPPLY • Built-in switching power supply and "silent" cooling system designed for continuous transmission at maximum output.



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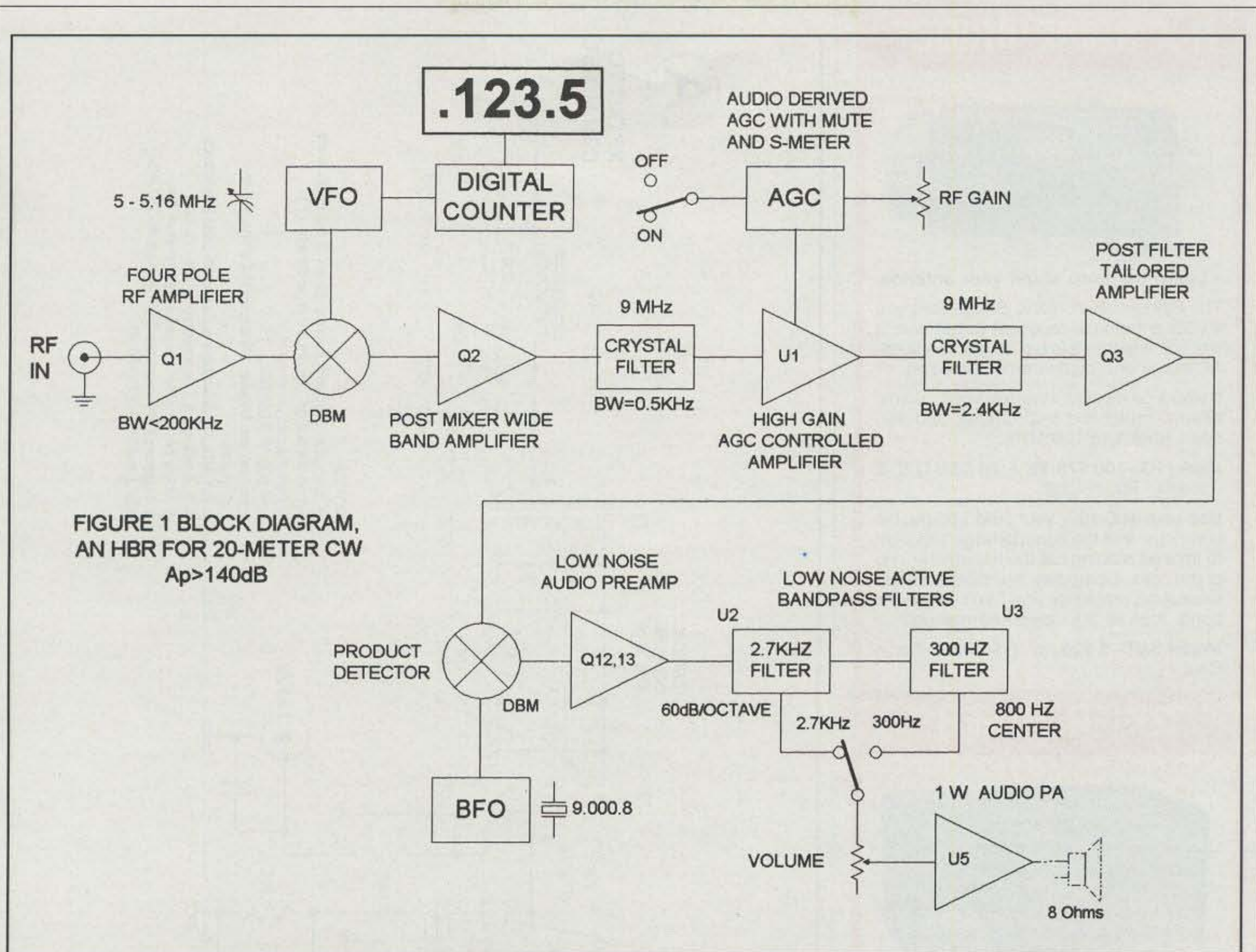


Fig. 1- Block diagram of the homebrew receiver for 20 meter CW.

kHz. The built-in 8:1 drive in the AVO3 capacitor tunes about 38 kHz per shaft revolution. This is a marginal tuning condition for 20 meter CW. I solved the problem by making a coaxial drive system. A large outer knob drives the VFO capacitor built-in 8:1 drive. A second inner knob drives another 6:1, reducing drive⁴ mounted in series with the capacitor shaft. You can tune band-end-to-band-end with four turns on the outer knob, or 24 turns on the inner knob. The inner knob tuning resolution is about 6.25 kHz per revolution.

BFO

Many QRP receivers have a single-stage BFO. I find that a single-stage oscillator is barely able to meet DBM needs. Not only does a BFO need more power than most single-stage oscillators provide, but to limit mixer distortion the design needs to control the BFO level entering the mixer.

Like the VFO, the BFO in fig. 5 uses an FET buffered BJT amplifier. The BFO output circuit differs slightly from the VFO by

using direct coupling between Q9 and Q10. The Q10 output uses a C-C-L circuit followed by a pi-filter. The output signal is clean, symmetric, and free of obvious distortion. During alignment, set the BFO level for minimum detected audio distortion, not maximum BFO output amplitude.

For added stability, Q10 is an NPN with only modest gain at the BFO frequency. It uses emitter feedback, and it has beads inserted on the collector and gate leads.

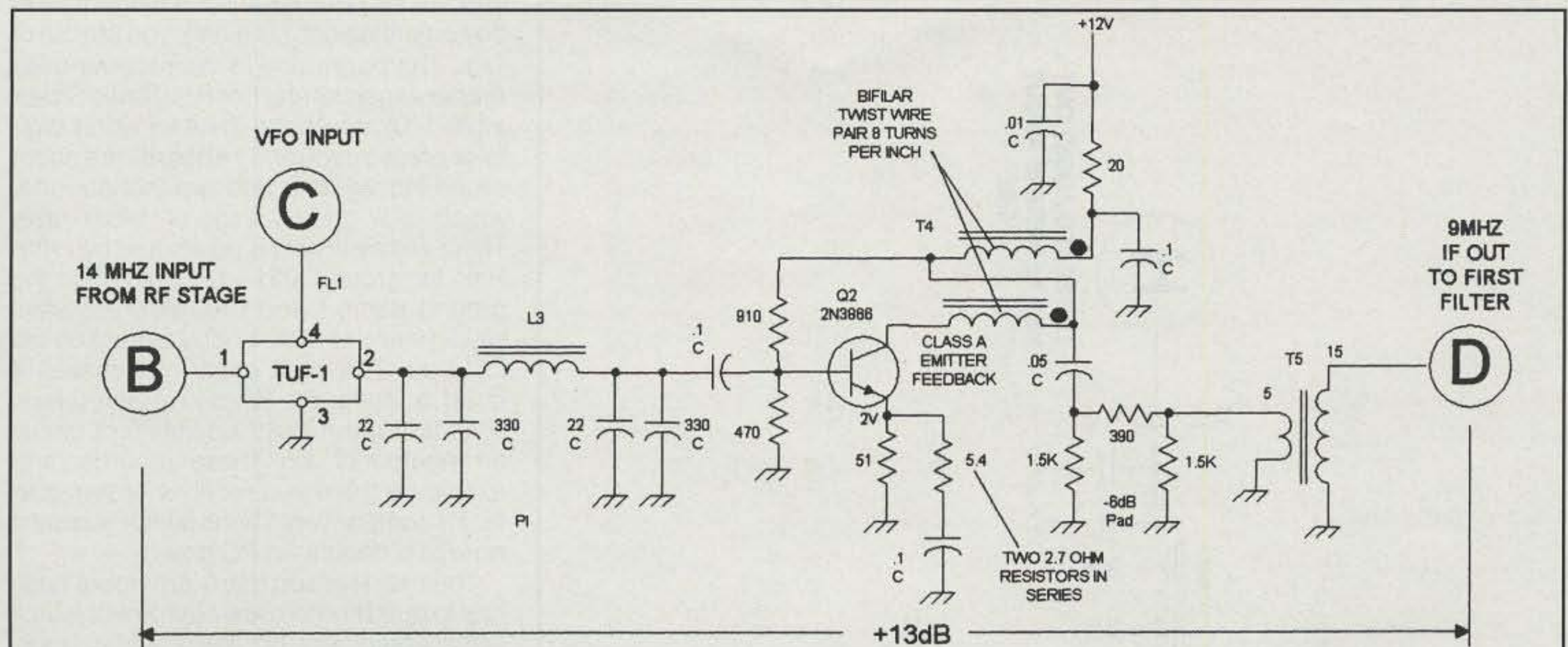
Audio

Fig. 6 shows the audio system design. A low-noise high-gain preamp initially pushes the detected audio up before filtering. Audio filtering begins with two 300 Hz to 3 kHz band-pass filters in series (U2 and U3). The filtered audio then enters a very narrow 300 Hz active filter centered at 800 Hz (U4). The low-noise preamp input (Q11, 12, and 13) matches the preceding DBM detector (FL4 in fig. 3(C)). Only Q12 and Q13 actually amplify the signal; Q11 is a de-ripler that smoothes the +12V DC. The audio band-pass filters

(U2 and U3) are inexpensive, low noise, unity gain, active, thick-film circuits. Each assembly has a 30 dB/octave roll-off. They combine for ultra-quiet no-station listening.

A front-panel switch selects between either the 2.7 kHz or 300 Hz audio. This 300 Hz band-pass is extremely sharp, and tuning in this filter mode is difficult because you can easily pass through a station between key strokes. The 2.7 kHz filter width is ideal for most CW contacts because it's so quiet. Only when there is a pile-up of overlapping stations does the sharp 300 Hz filter become useful. It has an 800 Hz center to match a multi-mode decoder sensing frequency; however, the RC part tolerances will move the filter center around about 5%. The BFO frequency needs to match this 300 Hz filter center.⁵ If the BFO frequency and 300 Hz filter centers are different, the beat signal may move out of the filter band-pass.

The thick-film 2.7 kHz band-pass filters (U2 and U3) are available through Digi-Key.⁶ These filters are ideal for CW but are not suitable for SSB applications.⁷



- NOTES**
1. Except as indicated, decimal values of capacitance are in microfarads (μF), others are in picofarads (pF);
 2. Resistances are in ohms;
k=1,000, M=1,000,000;
Resistors are 1/4 watt, 5% tolerance Carbon or Film Composition
 3. See tables 1 & 2 for transformer and coil data.
 4. Mount the IF section in a separate aluminum box.
 5. The TUF-1 DBM is available from Oak Hills Research.

Fig. 3(A)– IF section schematic diagram, post mixer amplifier.

The interstage and frequency setting capacitors (designated MF) in both filters are stable non-polarized metal-film units. These capacitors are also available through Digi-Key.

AGC

The single IC AGC system in fig. 7 has three parts: an adjustable high-gain pre-

amp, (U6-A); an absolute-value circuit (U6-D and C); and a buffer-S-meter amplifier (U6-B). The part count is low, and its performance is excellent.

The absolute-value circuit has a very smooth AGC action not found in some op-amp designs. If you initially build the circuit⁸ less the 1 μF timing capacitor, you can see the full wave rectified signal across the 560K resistor with an oscillo-

scope. This is a simple way to prove to yourself the absolute-value circuit functions okay before putting it to work.

Construction

I find that PC boards offer few advantages in one-of-a-kind QRP projects. Fixed PC board designs limit you to one basic circuit arrangement where you can change

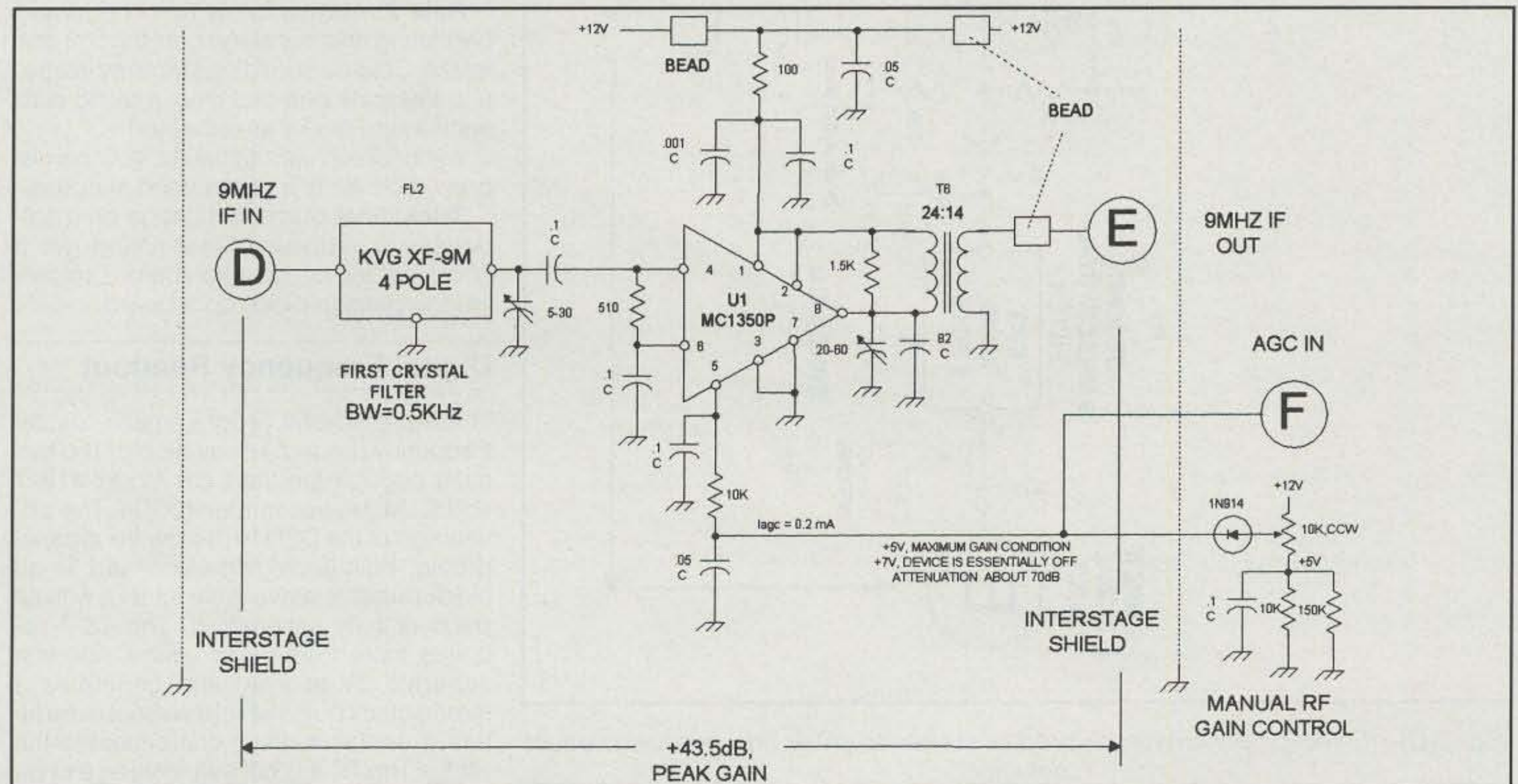
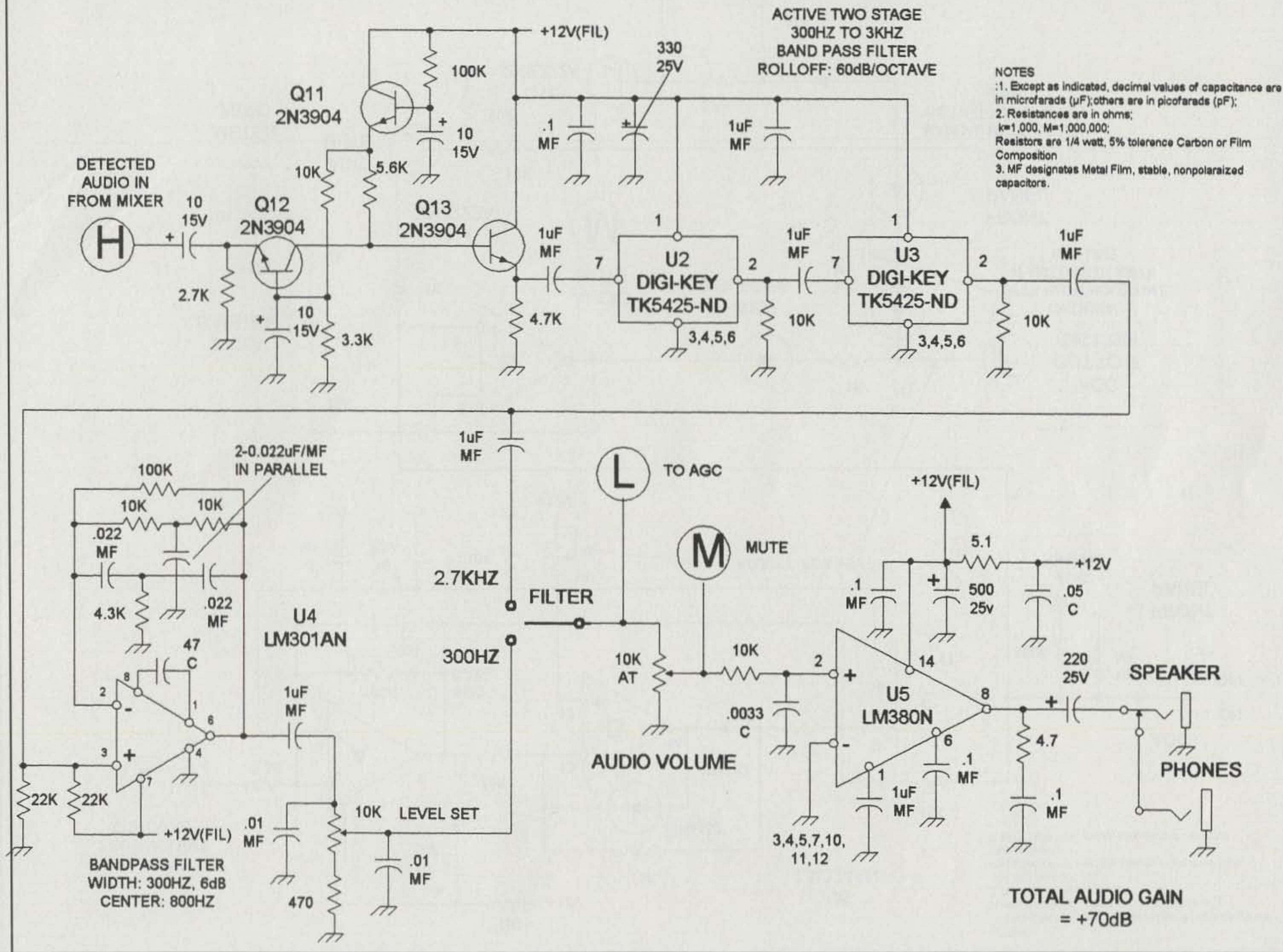


Fig. 3(B)– IF section schematic, high-gain AGC-controlled amplifier.

Fig. 6—Schematic of audio system.



NOTES
 :1. Except as indicated, decimal values of capacitance are in microfarads (μ F), others are in picofarads (pF);
 2. Resistances are in ohms;
 k=1,000, M=1,000,000;
 Resistors are 1/4 watt, 5% tolerance Carbon or Film Composition
 3. MF = Metal Film, stable, nonpolarized Capacitor.

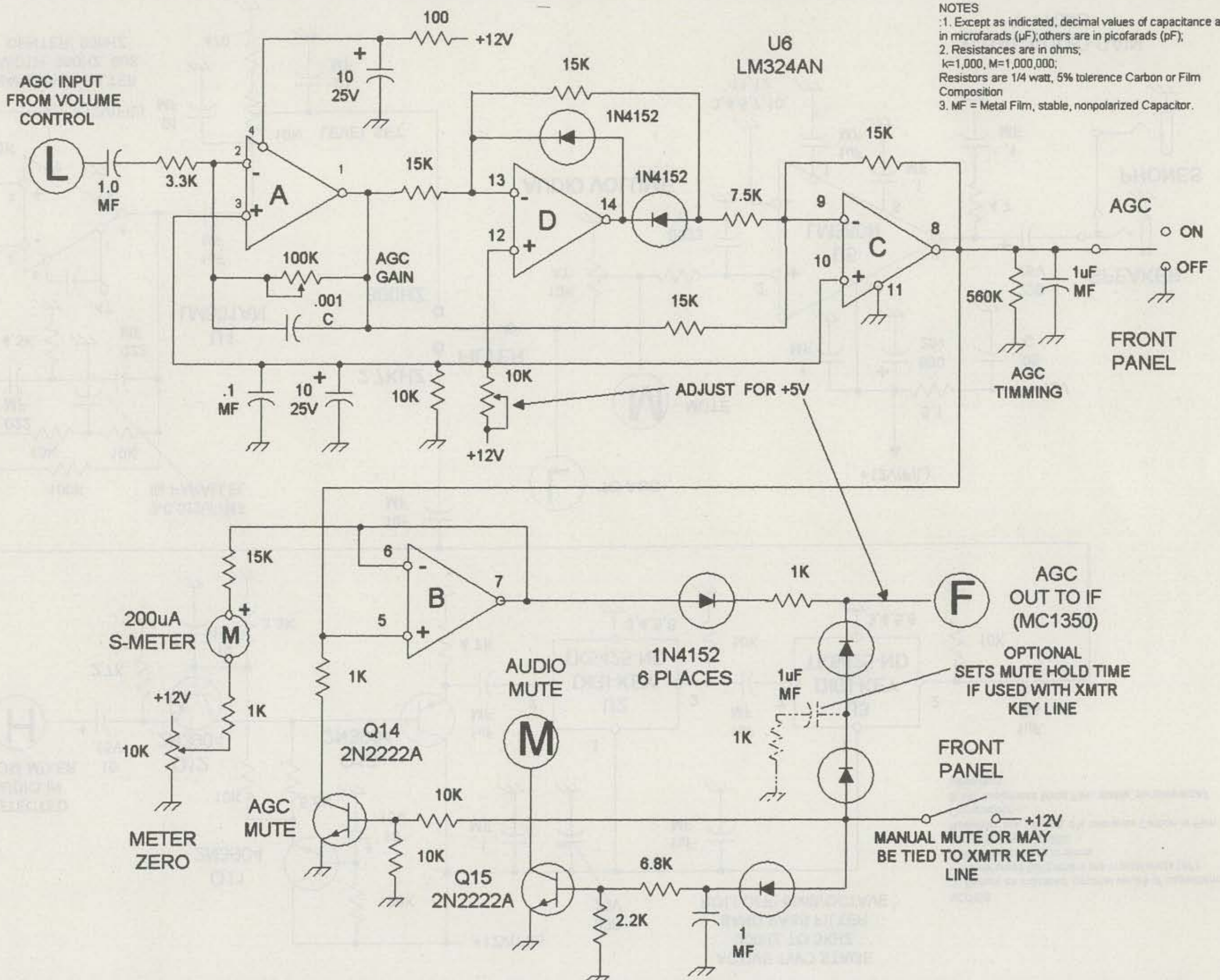


Fig. 7—Schematic of AGC system.

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On the air the handheld performs quite well on receive with good audio sound. On transmit some reports indicate that the audio is "a little hot," meaning that if you speak too close to the mic, it is possible to modulate.

The DJ-G1 comes with a wall charger and a 4 1/2 inch long flexible helical whip antenna. The battery is recharged when its contacts touch pins pointing up from the bottom of the charger stand. Normally, I am cautious about exposed terminals because of the safety factor. However, the terminals on the handheld's battery are recessed in the plastic, thereby reducing the possibility of accidental contact.

Why is this important? Nickel-cadmium batteries are low in internal resistance, which makes them high-current producing sources of electricity. They will deliver this high current for a sustained period. What happens if a nickel-cadmium battery is shorted? The item shorting it will become extremely hot, causing a burn to the touch or possibly igniting a combustible. Have you ever carried a spare battery in your pocket with some change? Have you wondered why the battery and/or your change became warm or even hot? Well, now you know.

Because of the recessed design of the battery terminals on this model, it is not likely that the terminals will come in direct contact with a conductor.

With the standard battery the handheld runs 1.5 watts on high power, 1 watt on mid power, and 0.2 watts on low power. From a car battery the handheld can run up to 5 watts. When in the car, however, I prefer to use the radio with the cigarette-lighter power adapter (which supplies 13.8 volts to the radio) because of the higher power (5 watts) capability with the higher voltage. Other accessories include larger batteries, speaker mics, headsets, and soft carrying cases.

The receiver has a battery saver mode and an auto power off mode. The battery-saver mode shuts off the receiver for a few milliseconds and the auto power off mode shuts off the handheld after 30 minutes. Just prior to shut off the radio plays a short jingle as a way of alerting you that the radio is about to shut down. To restore the radio to its normal operation, you must turn it off and back on again.

As mentioned above, this little handheld has a lot packed into it. I have had a lot of fun with it and enjoyed the many versatile features of the radio. I think that you will too.

Suggested retail price for the DJ-G1 is \$409.00. It is distributed through Alinco Electronics Inc., 438 Amapola Ave. #130, Torrance, CA 90501 (310-618-8616). ■

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SDP-600

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SDP-600 Personal Autopatch, fully wired.....\$249.95 SDPA 12 volt power supply unit\$11.95

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Spider™ Family of Multi-Band Antennas

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ORIGINAL NO HASSLE, MULTIPLE
BAND ANTENNA

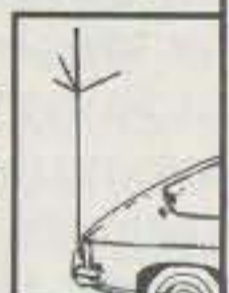
Four amateur bands (10, 15, 20, and 40 meters) at your command without having to change resonators or retune — just band switch your rig. Also available are the 75, 12, 17 and 30 meter bands. Needs no antenna tuner. Custom made with highest quality workmanship and materials.

Wherever you roam, on Land or Sea . . . or even at Home



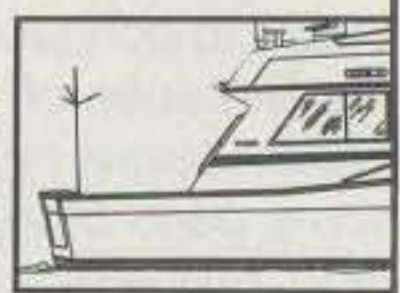
On Land

Suitable for use on any motor vehicle from a compact automobile to a motor home or trailer. Work four bands without stopping to change resonators.



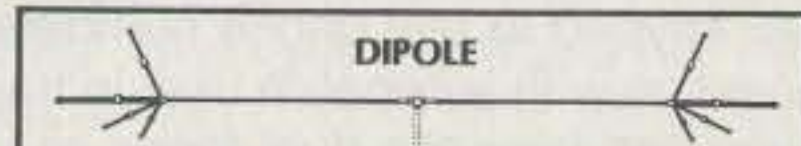
Or Sea

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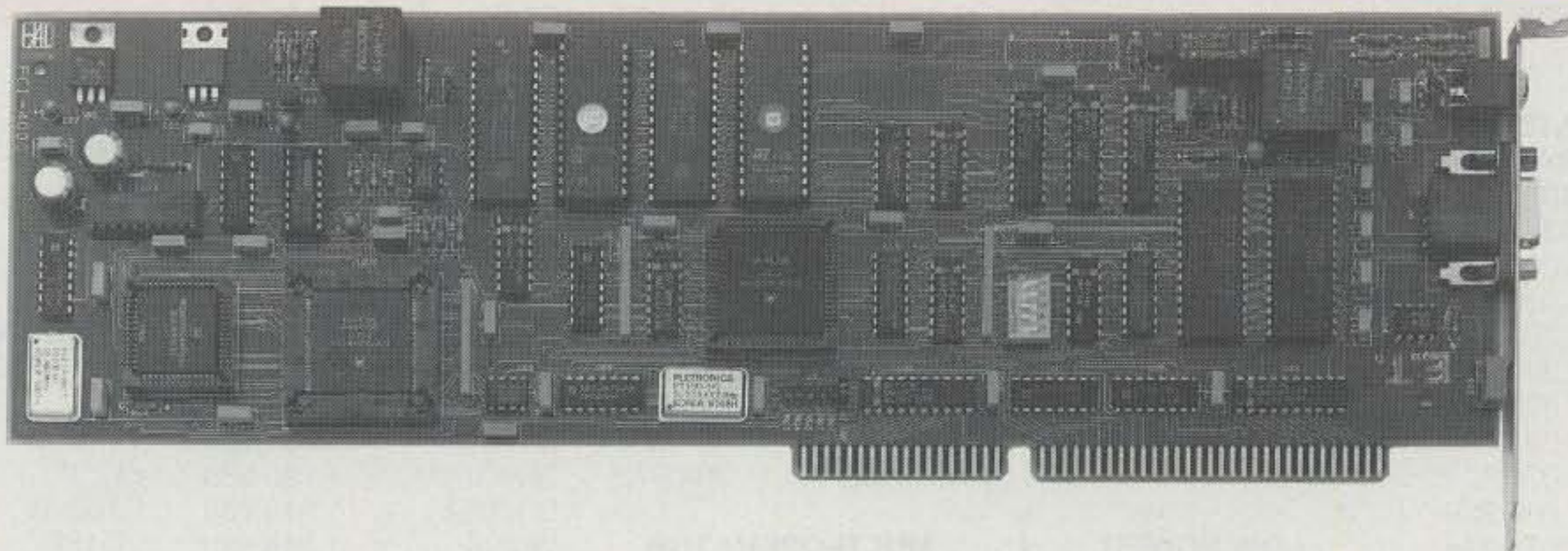
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1994 CQ WPX SSB Contest High-Claimed Scores

The following are early-bird high-claimed scores. These are raw scores subject to verification.

UNITED STATES SINGLE OPERATOR ALL BAND

KF3P	6,334,790
WN4KKN/6	6,008,112
K3ZO	5,020,766
K5ZD	4,700,124
AA2GQ	3,294,480
KF2O	2,373,792
KE9I	2,324,884
W6TKF	2,036,445
KA4RRU	2,036,259
KI6CG	1,978,344
WE6G/1	1,663,155
WA6BXH	1,645,569
K4VUD	1,552,666
KA0ZFX	1,410,701
W3BGN	1,357,945
AE6Y	1,345,520
KC6CEX	1,337,850
KB3TS	1,075,804
AB4RU	996,480
AJ9C	969,680

28 MHz

KE5FI	297,964
N5NMY	207,577
N9NUN/T	18,954

21 MHz

KC1XX	2,951,454
N8II	2,057,224
KZ5D	2,052,427
WD6GTP/4	1,491,336
KF8UM	890,812
WB6MZQ	462,208
K6XO/7	432,796
AC6V	408,157
W7FP	295,260
WA4QMQ	264,020

14 MHz

KK9A	2,830,840
KS3F	2,504,656
N3HBX	1,619,118
WM2C	1,570,628
AC4NJ	1,535,255
K9ZO	1,411,875
KM6YX	570,051
K1KJT	557,175
AD1S/5	475,042
K9ES	355,856

7 MHz

N6RO	1,339,066
KC7EM	1,317,876
WU3V/5	1,196,296
KS9K	810,690
W6MWW	12,100
K3UA	5,214

3.7 MHz

WE3C	1,010,544
KE1Y	955,200
W9LT	535,062
NI4P	515,328
AB6ZV	444,878
KO1F	314,552
KV7S	178,088
KQ4GC	65,340
NT7Y	64,380
K2ONP	23,958

1.8 MHz

K1ZM	91,936
AA4MM	20,022
K0CS	3,570

LOW POWER ALL BAND

WS1A	1,867,131
ND8L	1,464,096
KQ3V	1,271,205
WD5K	1,071,558
KJ6HO	842,022
AC0W	831,068
KE2ZU	821,219
NZ5O	698,610
N7LOX	664,560
K3MD	517,945
AD4KE	517,194
KI4HN	514,371
AA1EY	485,002
W9IL	417,410
AB4KL	351,897
KJ4KX	332,340
K2QMF	302,232
NG9L	301,716

28 MHz

WB2BZR/3/T	233,874
KB9BGV/T	42,636
N0OST	18,960
KE8NH	15,194
KD4RHT	12,880
N2LDU/T	8,216
W5EIJ	5,382
KD6OPB/N	4,416

21 MHz

N5NMX	556,320
N4MO	450,570
WA6KUI/4	342,286
WZ8T	333,333
WJ7S	209,576
K3WW	165,335
KU6T	125,475

14 MHz

WF1L	818,950
WA2UUK	731,025
AK0A	207,792
KL7NL/W4	121,737
NP4IW/6	67,600

7 MHz

N0BIW	97,944
-------	--------

3.7 MHz

KJ8V	152,100
NO0Y	7,392
WF5E	2,560

ASSISTED

K1YR	3,028,524
WA0PUJ	2,601,300
KY2T	2,553,966
K2WK	2,046,698
KF2ET	1,352,166
KA5W	893,487
KN6M/5	867,220
W2HG	377,010
WJ2W	325,755
WA3WJD	294,972

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NX1H	6,878,193
K5XI	6,795,784
AA6TT	6,083,650
N1AU	5,174,784
W6EEN	4,533,438
KM5X	4,340,882
NC0P	3,586,949
KN6SO	3,334,020
NJ1V	2,923,000
NW5H	2,606,976
K2SIG	2,448,368
KF9PL	2,192,537

MULTI-OPERATOR MULTI-TRANSMITTER

W4MYA	7,293,056
AI0Y/9	5,115,096
AD6E	2,778,888
AB5AE	921,526
W7WHY	838,384
KA5BAT	196,482

QRP/p

WA1LNP	A	1,161,646
WA6IET	A	420,472
WT3W	A	343,023
N1CC/2	A	258,594
NM1Q	A	179,520
WA6FGV	28	19,040
WA7FAS	21	54,622
KA1CZF	14	133,431

DX SINGLE OPERATOR ALL BAND

ZD8Z	18,238,431
P40V	17,366,875
6D2X	10,705,912
VE3EJ	10,651,850
WH6/WR6R	9,819,828
PQ0MM	9,734,663
IQ4A	7,767,240
HH2PK	7,743,450
5B0A	7,710,340
D3C	7,318,298
HC1OT	7,289,351

S59A	6,646,149
5N0MVE	6,254,275
CT5P	6,251,400
II7M	5,373,380
JH5FXP	5,186,880
J31K	4,832,840
F6FGZ	4,595,206
JH7PKU	4,442,672
OM5A	4,373,862

28 MHz

PP5JD	4,204,158
LU4D	3,665,333
C91J	2,167,128
LU7HLF	1,864,680
TG9GI	1,795,239
LU4MEE	1,548,768
VP2VF	1,344,580
LU3HL	1,339,880
3G4B	1,100,682
LU4OJS	556,200

21 MHz

ZP0Y	11,114,100
LT5H	4,781,760
EA8AFJ	4,015,017
TM2V	3,565,230
IO4LEC	2,908,464
S53ZO	2,620,320
S59L	2,413,616
9A5Y	2,337,364
VE7SZ	2,174,872
TM0K	2,103,620

14 MHz

EA8AH	8,239,000
IU9S	5,736,483
S50A	4,865,545
VX7A	4,540,788
VE3RM	3,600,175
9A7A	3,420,780
S53M	3,242,200
G3NLY	3,049,311
OH8LQ	2,762,946
ED8BWW	2,717,544

7 MHz

CT3BX	5,194,944
F2EE	3,364,050
LR1I	2,930,006
OH1EH/OH0	2,878,036
YV5MRR	2,727,450
FM5DN	2,358,070
S50E	2,292,906
VK3EW	2,022,804
CT3BD	2,001,130
9A3XV	1,527,246

3.7 MHz

EA8/OH1MA	2,699,200
VE7CC	1,567,120
GW8GT	1,500,924
N6VI/KH6	1,016,652
S59KW	815,626
S51NA	726,604
4N1A	724,172

YT0T	722,190
S54DL	638,664
LZ6R	619,512

1.8 MHz

IO3MAU	247,904
OM3CQD	133,172
F6AML	122,748
T97T	106,652
YV1DRK	19,392

LOW POWER ALL BAND

LT1N	4,112,703
YV4DSB	3,462,696
EL2PP	3,212,982
EA8BGY	2,459,889
VO1SF	2,074,730
LU7FEU	1,995,520
NP2I	1,918,080
ZS6SA	1,787,159
EA3BKI	1,666,500
TE5T	1,661,936
ON5GQ	1,595,054
5U7Y	1,515,972
CJ6V	1,496,153
UR5QMA	1,358,721
S50R	1,294,512
CE2EZE	1,265,103
VD2SPY	1,252,240
KP2BH	1,218,014

28 MHz

CX7BF	4,468,140
TI2KSR	2,551,077
LU8HSO	1,579,578
CX8AT	1,432,219
5Z4FO	1,269,000

21 MHz

ZF1CQ	5,113,840
IB4M	3,314,675
EF3CIL	1,645,020
JI2UNR	1,268,813
UA4LCQ	901,842
KH6GMP	896,782
XE2AF	853,006
EA7HF	724,306
YC3SPS	671,160
IS0NHT	602,910

14 MHz

US4LAD	963,900
VA3JK	928,800
CR8BWW	834,418
VA3WTO	669,940
EA9KB	401,617
VE6BMX	350,532
S57U	289,068
VE3KUK	266,220
CS1D	240,846
DL7UBA	178,318

7 MHz

9A2WV	1,157,970
S51QZ	205,320

EA3GJH 178,200
 YO3JF 123,840
 OK1AXV 111,748

3.7 MHz

UT7DX 515,200
 S50C 514,080
 T91ENS 382,432
 UR5DX 275,070
 ED2BFM 203,775

1.8 MHz

OZ3SK 92,400

ASSISTED

DL3DKV 1,820,406
 S56A 1,293,352
 ON6AA 1,210,827
 JH4NMT 1,078,184
 VA3VET 503,355
 DF1IC 236,520
 DL5IC 186,979
 GW4BLE 151,425
 DJ3WE 72,275
 IK3SCB 49,560

MULTI-OPERATOR SINGLE TRANSMITTER

ZX0F 28,361,636
 EA8BR 15,404,150
 PT7CB 14,754,904
 CT9M 14,697,306
 C49C 12,421,388
 TM1C 12,150,720
 VX2A 9,365,125
 LT1V 8,982,636
 LZ5W 7,819,958
 VD2ZP 7,484,935
 ED3TT 7,192,224
 L20A 7,008,185
 CT8T 6,767,562
 C4YY 6,470,136
 IO5A 6,166,944
 OL3A 6,047,215
 9I2M 6,000,736
 JH5ZJS 5,897,461
 JJ3YBB 5,867,070
 CK7K 5,687,958

MULTI-OPERATOR MULTI-TRANSMITTER

VP2EC 40,241,500
 9A1A 28,747,568
 LU4FM 25,539,360
 OT4A 21,754,188
 HG73DX 19,378,385
 VS6WO 16,608,340
 ZP94B 11,145,160
 ZW4Y 10,911,717
 CZ7Z 10,816,341
 JA1YXP 5,333,020

QRP/p

HC8A A 7,595,000
 RV9C A 1,211,675
 F1BEG A 639,808
 EA3FHT A 498,420
 SP3SLA A 452,540
 LW1DIP 28 77,550
 UY3CC 21 149,388
 IK5RUN 14 42,444
 SK0PR 7 35,076
 JA2DLM 7 22,776
 VE5RMO 3.7 24,300

AMIDON, INC. W2FMI BALUNS AND UNUNS TRANSFORMERS

HIGH POWER (2Kw - 10Kw) BALUN TO MATCH 50Ω COAXIAL TO:

			PART NO.	PRICE
12.5Ω	Balanced	Direct Connect Yagi Beam	4:1-HB50	\$39.95
50Ω	Balanced	1/2λ Dipole or Yagi Beam	1:1-HBH50	\$39.95
75Ω	Balanced	1/2λ Dipole at 0.22λ above Ground	1.5:1-HVB75	\$59.95
100Ω	Balanced	1/2λ Dipole at 0.22λ, 0.33λ & Quad Loop	2:1-HB100	\$59.95
200Ω	Balanced	Folded Dipole, Log Periodic Beam	4:1-HBM200	\$39.95
200Ω	Balanced & Unbalanced	Off Center Fed Antennas	4:1-HB/U200	\$59.95
200Ω	Balanced	10Kw Antenna Tuners & G5RV Log Periodic Beam	4:1-HBHT200	\$59.95
300Ω	Balanced	300Ω Ribbon Folded Dipole	6:1-HB300	\$59.95
300Ω	Balanced & Unbalanced	Off Center Fed Antennas	6:1-HB/U300	\$89.95
450Ω	Balanced	Twin Lead/Ladder Line	9:1-HB450	\$89.95
600Ω	Balanced	Rhombic & V-Beam Antenna	12:1-HB600	\$199.95

UNUN: for ground fed antennas, verticals, slopers, inverted L

PART NO.	IMPEDANCE MATCH	PRICE
2:1-HDU50 (2 Ratios) <i>(connecting 50Ω coaxial to junction of two 50Ω parallel coaxial)</i>	50:22Ω 50:25Ω	\$49.95
2:1-HDU100 (2 Ratios)	112.5:50Ω 100:50Ω	\$49.95
1.5:1-HU75 <i>(connecting 50Ω coaxial to 75Ω coaxial)</i>	75:50Ω	\$49.95
4:1-HCU50	50:12.5Ω	\$49.95
9:1-HU50	50:5.56Ω	\$49.95
1.78:1-HDU50 (2 Ratios)	50:28Ω 50:12.5Ω	\$49.95
1.56:1-HDU50 (2 Ratios)	50:32Ω 50:18Ω	\$49.95
1.78:1-HMMU50 MULTIMATCH UNUN <i>(8 different ratios; can be used for Beverage Antenna)</i>		\$69.95

Unconditional money back guarantee for 1 year on completed unit.

All designs, when used according to instructions, are guaranteed to give outstanding performances. Comparisons with other matching transformers are invited.

NOTE: OTHER BALUN & UNUN TRANSFORMERS AVAILABLE. PLEASE CALL OR WRITE FOR ADDITIONAL DETAIL.

BOOKS: 1) "Transmission Line Transformers Design Handbooks", by Jerry Sevick, W2FMI, Amidon Associates, Inc., 1991. \$8.00 ea.
 2) "Transmission Line Transformers", by Jerry Sevick, W2FMI, APRIL, 1990. \$20.00 ea.

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- Up to 10Kw
- Current & Voltage Type



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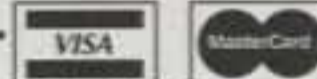
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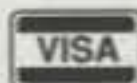
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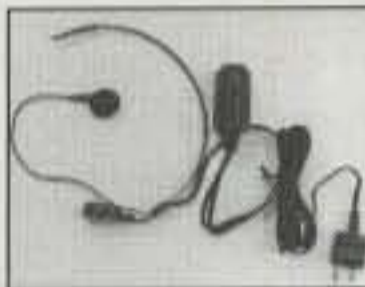


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CIRCLE 111 ON READER SERVICE CARD

Eartalk— \$39.00

Microphone is built into earphone
 PTT switch activated
 CT-221 suitable for ICOM, Yaesu, Alinco, Standard, and Radio Shack.
 CT-221K for Kenwood only.



Throat Mic — \$55.00

Uses vocal cord vibrations
 Good for high noise environment.
 X-06 suitable for ICOM, Yaesu, Alinco, Standard, and Radio Shack.
 X-06K for Kenwood only.

Iroda Soldering Iron Kit — \$40.00

Cordless, portable
 Butane gas powered
 Used as a soldering iron, blow torch, heat blower or hot knife
 60 min. of continuous use
 Adjustable tip temperatures from 400 to 1,300° C
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Universal battery charger that conditions and fast charges all types of battery packs. Eliminate "memory effect" and uses — delta V charging to maximize capacity. Now available for ICOM W2A/2SAT/P2AT, Yaesu FT-530/411, Kenwood TH-7B/2B, Alinco DJ-580T and Standard C-158A/528A



Speaker mic w/earpiece Yaesu MH19A2B

Comes with a separate earpiece and small lapel microphone with PTT switch on the side. \$28.00

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Fits ICOM, Yaesu, Standard, Alinco and Radio Shack transceivers. Comes with a handy rotating clip, an earphone jack and LED TX light. \$19.95

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CIRCLE 65 ON READER SERVICE CARD

K6BSU presents an intriguing and enjoyable project for the workbench. It will come in handy when you want to gauge code speed, both yours and the other guy's.

Build Your Own Morse Meter

BY FLOYD E. CARTER*, K6BSU

The Morse Meter is a unique station accessory for the CW operator. It will automatically calculate Morse code speed in words per minute and will display the result on a digital display. It will not only calculate your own transmitting speed, but will display the Morse speed of your QSO station by using the audio output of your station receiver.

These days some amateurs use their personal computer to send and receive Morse code on the amateur radio bands. This high-tech approach to a delightfully primitive and historic form of communication is in danger of transforming it into one in which neither party will be able to decipher Morse code at any speed without a computer, and with no awareness of the nature of their on-the-air signal. Happily, the majority of amateur CW operators still use old-fashioned manual keys, including mechanical bugs and electronic keyers. These keys universally feature uncalibrated speed dials or settings.

What The Morse Meter Does and How It Works

The Morse Meter is based on the principle that the number of Morse dots generated during an interval of 2.4 seconds is numerically equal to code speed in words per minute. Similarly, the number of Morse dashes generated during an interval of 4.8 seconds also equals wpm

**2029 Crist Dr., Los Altos, CA 94024*

(see side bar). After calibration, the Morse Meter will indicate with an accuracy of ± 1 wpm, which is the characteristic accuracy of counters with a fixed gate time base.

Circuit Description

The accepted standard for the key circuit of modern solid-state transmitters is that the transmitter provides a current-limited positive voltage at the key from about 2.5 to 6 VDC. The external key, bug, or electronic keyer closes the key line to ground or circuit common for transmission. The key-down current through the key is on the order of a few milliamperes. The Morse Meter key line input also depends on the key or keyer to sink an additional $\frac{1}{2}$ ma. This means that the Morse Meter and the station transmitter may be connected to the key at all times without affecting normal station operation.

A separate audio input jack to the Morse Meter permits off-the-air measurement of Morse speed. Audio from the station receiver is rectified and amplified. The signal at this point activates the Morse speed counter in the same way as a local key or keyer. Switch S1 permits the audio to be disconnected so that the Morse Meter will not try to measure everything coming out of the receiver!

U1 is a D-type Flip Flop the output of which goes positive on the leading edge of the first dot or dash, and then remains in that state until reset for another measurement. The output of U1 triggers a

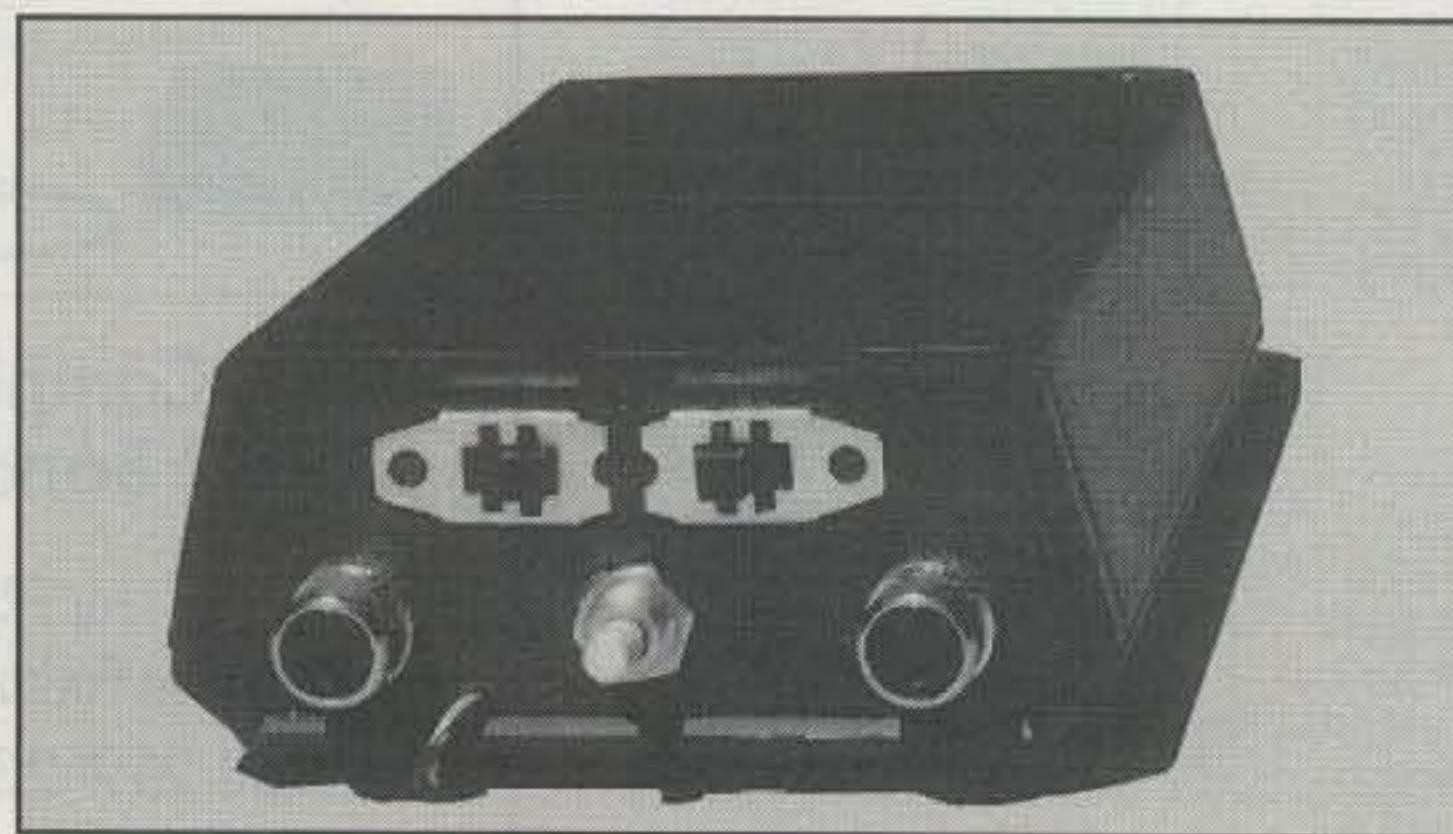
Monostable Multivibrator, U3, only once per measurement. The output of U3 is either 2.4 seconds or 4.8 seconds, depending on the position of switch S2. The output of U3 is the time "gate" which allows Morse dots or dashes to be gated through the AND gate U2a and U2b. Transistor Q2 provides the interface to the "count" input of the modular counter. The meter advances one count on the leading edge of a Morse dot or a dash, which causes Q2 to turn on, effectively shorting the counter white wire to its black wire. Since the Morse Meter only looks for "key-down" transitions, weighting, or the ratio of key-down to key-up, does not affect the measurement. After a wpm measurement the Morse Meter displays the last count until reset.

The heart of the Morse Meter is the totalizing counter module, M1. This is a self-contained and self-powered inexpensive six-digit counter made by Red Lion Controls (see parts list). It is supplied with a replaceable internal lithium battery which will run the counter and its LCD display for about 10 years. The counter is available from Digi-Key Corp. mail order for \$31 including its internal battery.

The rest of the circuit may be powered from any convenient source from 5 V to 12 VDC. The standby current drain is less than 3 ma at 5V, so a 9 V transistor-radio battery will provide a long lifetime. U4 is a low-power 5 V monolithic voltage regulator which will permit a wide range of input power supply voltages to be used.



The Morse Meter is built in a small project box. Sources for components are given in the parts list.



Rear view of the Morse Meter. The slide switches S1 and S2, the Reset button, and the two input jacks are mounted on the back panel.

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MODERN, MULTI-BAND ANTENNA SYSTEMS

MOBILE ANTENNA PRODUCTS



Modern, high-performance stations use COMET Antennas, Duplexers, Triplexers and Accessories! COMET products are designed to provide an exceptional level of signal quality and coverage area. Whether operating mobile or from your base station, COMET products make you sound good. No other product line has the selection, convenience, quality and performance!

DUAL-BAND MOBILE ANTENNAS

FL-67S Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 4.5dBi 1/2 wave, 446MHz 7.2dBi 5/8 wave x 3
VSWR: 1.5:1 or less
Max Power: 150 watts
Length: 4' 11"
Connector: Gold Plated PL-259

FL-62S Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 3.5dBi 1/2 wave, 446MHz 6.0dBi 5/8 wave x 2
VSWR: 1.5:1 or less
Max Power: 150 watts
Length: 3' 5"
Connector: Gold Plated PL-259

NEW! **SB-7/SB-7NMO** Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 4.5dBi 5/8 wave center-loaded, 446MHz 7.2dBi 5/8 wave x 3
VSWR: 1.5:1 or less
Max Power: 70W FM
Length: 4' 7"
Connector: PL-259 or NMO style

NEW! **SB-5/SB-5NMO** Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 3.0dBi 1/2 wave, 446MHz 5.5dBi 5/8 wave x 2
VSWR: 1.5:1 or less
Max Power: 120W FM
Length: 38"
Connector: PL-259 or NMO style

NEW! **SB-2/SB-2NMO** Dual-Band 146/446MHz
Gain & Wave: 146MHz 2.15dBi 1/4 wave, 446MHz 3.8dBi 5/8 wave
VSWR: 1.5:1 or less
Max Power: 60W FM
Length: 18"
Connector: PL-259 or NMO style

B-10/B-10NMO Dual-Band 146/446MHz, Cellular Look-a-like
Gain & Wave: 146MHz 0dBi 1/4 wave, 446MHz 2.15dBi 1/2 wave
VSWR: 1.5:1 or less
Max Power: 50W FM
Length: 12"
Connector: PL-259 or NMO style

B-20/B-20NMO Dual-Band 146/446MHz, Cellular Appearance, No Ground Plane Required
Gain & Wave: 146MHz 2.15dBi 1/2 wave, 446MHz 5.0dBi 5/8 wave x 2
VSWR: 1.5:1 or less
Max Power: 50 watts
Length: 30"
Connector: PL-259 or NMO style

NEW! **SB-25/SB-25NMO** Mono-Band 146MHz w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 4.1dBi 5/8 wave center loaded
VSWR: 1.5:1 or less
Max Power: 100W FM
Length: 4' 9"
Connector: PL-259 or NMO style

COMET products are available from most major dealers. For customer service, or a complete catalog, please call us at 800/962-2611. We're confident COMET products and accessories will enable you to enjoy Amateur Radio to its fullest!

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 Light weight, extremely small: 1"x2" with collar pocket clip.
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TRI-BAND MOBILE ANTENNAS

CX-224/224NMO Tri-Band 146/220/446MHz, w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 2.15dBi 1/2 wave, 220MHz 3.6dBi 5/8 wave, 446MHz 6.0dBi 5/8 wave x 2
VSWR: 1.5:1 or less
Max Power: 100 watts
Length: 3'
Connector: PL-259 or NMO style

FJ-15S Tri-Band 52/146/446MHz w/Fold-Over
Gain & Wave: 52MHz 2.15dBi 1/4 wave, 146MHz 4.5dBi 5/8 wave, 446MHz 7.2dBi 5/8 wave x 3
VSWR: 1.5:1 or less
Max Power: 120 W FM
Length: 4' 10"
Connector: PL-259

HF MOBILE AND HT ANTENNAS

HA-4S Quad-Band HF 40/* (20)/15/12/10 Meters w/Fold-Over
Wave: 1/4 wave
VSWR: 2:1 or less
Weight: 1 lb. 14 oz.
Length: 4' 4"
Max Power: 120W SSB (200W SSB 28MHz)
Connector: PL-259

SH-55 Super Flexible 146/446MHz HT Antenna
Gain & Wave: 146MHz 1.5dBi 1/4 wave, 446MHz 3.2dBi 5/8 wave x 2
Max Power: 10 watts
Length: 15.5"
Connector: BNC

NEW! **CH-722SA** High Gain HT Antenna
Gain & Wave: 146MHz 3.0dBi 1/2 wave, 446MHz 5.5dBi 5/8 wave x 2
Max Power: 50 watts
Length: 35', 2 sections, 18" each
Connector: BNC

CH-32 Miracle Baby 146/446MHz HT Antenna
Gain & Wave: 0dB 1/4 wave
Max Power: 10 watts
Length: 1.75"
Connector: BNC

DUPLEXERS AND MOBILE MOUNTS

CF-4106K, I, J, 146/446MHz
Band Pass, Ins Loss, Max Pwr. 1.3-150MHz, 0.1dB, 800w PEP
 400-540MHz, 0.2dB, 500w PEP
Isolation: 60dB
CONNECTORS: 4160K 4160I 4160J
 Output: SO-239 SO-239 SO-239
 Low In: PL-259 PL-259 SO-239
 High In: PL-259 N-Male SO-239

RS-21 Trunk, hatchback, rear door (van, blazer, etc.) mount. Adjustable to virtually ANY angle. Rubber-coated base protects vehicle paint.

NEW! **RS-820** Heavy-Duty, Low Profile Trunk Lip or Hatch Back Mount. Rubber-coated base protects vehicle paint.

WS-1M Multi-Adjustable Window Clip Mount. 11.5 feet of high quality coax. Gold-plated UHF Conns. for Antennas up to 40" in height.

3D4M Standard Cable Assembly 13.5 feet of low loss coax. Gold plated UHF (PL-259/SO-239) connectors.
3D5M Standard Cable Assembly Same as 3D4M, but 17 feet of coax.

CK-5M Deluxe Cable Assembly 13 feet double shielded very low loss coax + 12" RG-188 teflon coax. Gold plated UHF (PL-259/SO-239) connectors.
CK-5M5 Deluxe Cable Assembly Same as CK-5M, but 17 feet of coax.

NEW!


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- High quality materials - Gold plated RF connectors & solid brass castings, 17/7 PH stainless steel, anti-corodal aluminum, teflon insulators, & even stainless steel hardware.
- Custom VSWR & bandwidth charts - with every model, actual antenna test range results, not theoretical printouts.
- Factory pre-tuned - while fully tunable, they are shipped pre-tuned for North American bands, with custom tuning available.
- Best DC ground potential for maximum static & lightning protection

HP 7000 70cm Mono Band




Type:	UHF 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	440 - 450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	75 Watts
Bandwidth: at VSWR 1.5:1	10MHz
Gain:	3.2 dBd - 5.35 dBi
Connection:	UHF Femal with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 18.5
Weight:	approx: 8.8oz.

HP 7000 C 70cm Mono Band



Type:	UHF 2 x 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	440-450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	75 Watts
Bandwidth: at VSWR 1.5:1	10MHz
Gain:	6 dBd - 8.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 34.6 inch.
Weight:	approx. 10.9 oz.


HP 2070 H 2m/70cm Dual Band



Type:	VHF 1/2 Lambda UHF 2 x 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	VHF 144 - 148MHz UHF 440 - 450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	VHF 150 Watts, UHF 100 Watts
Bandwidth: at VSWR 1.5:1	VHF 4 MHz UHF 6 MHz
Gain:	VHF 3 dBd - 5.15 dBi UHF 6 dBd - 8.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) insulator
Length:	approx. 41.3 inch.
Weight:	approx. 11.6 oz.


These super High Performance antennas, as well as the complete SIRIO antenna line for Amateur, Commercial, Marine and Cellular are now available. Contact your favorite dealer or call EDCO for the dealer nearest you. SIRIO offers High performance antennas at unbeatable prices!

HP 2070 2M/70CM DUAL BAND




Type:	VHF 1/4 Lambda UHF 3/4 Lambda
Impedence:	50 Ohms
Frequency Range:	VHF 144-148MHz UHF 440-450MHz
Polarization:	Vertical
VSWR:	at freq. res.<1.2:1
Max. Power:	VHF 75 Watts, UHF 50 Watts
Bandwidth:at VSWR 1.5:1	VHF/UHF 10MHz
Gain:	VHF 0 dBd - 2.15 dBi UHF 3.8 dBd - 5.95 dBi
Connection:	UHF Female with gold plates center conductor and PTFE (TEFLON) insulator
Length:	approx. 18.5 inch.
Weight:	approx. 8.8 oz.

HP 200 2m Mono Band



Type:	VHF 3/4 Lambda
Impedence:	50 OHms
Frequency Range:	144 - 148MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	150 Watts
Bandwidth: at VSWR 1.5:1	4MHz
Gain:	4 dBd - 6.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 60.6 inch.
Weight:	approx. 11.8 oz.

HP 200 C 2m Mono Band



Type:	VHF 3/4 Lambda
Impedence:	50 Ohms
Frequency Range:	144 - 148 MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	150 Watts
Bandwith: at VSWR 1.5:1	4MHz
Gain:	4 dBd - 6.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 60.6 inch
Weght:	approx. 11.8 oz.



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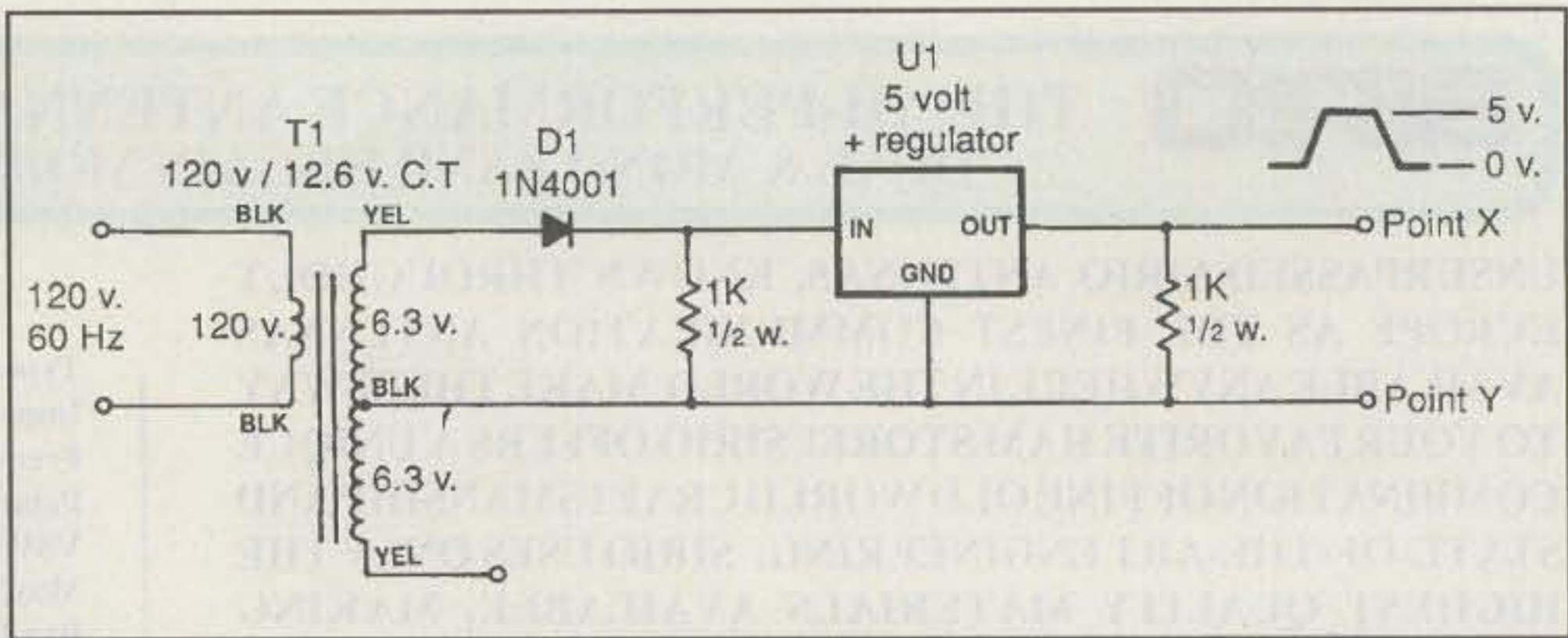


Fig. 2—A simple calibrator that can be used for the Morse Meter.

PARTS LIST FOR CALIBRATOR (fig. 2)

- T1—Small power transformer, 120/12.6 VAC C.T. (R.S. #273-1365a)
- D1—1N4001 rectifier diode
- U1—5 V monolithic regulator (R.S. #276-1770)

remainder of the parts are available from Radio Shack.

Calibration

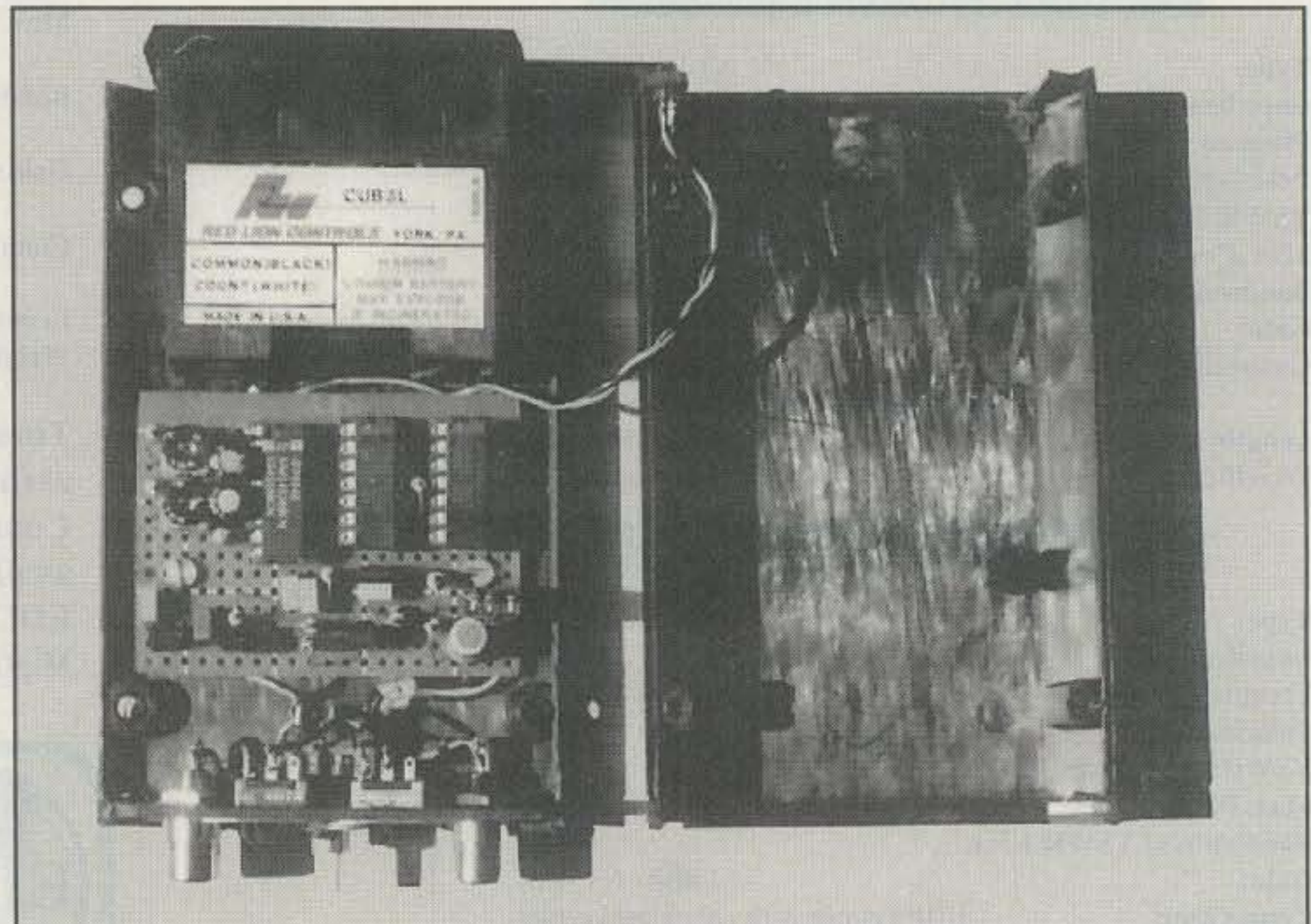
Calibration consists of setting the Monostable Multivibrator, U3, for a time of 4.8 seconds for Morse dashes and/or 2.4 seconds for Morse dots. There are four methods to accomplish this calibration, so choose the method which is most convenient.

Method 1. With the circuit board jumper installed, key the Morse Meter by grounding the key input line. An electronic counter capable of interval measurement is connected to U3 pin 6. The

appropriate trimmer potentiometer, R5 or R6, is adjusted for the desired time interval—4.8 seconds for dashes or 2.4 seconds for dots.

Method 2. Tune in WWV and listen for the 1 second time ticks. Ground the Morse Meter key line exactly on a WWV tick and count the seconds. For Morse dashes set R5 so that the LED indicator goes out just prior to the 5th second WWV tick. With a little practice one can closely estimate 4.8 seconds. After this is set, connect a key to the Morse Meter key line, send a string of dashes, and note the wpm reading on the meter. Then, without changing the setting of the keyer or R5, switch S2 to the "dot" position and send a string of Morse dots. Adjust R6 for the same wpm reading as before on the meter.

Method 3. If you have an oscilloscope with a calibrated time base, set it to trigger on the leading edge of the "gate" signal from U3 pin 6. Activate the Morse Meter by grounding the key line, and set R5 for 4.8 seconds by monitoring the gate signal displayed on the oscilloscope. R6



The Morse Meter shown with the cover removed. The components are assembled on a Radio Shack perf-board with the LED mounted on the box top lid.

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You get MFJ's *automatic* notch filter that searches for and eliminates *multiple* heterodynes.

You also get MFJ's advanced *adaptive noise reduction*. It silences background noise and QRN so much that SSB signals sound like a local FM repeater.

The *automatic* notch and *adaptive* noise reduction can be used with *all* relevant tunable and pre-set filters.

Automatic gain control (AGC) keeps audio level constant during signal fading.

Automatic notch filter

MFJ's *automatic* notch filter searches for and eliminates *multiple* heterodynes. It's *milli-second* fast -- interfering CW and RTTY signals are also eliminated.

Voice signals aren't degraded because the notch is *extremely* narrow.

With up to 50 dB attenuation, you'll copy stations otherwise masked by heterodynes, miss fewer calls and be less exhausted.

Leave the *automatic* notch filter on during a phone contest and you'll never hear unwanted heterodynes of tuner-uppers.

You can *selectively* remove tones. Say, you're on CW and a couple of annoying CW stations appear nearby. You can use the *two* manually *tunable* notch filters -- an MFJ exclusive -- to completely knock them out.

Adaptive noise reduction

Turning on *noise reduction* silences background noise. Noisy SSB, FM, AM, CW and Data signals become readable.

Noise reduction works in all filter modes and on all random noise -- white noise, impulse noise, static, ignition noise, power line noise, hiss and atmospheric noise.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

Reducing random noise reduces fatigue, especially when the band is noisy.

Tunable highpass/lowpass filters

For Voice and Data, nothing beats MFJ's exclusive *tunable* highpass/lowpass FIR linear phase "brick wall" filters.

You can *tune* the lower cutoff frequency 200 to 2200 Hz and the upper cutoff frequency 1400 to 3400 Hz.

Signals just 75 Hz away literally disappear -- they are reduced a *thousand* times, 60 dB!

Unlike other filters, speech clarity is not reduced by envelope distortion caused by unequal time delay.

By adjusting the highpass and lowpass filters you can create *custom* filters for Voice, Data and other modes.

When signals are weak, you can improve copy by removing high and low speech frequencies. They contain little information but are full of noise that reduce readability.

On crowded HF bands, overlapping SSB signals make copying difficult. You can improve copy by slicing off some overlap with razor sharp "brick wall" responses.

You can also highpass filter out hum, pulses, rasp and other irritating low frequency noise.

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in an MFJ *tunable* FIR bandpass filters.

You can *tune* the center frequency from 300 to 3400 Hz. And *vary* the bandwidth from 30 Hz to 2100 Hz -- from super tight CW filters to wide razor-sharp Data filters.

As you narrow the bandwidth, interfering signals drop out, because, just 60 Hz away, they're down by over 50 dB.

You can use *narrower* bandwidths to fight tough QRM because these linear phase filters don't distort signals with unequal time delays.

Even with the narrowest 30 Hz bandwidth,

you'll never have a problem with ringing.

One position gives you *two* tunable filters you can use together on one signal. For example, on RTTY, tune one filter to mark, the other to space and set the bandwidth tight for an incredibly sharp RTTY filter.

15 pre-set filters -- use factory set or program your own

You can select from *fifteen* convenient *pre-set* filters. Use them for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode you can think of.

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Only MFJ gives you the best of both worlds -- *tunable* filters to eliminate nearly any QRM and fast convenient *pre-set* filters customized for any mode.

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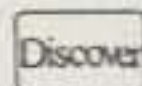
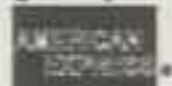
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may be set for 2.4 seconds by the same method, but it is more accurate to establish wpm using dashes, and then switch S2 for dots. Then set R6 to the same wpm reading by sending dots.

Method 4. This method uses a source of semi-square waves at 60 Hz and from 0 to +5V in amplitude. A simple calibration source can be constructed from the diagram of fig. 2. This circuit looks almost like a simple DC power supply, but without the filter capacitor! Connect this calibration source to point X and Y on the Morse Meter, after first removing the circuit board jumper. Set S2 to the dash position, reset the counter, and adjust R5 for a count of 288 on the meter. At 60 Hz there are exactly 288 cycles in 4.8 seconds. Next switch S2 to the dot position and set R6 for a count of 144 on the meter, which equals a gate time of 2.4 seconds. When calibration is complete, you can convert the calibrator into a general-purpose 5 VDC power supply by adding another rectifier diode to make a full-wave circuit and adding an electrolytic capacitor of about 2200 uFd for filtering. Nothing goes to waste!

Modifications

The Morse Meter can also be used as a general-purpose low-frequency digital counter. Change S2 to a three-position switch and add a third resistor network so that the gate time will be 1 second. Then the Morse Meter will count directly in Hz up to the count rate limit of the counter module, which unfortunately is only 100 Hz. This modification will require a TTL or CMOS level input at point X with the jumper removed. The Monostable Multivibrator time interval is equal to $T(\text{seconds}) = R(\text{megohms}) \times C(\text{microFarads})$.

Determining Morse Code Speed

The average English-language word in Morse code is defined as being 50 units in length. A unit is defined as the shortest signal element, equivalent to a "bit" in computer lingo, or a "Baud" in digi-speak. For Morse, a dot consists of one unit key down, followed by one unit key up, totaling two units. A Morse dash consists of three units key down followed by one unit key up, totalling four units. If 50 units are transmitted in exactly one minute, the speed is defined as one word per minute. Linear proportion applies, so when 2×50 units are transmitted in exactly one minute, the speed is 2 wpm, etc.

If 50 units require 1 minute at 1 WPM, each unit = $6/5$ seconds in length.

At 1 wpm a Morse dot takes 2 units/dot \times $6/5$ sec./unit = 2.4 sec./dot. Since the relationship is linear, the number of Morse dots sent in 2.4 seconds will equal that numerical speed in wpm.

Similarly, at 1 wpm a Morse dash takes 4 units/dash \times $6/5$ sec./unit = 4.8 sec./dash. So again, the number of dashes sent in 4.8 seconds is equal to the speed in wpm.

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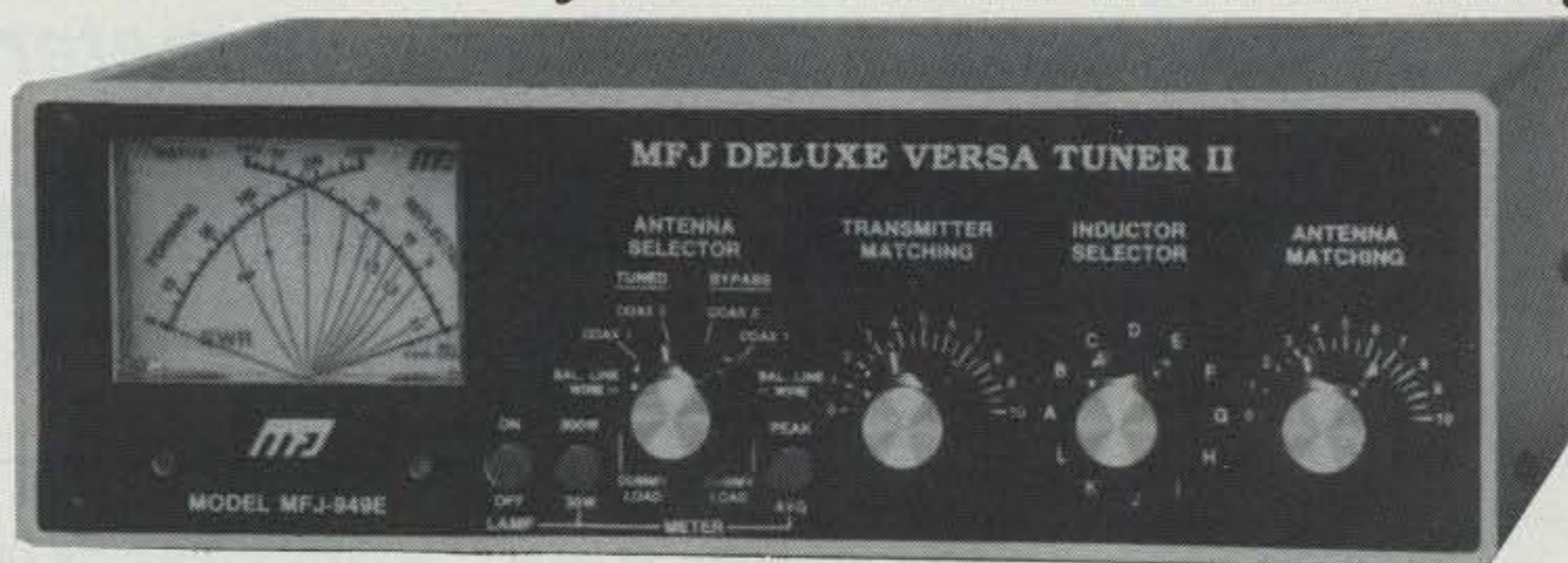
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The MFJ-949E has a *full size* non-inductive 50 ohm dummy load measuring 3/4 inch diameter by 5 inches. It *easily* handles 300 watts of abusive tune-up power.

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

Watchout for cheap midget size dummy loads that changes resistance as it heats up -- marginal ones could burn up your transceiver.

Custom Inductor Switch

The inductor switch is the most likely component to burn up in *any* antenna tuner.

The inductor switch in the MFJ-949E was *custom* designed to withstand the extremely high RF voltages and currents that are developed in your tuner -- it's not a flimsy *plastic* switch made for small signals and wired with *tiny* gauge wire.

Superior Cabinet

Each MFJ-949E cabinet is chemically treated and has a new tough scratch-proof *vinyl* cladding -- not paint that can scratch or chip off. You won't find a tougher, longer lasting finish anywhere.

Detailed logging scales and legends are *permanently* silk screened on a *real* aluminum front panel and back panel -- it's not merely a plastic decal or glued-on paper strip that can peel off.

Superior Materials... Superior Construction

Every MFJ-949E use Teflon® insulating washers, countersunk screws for meter bracket, wing-nut for ground post, fire-retardant epoxy glass PC board (*not* canvas based), heavy .063 inch thick aluminum chassis (*not* flimsy .050 inch), heavy gauge wire used throughout (*not* small gauge), custom cabinet (*not* multi-purpose with unused holes and internal protruding screws).

No Matter What Guarantee

Every MFJ-949E is backed by MFJ's famous one year *No Matter What*™ unconditional guarantee. That means we will repair or replace your MFJ-949E (at our option) *no matter what* for a full year.

Others may give you a *limited* warranty on defects in material and workmanship.

But what do you do if it burns up and they say, "Sorry, your *limited* warranty does not cover that?"

Continuing Service

Only MFJ gives you a *direct* toll-free technical help line -- not merely a sales line. It's answered by *electronic technicians* who are experts in antenna tuners. We're here to help keep your MFJ product performing flawlessly -- no matter how long you own it -- just call toll-free 800-647-TECH(8324).

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Order your MFJ-949E today or simply pick one up at your favorite dealer or hamfest -- no shipping, no waiting, no hassles.

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N4PC comes up with another antenna that's easy to build and fun to use. What's more, it's efficient, uses wire, and covers three bands—20, 30, and 40 meters.

The N4PC Bi-Delta Antenna

BY PAUL CARR*, N4PC

Always strive for maximum efficiency and versatility. This is a good rule to apply to all aspects of your amateur station and especially to the antenna system. The antenna presented here is an application of that basic rule. I have taken a Delta loop, an antenna used by many within the amateur fraternity, and improved upon it so it works more efficiently than it originally did. The modified antenna still works as well as it did on the original frequency. Here is the bonus: It now produces gain on the second harmonic, and it works well on the band between. Furthermore, it is easy to build and erect.

Background

Many people have helped in the development of the Delta loop antenna. It was designed by Harry Habig, K8ANV. Lew McCoy, W1ICP, wrote the original article, and it was named by Doug DeMaw, W1FB. Many variations of this antenna have appeared through the years both as multi-element and single-element models. Basically, the antenna is a full-wave loop at its design frequency, and the orientation is like an inverted Greek letter "Delta." The antenna has a slight amount of free-space gain when compared to a reference dipole.

Well, an antenna of this geometry is fine for the low band, but what happens on the second harmonic? If we use the antenna on the second harmonic as a closed loop, we lose efficiency. However, there is an antenna that uses two wavelengths of wire, and it is in the form of a loop. It is known as the "Bi-square" design. It has four equal sides, and it is normally fed at the bottom through a balanced feed system. Opposite the feed point, the loop is left open to establish the proper current distribution. It can be erected in a square or diamond configuration. It is horizontally polarized, and many amateurs have found it to be a very effective gain antenna. Why not use the Delta loop in this configuration? Now it's time for a computer study.

*97 West Point Road, Jacksonville, AL 36265

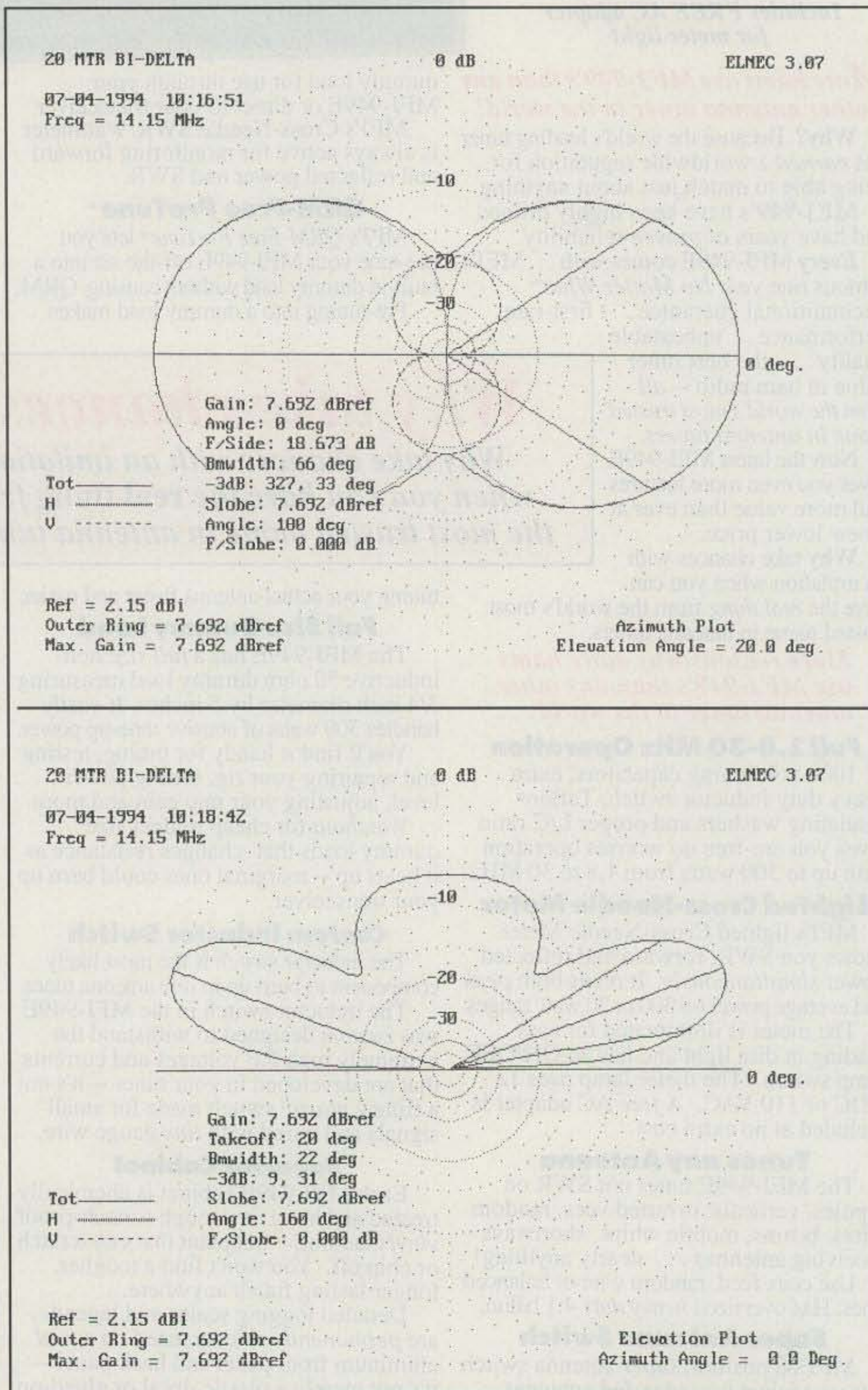
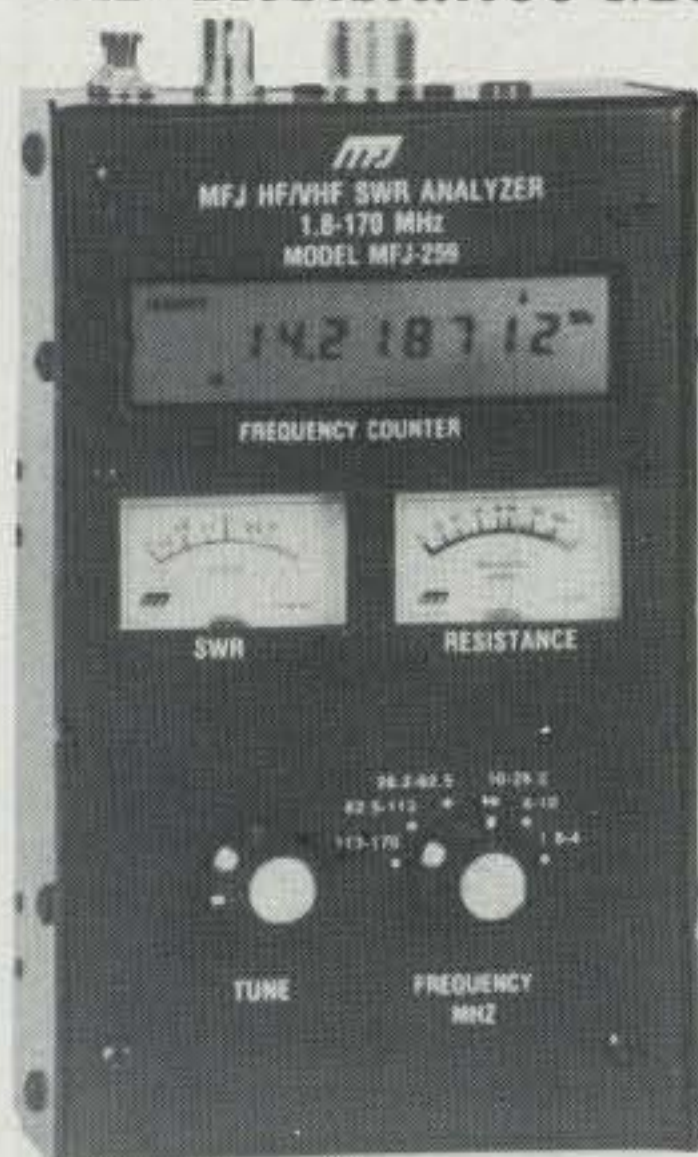


Fig. 1(A & B)—The azimuth and elevation plots for 20 meters.

MFJ HF/VHF SWR Analyzer™ with RF Resistance Meter

Read your antenna SWR from 1.8-170 MHz... 10-digit LCD frequency counter... RF Resistance Meter™... smooth reduction-drive tuning... simple-to-use...



What the MFJ-259 Does

The MFJ-259 gives you a complete picture of your antenna's performance anywhere between 1.8 and 170 MHz -- you can even check SWR outside the ham bands without violating FCC rules. Set the bandswitch and tune the dial--just like your transceiver. SWR is displayed instantly!

RF Resistance Meter™

Does 2:1 SWR mean 25 ohms or 100 ohms? The new MFJ-259 tells you at a glance!

Now you can measure RF resistance up to 500 ohms at minimum SWR -- instantly -- on MFJ's exclusive side-by-side RF Resistance and SWR Meters!

Take the guesswork out of building matching networks and baluns for your antennas.

Watch the effects of spacing on radiation resistance as you adjust your antenna.

Here's What You Can Do...

Find your antenna's true resonant frequency from the shack.

Tune the antennas on your

tower and watch SWR change instantly as you make each adjustment. You'll know exactly what to do by simply watching the display.

Tune critical HF mobile antennas in seconds -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on a single band, or analyze multiband performance over the entire spectrum from 1.8 to 170 MHz!

Measure inductance, capacitance, resonant frequency of tuned circuits, transmission line velocity factor/impedance/loss. Test RF chokes, transformers, baluns.

Adjust your tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259 is really four test instruments in one: an accurate RF signal generator, a high resolution 170 MHz frequency counter, RF Resistance Meter™ and an SWR Analyzer™.

Free Manual

MFJ comprehensive 18 page instruction manual is packed with useful applications -- all explained in simple language you can understand!

For free manual write or call MFJ.

Take It Anywhere

The MFJ-259 is fully portable, powered internally by 8 AA batteries or 110 VAC with MFJ-1312B, \$12.95. It's in a rugged all metal cabinet that's a compact 4x2½x6¾ inches. Take it to remote sites, up towers, on DX-peditions -- anywhere your antennas are located.

For rough service, pick up a convenient MFJ-29, \$19.95, padded carrying pouch to keep your MFJ-259 close at hand and looking like new.

How Good is the MFJ-259?

MFJ SWR Analyzers™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Professional installer and technicians use them worldwide.

Get More by Paying Less

With the MFJ-259, you get full 1.8 to 170 MHz coverage, simple operation, instantaneous readings, a high accuracy frequency counter and MFJ's exclusive RF Resistance Meter™-- all for a low \$219.95.

MFJ-259
\$219.95 If you work with antennas, MFJ's revolutionary new SWR Analyzer™ is the best investment you'll ever make! Now you can diagnose a wide range of antenna problems instantly with one easy-to-use instrument.

1.8-170 MHz SWR Analyzers™

MFJ-249 MFJ-249 HF/VHF
\$199.95 SWR Analyzer™ has all the features of MFJ-259 but less RF resistance meter. Includes 1.8-170 MHz continuous coverage, 10-digit LCD frequency counter and smooth vernier tuning.

MFJ-209 MFJ-209 HF/VHF
\$109.95 SWR Analyzer™ is same as MFJ-259 without LCD frequency counter and RF resistance meter. Has jack for external frequency counter. MFJ-249/MFJ-209 are 4x2½x6¾ inches and uses 8 AA cells or 110 VAC with MFJ-1312B, \$12.95.

Carrying Pouch

MFJ-29 Tote your
\$19.95 MFJ-249, MFJ-259 or MFJ-209 SWR Analyzer™ anywhere with the MFJ-29 custom Carrying Pouch. Made with a special foam-filled fabric, the MFJ-29 cushions blows, deflects scrapes, and protects knobs, meters and displays from harm. Wear it around your waist, over your shoulder, or clip it onto the tower while you work--the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends. Protect your investment and keep your analyzer safe and looking like new!

Dip Meter Adapter

MFJ-66 Plug a dip meter
\$19.95 coupling coil into your MFJ SWR Analyzer™ and turn it into a sensitive and accurate bandswitched dip meter. With a dip meter you'll save time and take the guesswork out of winding coils, measuring inductance and capacitance, measuring velocity factor and electrical lengths of coax. Determine resonant frequency of tuned circuits and measure Q of coils. Set of two coils cover 1.8-170 MHz depending on your MFJ SWR Analyzer™.

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Write or call... 800-647-1800

10-160M SWR Analyzer™

MFJ-207 If you're an HF man, this
\$79.95 compact MFJ-207 HF SWR Analyzer™ will help you build 10-160 Meters antennas that'll make working DX almost routine.

Just plug in your coax to find the SWR of any HF antenna on any ham band 10-160 Meters. Has jack for external frequency counter. 7½x2½x2¼ inches.

Bandswitch Dip Meter™

MFJ-203 The MFJ-203 is a
\$99.95 sensitive Bandswitched Dip Meter™ that covers all hams bands from 160-10 Meters. There are no plug-in tuning coils to keep up with or break.

Has detachable coupling coil, dual FET oscillator, op-amp meter amplifier and jack for external frequency counter. 7½x2½x2¼ in.

2 Meter SWR Analyzer™

MFJ-208 MFJ-208 2 Meter VHF
\$79.95 SWR Analyzer™ finds the SWR of any antenna from 138-156 MHz. Jack for external frequency counter. 7½x2½x2¼ inches.

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Same as MFJ-208 but for commercial VHF. MFJ-217, \$79.95, covers 30-50 MHz and MFJ-218, \$79.95, covers 150-170 MHz.

MFJ Antenna Bridge

MFJ-204B Great for determining
\$79.95 feedpoint resistance of antennas and for designing impedance matching networks. Measure RF resistance up to 500 ohm. Covers all ham bands 160-10 Meters. Built-in resistance bridge, null meter, tunable oscillator-driver, frequency counter jack. 7½x2½x2¼ inches. Use 9 volt battery or 110 VAC with MFJ-1312, \$12.95

440 MHz SWR Analyzer™

MFJ-219 Read SWR of any antenna
\$99.95 420 to 450 MHz -- just plug coax of your antenna into SO-239 connector, set frequency and read SWR. Uses microwave integrated circuits and microstrip technology. Jack for external frequency counter. 7½x2½x2¼ in. MFJ-219N, \$99.95, same as MFJ-219 but with "N" connector.

MFJ-219/218/217/208/207/203 uses 9 volt battery or 110 VAC with MFJ-1312B, \$12.95.

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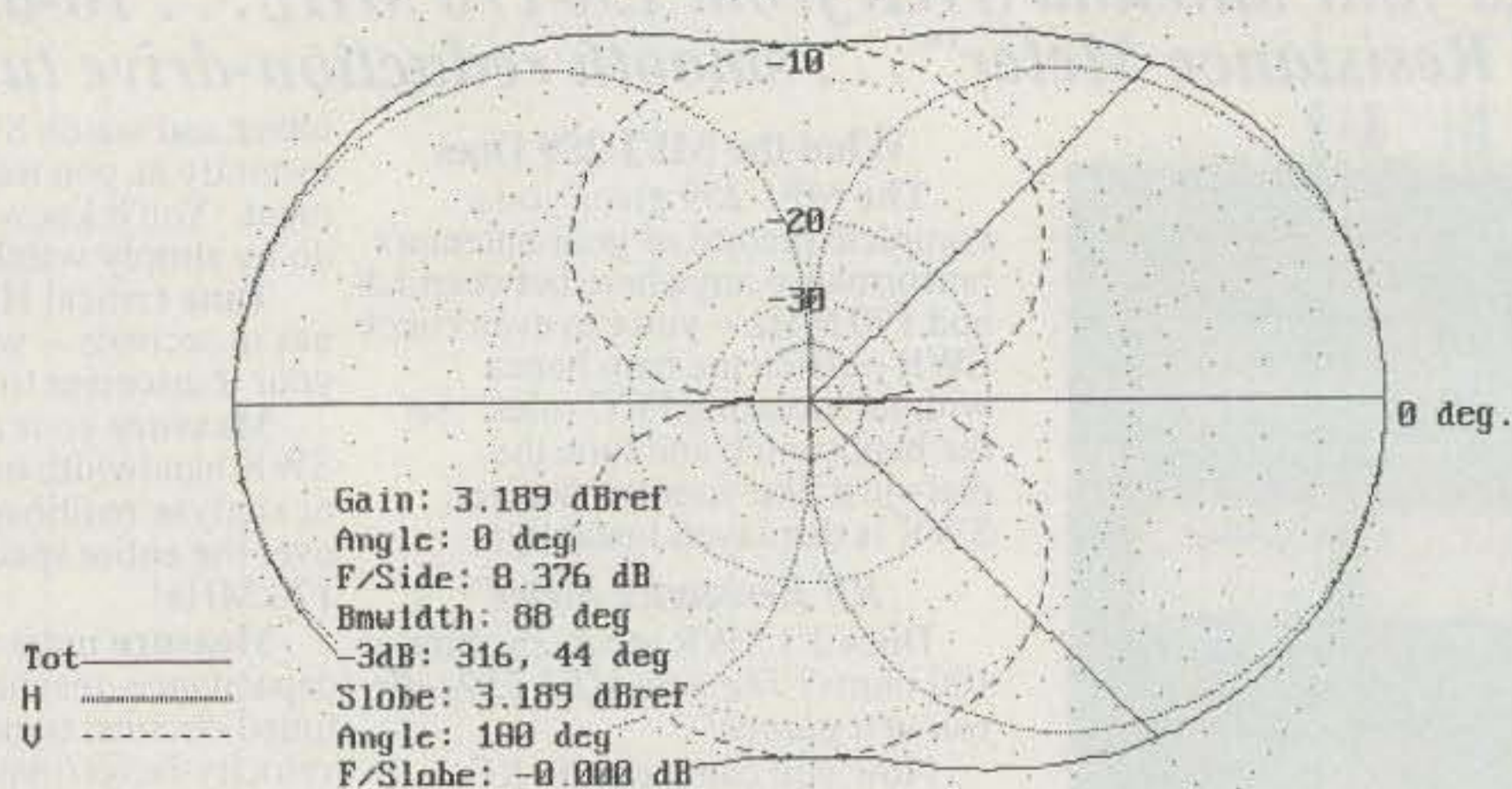
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20 MTR BI-DELTA

0 dB

ELNEC 3.07

07-04-1994 10:22:54
Freq = 10.115 MHz



Ref = 2.15 dBi
Outer Ring = 3.189 dBref
Max. Gain = 3.189 dBref

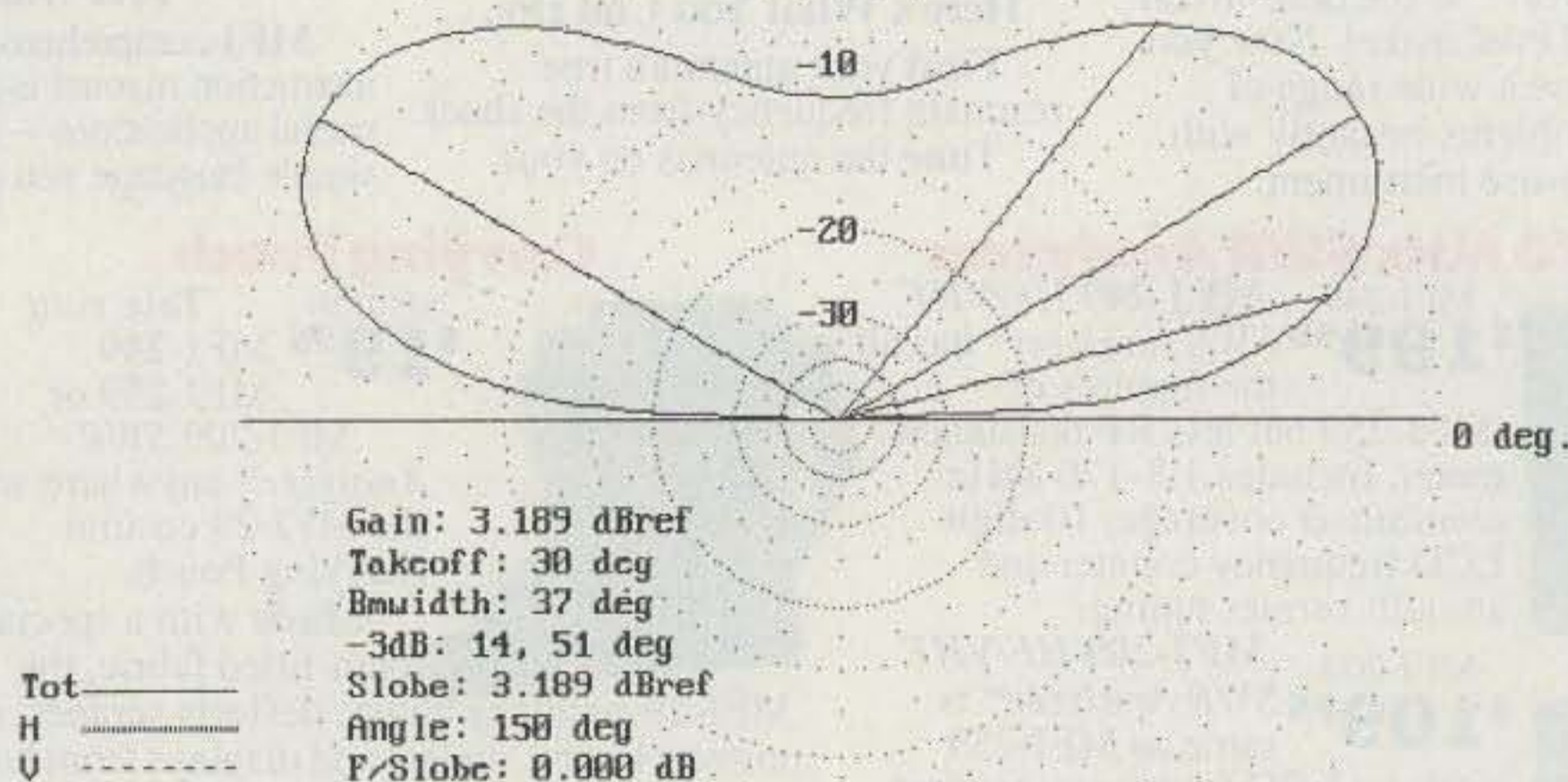
Azimuth Plot
Elevation Angle = 30.0 deg.

20 MTR BI-DELTA

0 dB

ELNEC 3.07

07-04-1994 10:24:29
Freq = 10.115 MHz



Ref = 2.15 dBi
Outer Ring = 3.189 dBref
Max. Gain = 3.189 dBref

Elevation Plot
Azimuth Angle = 0.0 Deg.

Fig. 1(C & D)—The azimuth and elevation plots for 30 meters.

Development

I used ELNEC by Roy Lewallen, W7EL, for the study of the antenna system. Computer programs can be very useful to determine the feasibility of a proposed design. I first designed a two-wavelength 20 meter system in the delta configuration, fed at the bottom and with the top wire open opposite the feed point. ELNEC showed the design to be equivalent to the Bi-square array. When the performance was checked on 40 meters, the system was vertically polarized and the pattern showed too much energy in the overhead

component. There was a definite loss in efficiency.

Next I made the top wire continuous and checked the efficiency. The program showed good efficiency on 40 meters, but the efficiency on 20 meters was lacking. I needed a way to open the loop on the high band and close the loop on the low band. I considered using a relay, but that choice would present its own set of problems. What about a quarter-wave stub of transmission line? A shorted quarter-wave stub would look like an open circuit on the high band and like an inductor on any frequency lower. This approach

MFJ Dual Band Mobile Antenna

For an incredible \$14.95, you get a dual band 2 Meter/440 MHz mobile antenna with strong magnet mount, stainless steel radiator, 15 feet of coax and BNC adapter for your handheld -- It's the fastest selling mobile antenna in ham radio!

MFJ-1724B
\$14.95 For an incredibly low \$14.95, you get an MFJ dual band 2 Meter/440 MHz mobile antenna!

It's the fastest selling mobile antenna in ham radio!

You get excellent gain for solid, noise-free QSOs. On 440 MHz, it's

a high gain 1/2 wave over 1/4 wave radiator. On 2 Meters, it's a full size 1/4 wave radiator.

Its tough stainless steel radiator is only 19 inches tall -- won't knock off when parking in your garage.

An extra powerful magnet holds it steady -- even at highway speeds.

You get 15 feet of coax with a standard PL-259 coax connector for your mobile rig.

You get a BNC adapter so you can also use it with your handheld!

Your MFJ-1724B is protected by MFJ's famous one year *No Matter What*™ unconditional guarantee.

Dual Band 144/440 MHz Ground Plane

MFJ-1754
\$24.95 *New!*

Dual band ground plane antenna for 2 Meters and 440 MHz gives you extra long range on 440 MHz with a high gain halfwave over quarter wave radiator. On 2 Meters you get solid quarter wave performance. Mounts on 1 to 1 1/2 inch mast with single U-bolt. Easy-to-tune.

1/4 Wave Ground Plane

MFJ-1740
\$12.95

The MFJ-1740 brings up 2 Meter repeaters as well as any 1/4 wave ground plane made!

You get easy tuning, low loss ceramic antenna insulator and strong lightweight aluminum construction.

Single U-bolt mounting for 1 to 1 1/2 inch mast. Cutting chart included for 220/440 MHz. Made in USA.

MFJ Pocket Roll-Up™ 2 Meter halfwave J-pole antenna

MFJ-1730
\$14.95

Roll up this halfwave 2M J-pole antenna and stick it in your pocket! It's the perfect gain antenna for traveling.

Get home station performance on the go. Just hang your MFJ Pocket Roll-Up™ in the clear and plug the BNC connector into your handheld.

It's omni-directional and has significant gain over a 1/4 wave. It does not need a cumbersome ground plane so it's convenient for indoors and works great with handhelds. Made in USA

Dual Band flexible Ducks 144/440 MHz flexible ducks for HTs

A. High Gain FlexiDuck™

MFJ-1717, \$19.95. Enjoy dependable QSOs when other rubber ducks give you noise. High gain 1/2 wave on 440 MHz, full size 1/4 wave on 2M. Won't ab you -- bends, twists, flexes with you. 15 3/4 inches.

B. FlexiDuck™, MFJ-1716, A. B. \$16.95. Similar to MFJ-1717. Full 1/4 wave on 440 MHz, efficient loaded 1/4 wave on 2 Meters. 8 3/4 inches.

Shorty Duck™ for HTs

Add this short, 4 1/4 inch Shorty Duck™ to your handheld for a Q-5 signal! Impedance matched for maximum gain. High-Q helical wound radiator.

5/8 Wave 2 Meter Mobile Antenna

MFJ-1728/B
\$24.95 For maximum range while mobile, use MFJ's Maximum Gain™ 5/8 Wave 2 Meter Mobile Antenna. You'll get the maximum possible gain of any single element mobile antenna!

Competitive 5/8 wave mobile antennas can't work any better -- no matter how much more they cost.

You get low SWR so your rig can safely deliver maximum power into your antenna. It's rated at 300 watts PEP so you can use any mobile rig plus a mobile amplifier.

You get a heavy-duty magnet mount that holds your antenna tight at highway speeds and a black magnet base that'll look good for years.

You get a stainless steel radiator that'll endure years of harsh mobile use and 12 feet of coax cable.

You get MFJ's one year *No Matter What*™ unconditional guarantee.

Order MFJ-1728 with standard PL-259 coax connector or MFJ-1728B that also includes a BNC adapter for your handheld.

Stacked 5/8 Wave for 2 Meters gives twice the omni-directional gain of a single 5/8 wave

MFJ-1764
\$34.95 MFJ's stacked 5/8 wave radiators give you more than twice the omni-directional gain of a single 5/8 wave radiator!

Wide 10 MHz 2:1 SWR bandwidth ... excellent ferrite choke balun feedline decoupling ... shunt choke for bleeding off unwanted static ... strong lightweight aluminum.

Fully assembled -- simply attach radiators -- no tuning required. Mounts vertically for FM/Packet or horizontally for SSB. Installs with single U-bolt on 1 to 1 1/2 inch mast or tower leg. 1 1/2 lbs., two 47 inch radiators, 23 inch boom. Made in USA.

Also works as excellent 6 Meter full halfwave centerfed antenna.

MFJ-1766, \$89.95, gives you four times the gain of single 5/8 wave. Includes 2 MFJ-1764, phasing cables. Doubles gain on 6 Meters.

MFJ-1765, \$29.95, phasing cables for 2 MFJ-1764s, other 2M ant.

MFJ dual band 144/440 MHz Yagi 5 elements on 440 MHz ... 4 elements on 2 Meters ... \$49.95

Get two Yagis for the price of one ... enjoy two Yagis in the space of one with single coax feed!

MFJ's exclusive dual band balanced feed with FerriteChoke™ decoupling prevents pattern skewing and gives you low SWR.

The MFJ-1768 is based on the National Bureau of Standards design that's optimized for maximum forward gain with high front-to-back ratio and a clean symmetrical pattern.

Mounts vertically for FM/Packet or horizontally for SSB with single included U-bolt on 1 to 1 1/2 inch mast or tower leg.

High strength 6061-T6 aluminum 5 foot, 1 1/8 inch diameter boom. 2 pounds. Elements are electrically isolated from boom. Made in USA.

Portable 3 element Yagi for 2 M

MFJ-1763
\$39.95 You can set up or take down MFJ's portable 3 elements 2 Meter Yagi in seconds! Elements simply screw into the boom.

You can take it with you wherever you go and have the "oomph" and directivity of a beam.

It's easy to store and sturdy enough to use as your home station antenna.

Mounts vertically for FM/packet or horizontally for SSB. Center or end mounts with single U-bolt. Great for packet/Cluster™.

It's compact 2 3/4 foot boom gives you a calculated gain within 1 dB of a four element Yagi with a boom nearly twice as long.

Extra thick elements maintain high gain and directivity over entire 2 Meter band. MFJ's FerriteChoke™ decouples feedline.

Elements and boom are made from strong lightweight aluminum and protected by MFJ's Permanent Molecular Bonding Technology™.

Weighs just 2 pounds. Boom is 30 1/2 inches. Made in USA.

5/8 Wave Ground Plane

MFJ-1750
\$19.95

For a low, low \$19.95, you get a high performance 2 Meter 5/8 wave ground plane home station antenna -- you'll get the maximum gain of any single element antenna.

More expensive 5/8 wave ground planes can't work any better -- no matter how much they cost.

You get ... shunt fed matching that bleeds off unwanted static and gives you low SWR ... strong lightweight aluminum construction ... low loss ceramic antenna insulator ... MFJ's RapidTune™ radiator ... MFJ's one year *No Matter What*™ guarantee. It mounts on 1 to 1 1/2 inch mast with single U-bolt and is Made in USA.

MFJ-1752, \$19.95, for 220 MHz.

HT Range Extenders

Telescoping antennas for handhelds

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B. Dual Bander™ for 2 Meters and 440 MHz, MFJ-1712, \$14.95. Got a new dual band handheld or separate units? One antenna fits all. It's a 1/4 wave for 2 Meters and a 5/8 wave with gain for 440 MHz. 7 1/4" collapsed, 19" extended.

C. Pocket Linear™ 3/8 Wave, 2 Meters, MFJ-1710, \$9.95. Carry this pen size antenna in your pocket like a ballpoint pen. When you're using your rubber duck, on the fringe and noisy, put on the Pocket Linear™, extend it to 24 1/2" and carry on your QSO. Has pocket clip. 5 1/4" collapsed.

144/440 MHz Duplexer

Lets you use dual band 144/440 MHz antenna with separate transceivers or separate 144/440 MHz antennas with dual band transceiver.

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Technical Help: 800-647-TECH (8324)

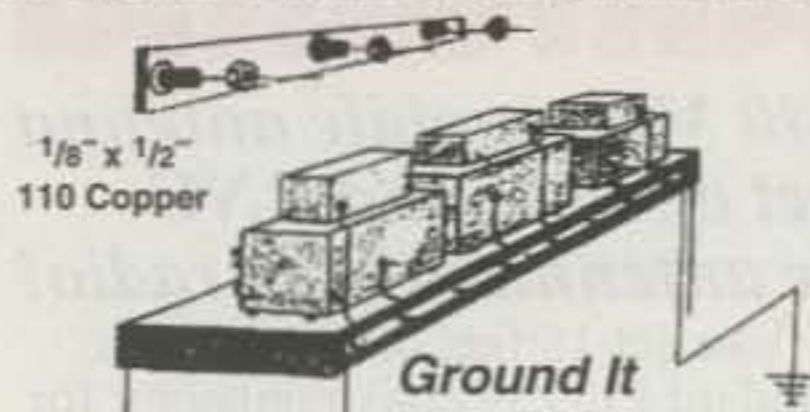
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12" Long w/Term. Ends All Solid Copper \$1.50 Ea.



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Anti Skid Feet, Variable Tone.
Adjustable Volume, 9 Volt Bat. Installed.
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20 MTR BI-DELTA

0 dB

ELNEC 3.07

07-04-1994 10:31:41
Freq = 7.1 MHz

Gain: 3.604 dBref
Takeoff: 41 deg
Bwidth: 144 deg
-3dB: 18, 162 deg
Slope: 3.604 dBref
Angle: 139 deg
F/Slope: 0.000 dB

Ref = 2.15 dBi
Outer Ring = 3.601 dBref
Max. Gain = 3.604 dBref

Elevation Plot
Azimuth Angle = 0.0 Deg.

20 MTR BI-DELTA

0 dB

ELNEC 3.07

07-04-1994 10:30:01
Freq = 7.1 MHz

Gain: 3.604 dBref
Angle: 0 deg
F/Side: 6.518 dB
Bwidth: 104 deg
-3dB: 300, 52 deg
Slope: 3.604 dBref
Angle: 100 deg
F/Slope: -0.000 dB

Ref = 2.15 dBi
Outer Ring = 3.604 dBref
Max. Gain = 3.604 dBref

Azimuth Plot
Elevation Angle = 41.0 deg.

Fig. 1(E & F)– The azimuth and elevation plots for 40 meters.

seemed reasonable.

I have a copy of "MicroSmith," a computerized Smith chart written by Wes Hayward, W7ZOI. This is a very handy tool for transmission-line studies. I used this program to calculate the loads for a stub on all bands of concern. I knew that the stub would look like an open circuit on 20 meters, and MicroSmith calculated the resulting loads for both 40 and 30 meters. I took this information and applied it as a load on the ELNEC program, and I had the desired results.

The subsequent computer analysis showed me what I wanted to see. The per-

formance on 40 meters was within a fraction of a dB compared to a non-loaded Delta loop, and the gain on 20 meters was equivalent to the gain of a Bi-square. Additionally, the antenna works about the same as a dipole on 30 meters, and that's a nice bonus.

Pattern Predictions

In all three cases (see fig. 1[A&B], [C&D], [E&F]) the horizontal pattern shows the classic figure-8 pattern.

20 Meters: The horizontal pattern indicates the maximum radiation is perpen-

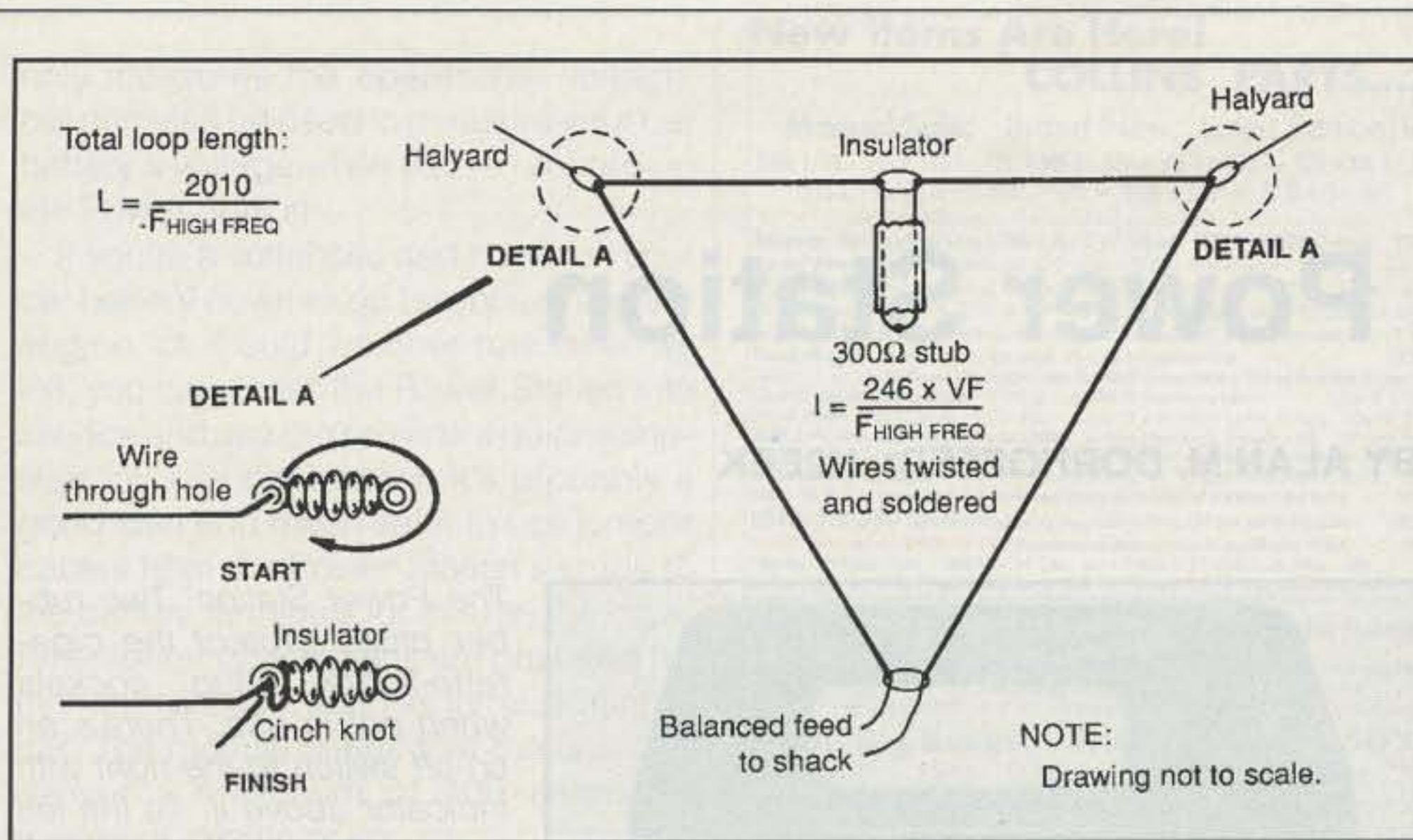


Fig. 2—Construction details for the N4PC Bi-Delta antenna.

dicular to the vertical loop, and maximum gain occurs at an angle of 20 degrees when the top wire is placed at a height of 55 feet. The computer model predicts a gain of more than 4 dB when compared to the same loop without the loading stub. That's a significant improvement.

30 Meters: Again, the pattern is concentrated perpendicular to the plane of the vertical loop. Maximum radiation is at an angle of 30 degrees with respect to the horizon. The performance is about the same as that of a half-wave dipole.

40 Meters: The figure-8 pattern has become less pronounced due to its height above ground. Remember, the antenna is now one-half as high (in terms of wavelengths) as it appeared in the 20 meter study. This produced a higher angle of maximum radiation and a more oval pattern. The predicted gain was within a fraction of a dB when compared to a non-loaded delta loop. The design looked promising, so on with the construction.

Construction

Start construction (see fig. 2) by cutting two pieces of wire 70 feet 6 inches in length. Measure 23 feet 6 inches from the end of each wire, fold the wire back on itself, and push the wire through the eye of an insulator. Loop the wire around the insulator and form a cinch knot. This will hold the wire securely when it is placed in the air and properly tensioned. Tie the short end of each wire to each end of a third insulator (the top insulator in fig. 1). Attach the long ends of the wires to each end of a fourth insulator (the feed point in fig. 1). Solder a balanced feedline to the wires at this insulator.

The quarter-wave stub was made from 14 feet 6 inches of 300 ohm twin lead (velocity factor of 0.82). I verified the calculated length by using an MFJ 249 SWR Analyzer. On one end of the stub, solder

the wires together, forming a short circuit. At the other end of the stub, connect one wire to each wire at the top insulator. Solder these connections.

Check the wiring of the loop with an ohmmeter. If everything is wired correctly, you should read the resistance of the wire in the loop plus the resistance of the feedline. Make a last visual inspection prior to placing the loop in the air.

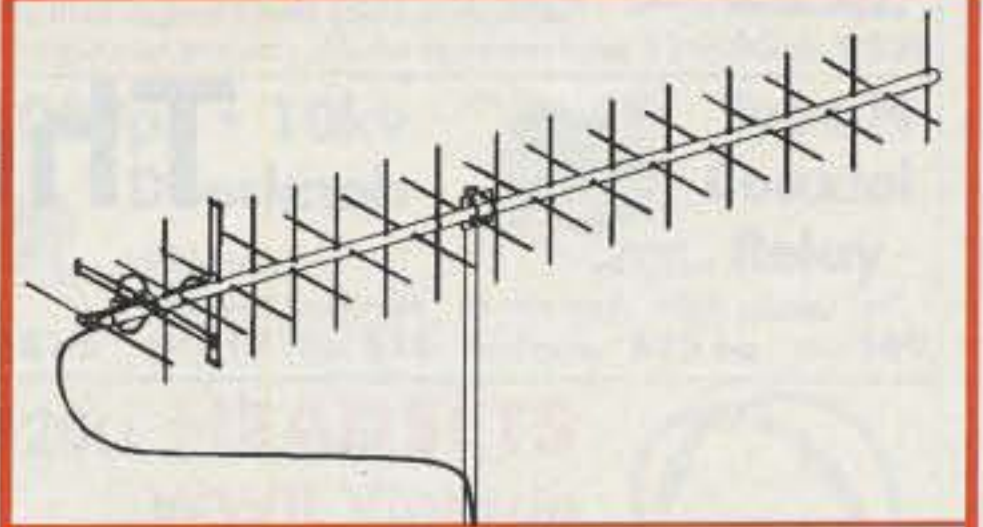
The antenna should be placed as high as possible. I am blessed with tall southern pines, and I was able to get the top wire up about 55 feet. My antenna is in the form of a triangle that has equal sides, but if you cannot get the antenna high enough to clear pedestrian traffic, the length of the top section can be increased by moving the corner insulators toward the feed-point insulator. Be sure to maintain symmetry. Route the feedline to the transmatch and you are ready to go on the air!

On-The-Air Results

I have been very happy with the Bi-Delta antenna. I have several antennas available for comparison, and I find the Bi-Delta to be very effective when compared to my other antennas. One test that I made to verify my design procedure was to try the antenna both open at the top and shorted at the top. This verified the effectiveness of the stub. I am happy to report that this test verified the system performed in accordance with the computer predictions.

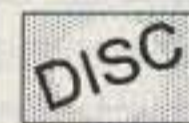
The antenna has many good features. It will fit in a space too small for a 40 meter half-wave dipole and give equal or better results. It will provide gain on 20 meters for those of you who do not have a multi-element beam. It will work as well on 30 meters as a dipole. It's easy to build and perhaps best of all, it's inexpensive. Try it. It may be just what you have been looking for.

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Here's a quick project that should come in handy during long operating or emergency conditions.

How To Build A Virtually Indestructible Battery Pack

BY JOHN R. SOMERS *, KC3YB

Many times during portable operation I have wished for a few minutes more life for my HT battery pack. More than once the voltage in my alkaline batteries got so low the rig wouldn't transmit. I then had to turn it off for several minutes while they "charged up," hoping I could get in one more transmission before they died completely. Unfortunately, while this may work with alkalines, once rechargeable batteries take the notion to leave you, they go in a hurry, whether you have finished or not. And when they're gone, they're gone.

For that reason I usually pack both kinds. I use the nickel-cadmiums as long as I have access to electricity and a charger to keep them at peak charge. When the lights go out—and the HT does, too—I switch to the alkalines and hope for the best.

Even though I have enjoyed good success with nickel-cadmium cells in an accessory battery case, the .65 amp/hour rating of AA cells is significantly less than found in larger cells. Standard rechargeable C and D cells, for instance, have a 1.6 amp/hour rating. High-capacity nickel-cadmiums have ratings of 2.0 and 4.3 amp/hours, respectively. Compare that with the .25 amp/hour rating of the battery pack that came with my HT!

I have always thought an accessory long-life battery pack would be of invaluable service in an emergency. However, I wasn't inclined to pay the price of commercial devices. Since I feel homebrewing is half the fun of amateur radio, I decided to see what I could cook up. For simplicity, plus very low cost, this project can't be beat.

Entirely by accident I happened to discover that C and D cells slide neatly inside similar-size (1 and 1 1/4 inch, depending on the size) PVC pipe. After learning that, it didn't take me long to concoct the rest

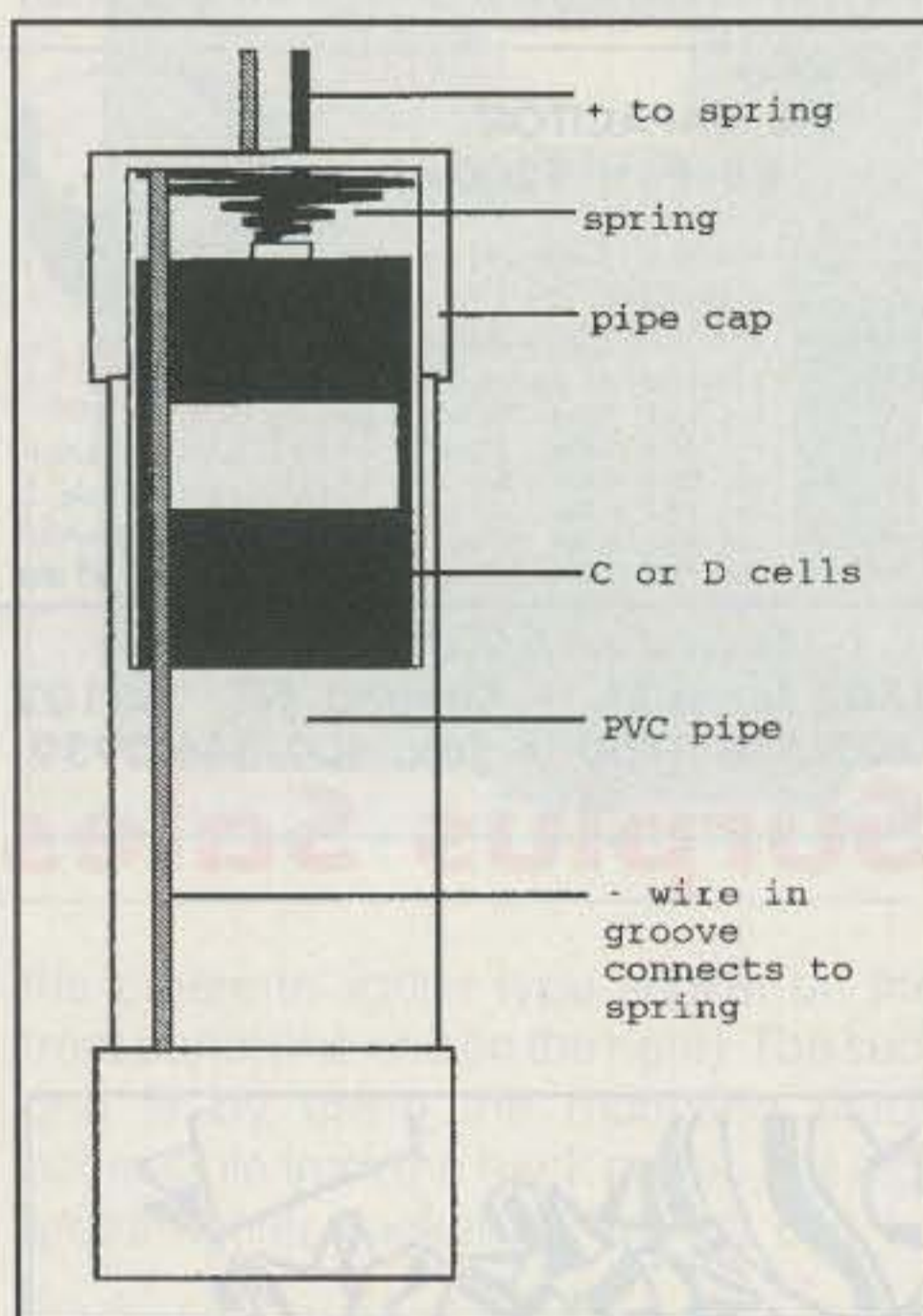


Fig. 1—Mechanical diagram for the PVC battery pack.

of a virtually indestructible battery pack.

Along with a section of pipe and two PVC pipe caps, I purchased a spring from my local hardware store. This was about 1 1/2 inches long and about 3/4 inch wide in the middle, tapering to both ends. I cut the pipe to the same length as the batteries I had selected (see Table I) with a hacksaw and sanded off the burrs. (Remember to take the lower voltage output of nickel-cadmium cells [1.25 versus 1.5 volts per alkaline cell] into account when calculating how long to cut the PVC pipe.) I prepared the spring by snipping it in half and soldering an insulated wire to each piece, near the cut end.

In order to connect the negative end of the batteries to the top of the battery pack, I ran the pipe lengthwise through a table saw. I set the blade so it cut a groove (dado to you cabinet makers) most of the way through the plastic and wide enough to

accept the wire. (The wire used should be as large as possible to avoid significant voltage drop when transmitting. Drawing an amp through 2 feet of 18-gauge hookup wire will result in the loss of almost 4 volts from a 12 volt supply; the same length of 12-gauge wire will waste less than 1 volt.) The springs on both ends were hot-glued in place into the pipe cap. The negative cap was then cemented to the pipe with the wire aligned in the groove. In a matter of minutes the battery pack was two-thirds completed.

There are several different ways to complete the top (positive) end of the battery pack, depending on your needs. The simplest way is merely to duplicate the bottom end and run the two wires through the top cap.

A neater variation is to use part of a coiled microphone cable between the battery pack and the HF or other load. Older cables have larger wires inside; even so, connect the wires and shield into two parallel conductors so as to lessen voltage drop. Only that portion of the cable needed should be used—perhaps 12 inches of a 6 foot (stretched) cord.

A third choice is to bring the voltage through the end cap by way of a DC jack of your choice. This jack should be polarized and designed to stay connected if the wire gets yanked. The other end, the one that connects to your HT, is up to you; probably the best idea is to use an empty battery holder that mates with your rig.

Once the positive end is completed, insert the batteries and attach the cap in place. Obviously, if you cement the top on the pipe, you can't remove or replace batteries as needed. I have found the tight fit of the pipe, backed up by a strip of electrical tape, works very well. Another piece of tape should be placed over the wire from the negative end to keep it in the sawed groove.

My original idea was to overcome the short life of nickel-cadmium cells by using

* 4429 Beechwood Place, Crisfields, MD 21817

a larger size, but either alkaline or nickel-cadmium batteries will work well in this device, vastly increasing the usability of your handheld. (Once I had built my prototype, I realized it worked well with a laptop computer, QRP rig, etc.—anywhere, in fact, where you need a source of either fairly high current or long life.)

For field use you may decide to attach some means of conveniently carrying the battery pack. A stainless-steel automobile sun-visor clip, sold at automotive and convenience stores, works very well for a belt clip. Another suggestion is to affix a nylon strap to the pipe and wear it around your waist or over your shoulder. A third choice is to lash the assembly to a knapsack. The possibilities are almost endless.

A suggestion at this point may be in order, particularly if you plan on traveling by air: Label the battery pack appropriately and travel with it disassembled. It looks awfully like a pipe bomb; there is no need to upset airport security for nothing.

This is the type of project I love to make. For about \$2.00 you can assemble a battery pack that rivals the current capacity of expensive, store-bought models. They are so quick and simple to assemble, you may want to make several. ■

PARTS LIST

A length of 1" diameter PVC pipe, length as follows (C cells are 1 7/8" long).

# cells	Nickel-Cadmium	Alkaline
4	5 volt = 7.5"	6 volt = 7.5"
5	6.25 volt = 9.4"	7.5 volt = 9.4"
6	7.5 volt = 11.25"	9 volt = 11.25"
8	10 volt = 15.0"	12 volt = 15.0"

A length of 1 1/4" diameter PVC pipe, length as follows (D cells are 2 3/8" long).

# cells	Nickel-Cadmium	Alkaline
4	5 volt = 9.5"	6 volt = 9.5"
5	6.25 volt = 11.875"	7.5 volt = 11.875"
6	7.5 volt = 14.25"	9 volt = 14.25"
8	10 volt = 19.0"	12 volt = 19.0"

(You can probably pick up 1-3 foot pieces of pipe as scrap. Remember to use PVC, not CPVC hot-water pipe.)

Other items

2—1" PVC end caps.

1—spring (size to fit inside pipe; diameter should be larger in the middle and small on the ends).

Small can PVC cement.

Wire (insulated, about 12-16 gauge, depending on current requirements) or coiled microphone cord (large conductor).

Miscellaneous: DC plug and jack, in-line fuse holder, or whatever means you choose to hook

the battery pack to the load.

Battery-pack shell or other means of connecting power to HT.

Table 1—Parts list for the indestructible battery pack.

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If you're thinking about putting up a tower this year, you might want to consider this idea put forth by KO1F. If you can't decide what to put on top of the tower, simply use the tower.

How To Mount A Tower To Use As A Low-Band Vertical Antenna

BY BRUCE A. CLARK*, KO1F

Most people have the general idea of how to form up a tower base. We'll run through it in a little bit. However, here at my QTH I use tower sections of Rohn 25 to construct my vertical antenna systems, so forming the base for each tower is an integral part of the process. While working on this latest installation, I also tried out an idea that I had while working with the mounting of high-power transistors. The following is something you might want to consider or keep in mind the next time you enlarge your antenna farm.

The Base

Basically, a concrete tower base is wider at the bottom (the part below ground) than at the top (the part that shows). This taper, generally several inches on a side, reduces the tendency of winter frost to pick up or heave the ground sufficiently to move the base. Ideally, the base should be deep enough to be below the

frost line in your area. At my QTH here in Maine, that means at least two feet deep.

Typically, a plywood form is constructed to hold the concrete until it cures. My plan called for the top to be square, 20 inches on a side, to accommodate a heavy steel plate of the same dimensions. Next, four 4 foot sections of $\frac{5}{8}$ inch threaded steel rod are prepared by each section having a large washer secured by nuts placed at one end. A template for the top can also be made of plywood and holes drilled where the threaded rods will come up and extend through. This keeps them in the proper alignment to mount the tower.

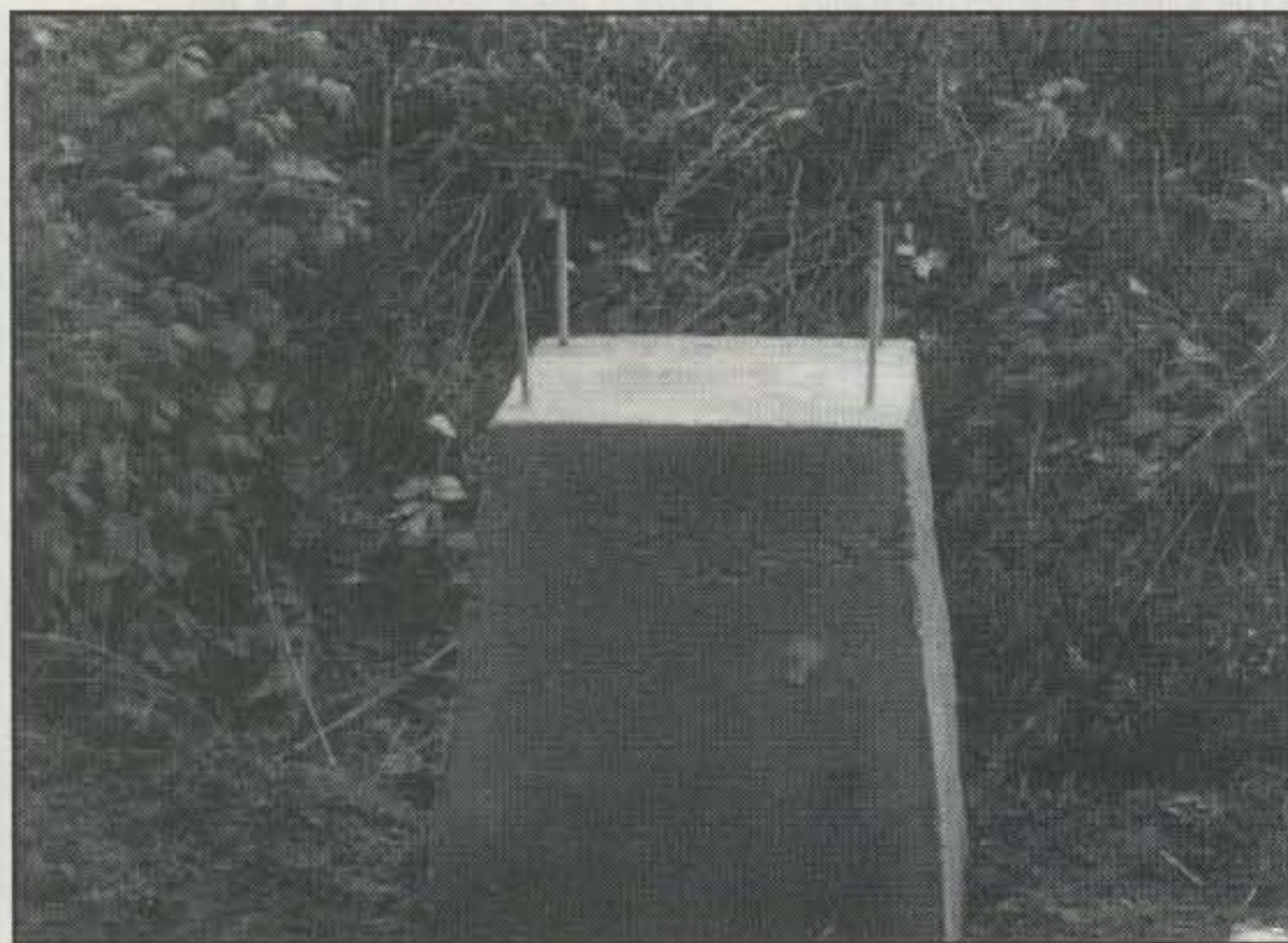
When the concrete is poured, the threaded rods (washer side down) are eased into the mix. The washers help hold the rods to the concrete. Care should also be taken to level the top of the concrete mix to prevent the tower from being out of plumb when erected. The four bolts extend up and through the template about 6 inches. After the concrete cures, you can cut away part of the form to a

level slightly below ground level. This way you don't have to disturb the ground around the new base again or worry about repacking it. A polyurethane coating is then applied to the exposed concrete to stabilize the moisture content. That's about all there is to it.

However . . .

So far all we've done is make your everyday tower base. But what about trying something different? How about insulating the tower from the base? The image of mounting the high-power power transistor came to mind.

First a section of Rohn 25 is centered on a steel plate 20" x 20" x $\frac{1}{4}$ ", and the legs are welded to the plate. A small hole is drilled up through the plate into each tower leg to allow water drainage and ventilation. Instead of $\frac{5}{8}$ inch holes being drilled in the corners of the plate to accept the rods, 2 to 3 inch holes are drilled in their place. The steel plate is then rust-proofed with a cold, galvanize spray.



The typical tower base after the concrete has cured. The running-thread can be seen in the corners.

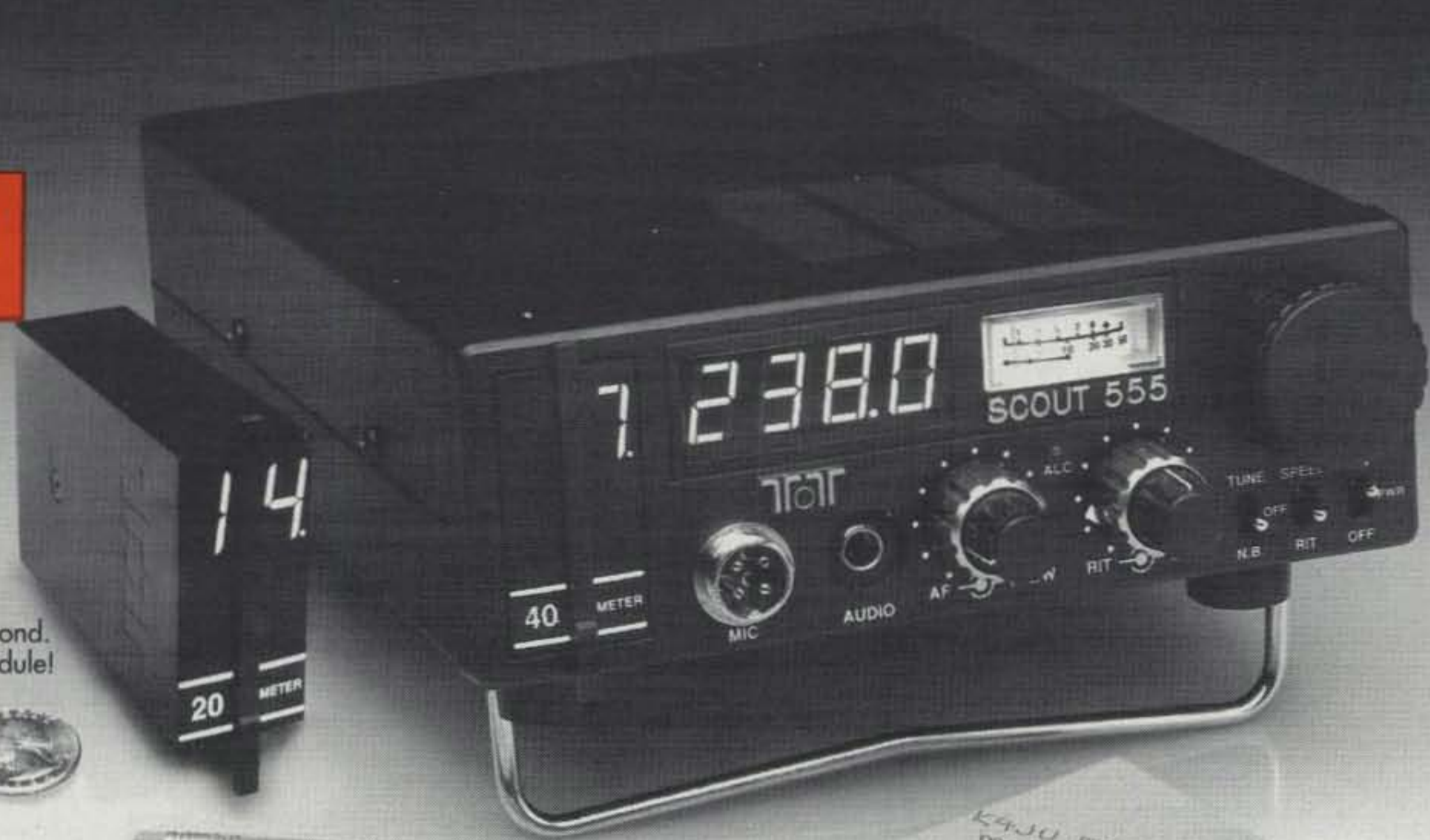


Here we introduce the first stage in insulating the tower from the concrete base. The two strips of 1 inch thick Tivar 100 can be seen on opposite sides of the concrete base.

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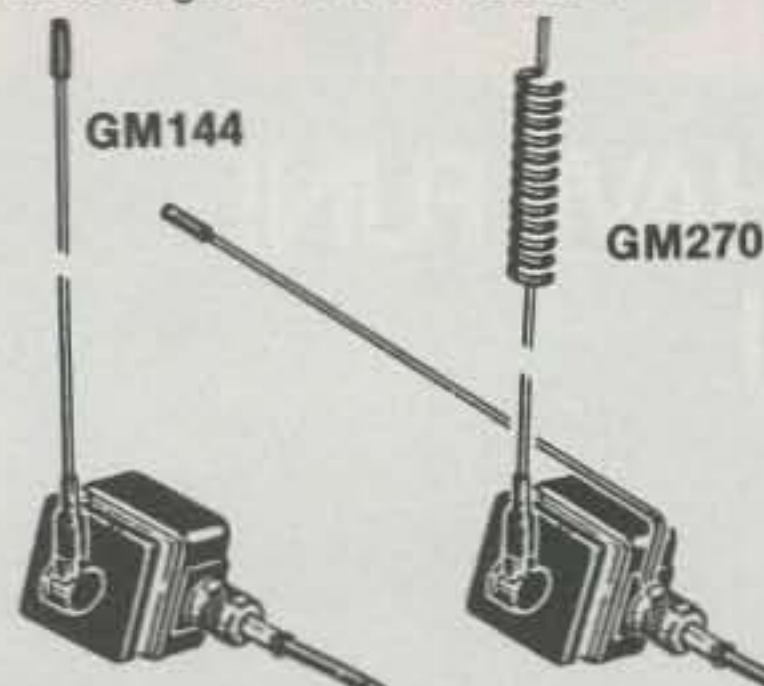
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Technical Data

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1/4 wave whip
MM450B 70cm: 6.5" tall
1/4 wave whip
MM270B 2m/70cm: 19" tall
1/4 wave 2m,
5/8 wave 70 cm



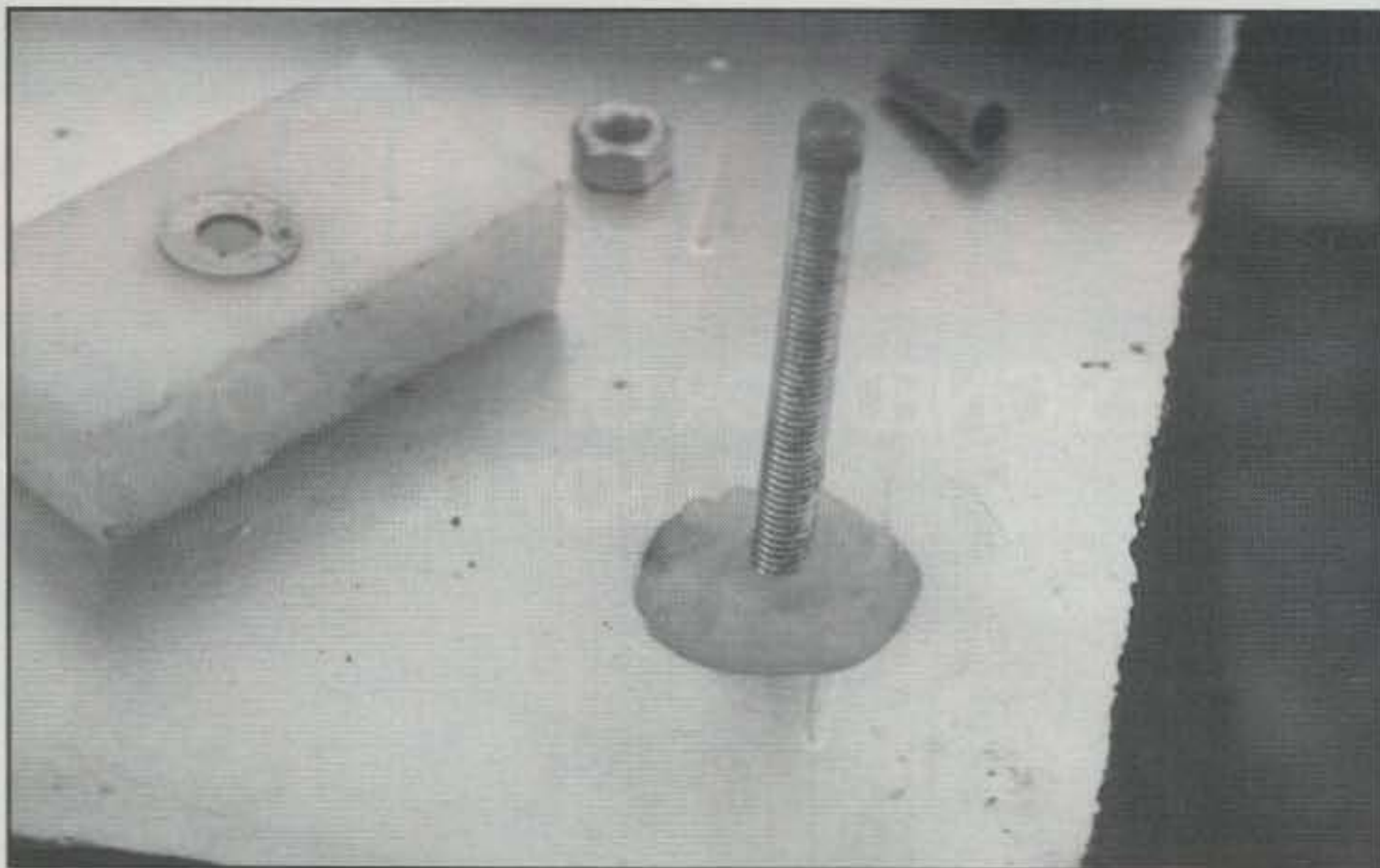
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With the steel plate in place, the enlarged mounting hole is filled with a silicon rubber (RTV) caulking. The smaller block of Tivar 100, nut, and washer, are shown to the rear.

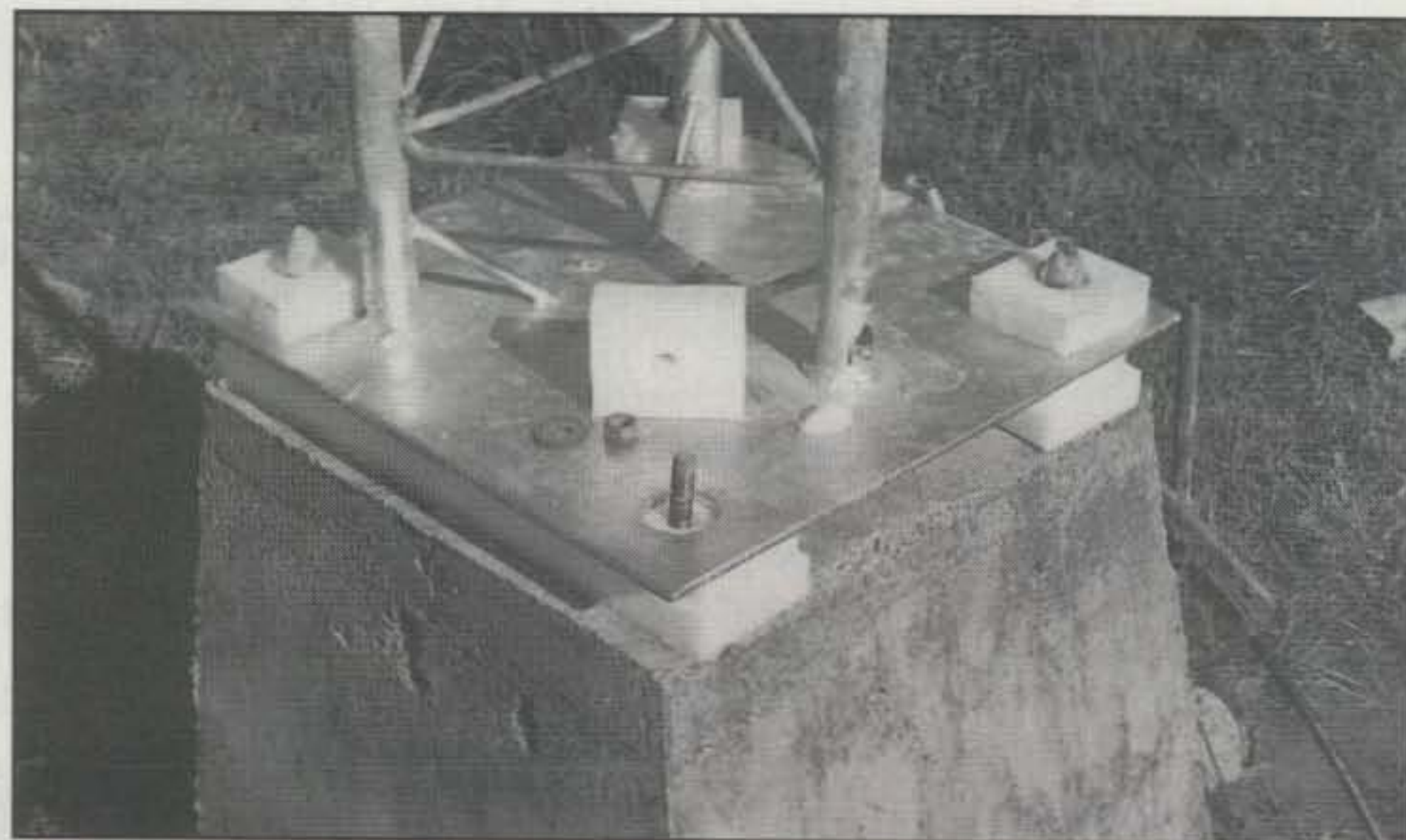
Big Holes and Insulation

The steel base plate is insulated from the concrete base by using two 1 inch strips of Tivar 100 plastic insulation stacked on two opposite sides. Tivar 100 is a good choice because of its high physical and dielectric strength. The reason for the large mounting holes (2 to 3 inches) is to minimize any loss due to capacitance effects. Care must be taken not to block the tower-leg ventilation holes. The blocks of Tivar 100 are drilled to accept the threaded rod. The steel base plate with tower section attached is now secured in place. The rods are centered in the enlarged steel plate holes. The holes are then filled with a silicon rubber caulking (RTV), and then covered with another block of Tivar 100. The small corner

blocks are held in place by rust-resistant washers and nuts. Tivar 100 is available through most local plastic distributors and/or their dealers.

Does It Stand Up?

Yes, on all counts. I've used this system now on several towers ranging in height from 60 to 100 feet with no adverse effects on the Tivar 100 due to weight or wear. In fact, at one time when the tower was at 60 feet and supported by a triangular guy-wire system, the wires on one side had an altercation with a truck driven by an inebriated sports fan on a Super Bowl Sunday. The wires lost the fight, but the tower remained vertical with no apparent damage, and the guy-wire system was easily repaired. ■



One more to go and the installation is complete. Some of the same caulking can be used to cover the remaining, exposed mounting hardware.

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CQ REVIEWS:

The Standard C158A 2 Meter Hand-Held

BY JOE SCHROEDER*, W9JUV

Standard's new C158A is a full-featured, compact hand-held that boasts just about every feature a user could ask for. The receiver covers 130–170 MHz, so you can listen to public-service, marine, and weather channels as well as 2 meters. Transmit is limited to 144–148 MHz as it comes out of the box, although licensed CAP and MARS members can get modification information to give access to those services. CTCSS (including Tone Squelch receive) and DTMF are provided, along with a very useful "Pager" function (more on that later). It also has 21 memories, a variety of scan modes, and more.

The 158A is big enough to fit comfortably in the hand, yet is compact enough to fit easily in a jacket or pants pocket. The keyboard might be a bit tight for very large fingers, although it felt very good to me. One minor complaint: the "0" button is to the left of the "1," a position that takes a bit of getting used to. The radio has a very solid and rugged feel. It is housed in aluminum castings which provide excellent physical protection and heat dissipation (if you're that long-winded a transmitter!).

The receiver is hot (0.1 μ V squelch sensitivity, 0.158 μ V 12 dB SINAD, specified). The squelch opened at well under 0.1 μ V and quieted nicely at just over 0.14 μ V on my venerable Model 80, but it has lots of good-sounding audio that didn't show noticeable distortion even at full volume. Sensitivity did drop off a bit up at the NOAA frequencies; it took all of 0.15 μ V to open the squelch, and a quarter microvolt for good quieting. However, these are far from shabby numbers, and may help explain why the C158A is one of the least intermod-prone hand-helds I have ever had. I've been able to use it on the streets of Chicago's Loop without being entertained with continuous uproar from paging tones, cab dispatchers, and business and public-service chatter!

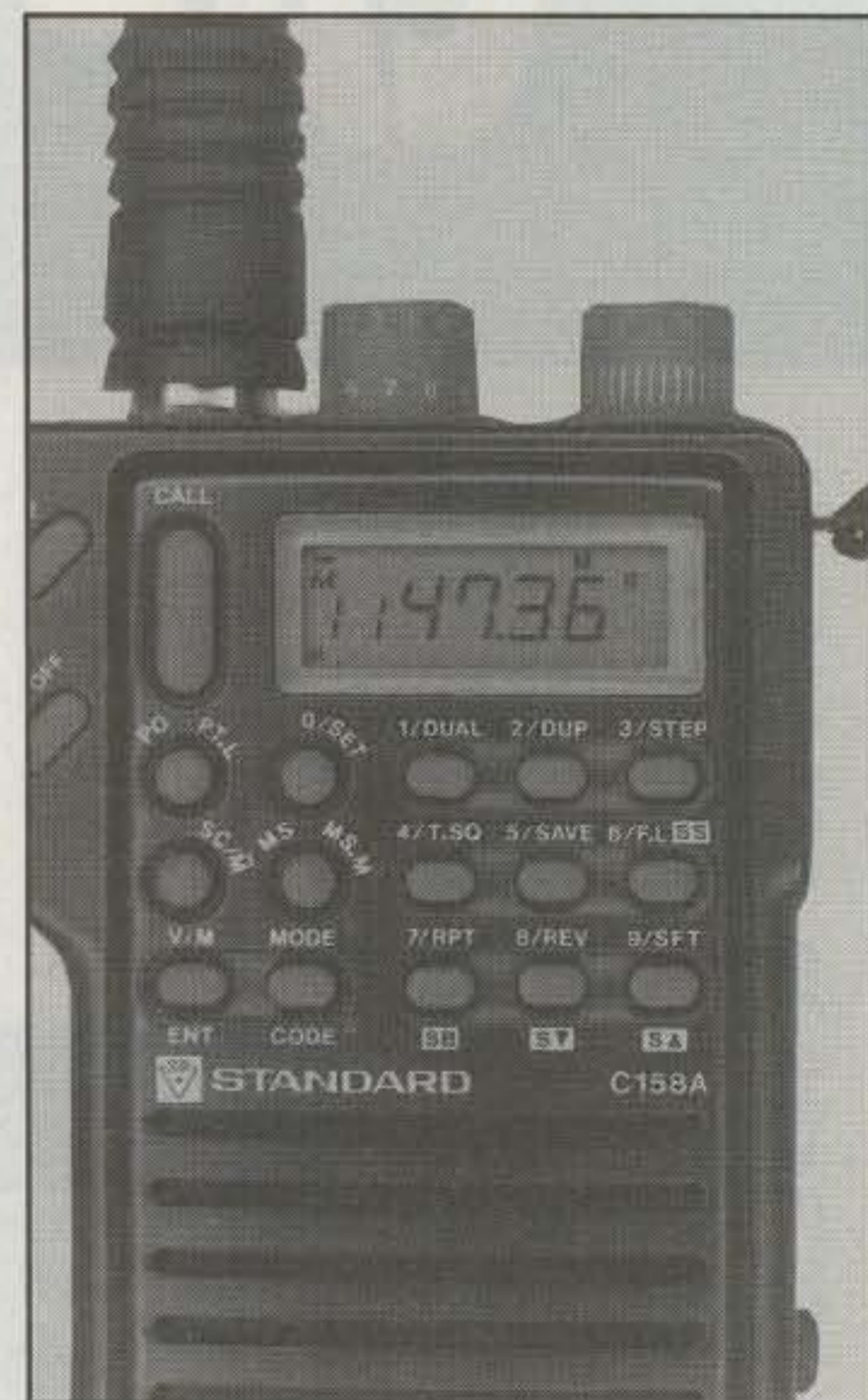
The C158A has 20 regular memory



Standard C158A hand-held, shown with the provided 7.2 volt, 700 mA nickel-cadmium battery pack. Push-to-talk is on the raised portion of the left side of the case, with the Function key just above it.

channels, plus "Call" for your favorite repeater; all channels store repeater offset and CTCSS. The 20 regular memory channels are in two banks of 10, and to get keyboard access to a channel in the bank you are in simply requires pressing 0 through 9. To get to the other 10 channels, you must either press **Function** and the **SC/M** key, which switches memory banks, or use the handily large "channel" knob on the top to toggle continuously through all 20 channels.

Speaking of the top knobs, one of the 158A's many features that really pleased me is the squelch control. It's a top-mounted pot, but is accessed with an almost-flush, fingertip-operated, grooved disk, so it is essentially impossible to



*Closeup view of the C158A's keyboard. The display indicates memory channel 1, repeater offset **plus**, transmit tone encode **on**, and transmit power **high**.*

move it unintentionally. No more accidental squelch opening when you pull this radio out of your pocket!

The 158A comes out of the box with a 7.2 V, 700 mA nickel-cadmium battery, to me the ideal choice for any portable radio. I've always been a proponent of lowest voltage, highest current power for my hand-helds. Ohm told us that current drain increases proportionally with voltage, so the higher the battery voltage the shorter the radio's operating time—even with the same current capacity. I've rarely had a problem making a repeater with 2 watts output, but I've yet to make a contact after my battery ran down! On regular squelched receive the 158A draws only 35 ma; that drops to a miserly 13 ma

*P.O. Box 406, Glenview, IL 60025

Comparing the KPC-9612 to any other TNC of equal cost would be like comparing what you see here to a gentle breeze.



Until now, all TNCs in this price range could operate at only one baud rate at a time. Now, Kantronics has created a whirlwind with its newest TNC: the KPC-9612. This is a dual-port TNC, meaning it can send and receive messages at 9600 baud and 1200 baud *at the same time*. So what you get with the KPC-9612 is twice the power for the

same price. You can also choose a 32K RAM or, for extra mailbox space, a 128K RAM. Either way, the KPC-9612 is portable and is only a wisp larger than the KPC-3, and it can run on a single 9-volt battery.

If you've been asking where you can find a small, inexpensive, dual-port TNC, look no further. The answer is blowin' in the wind.

Kantronics

Announcing the newest KENWOOD



**TS-950SDX
HF TRANSCEIVER**

**FREE KENWOOD
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1000 QSL CARDS
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**TS-850S/AT
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**BONUS!
GET '75 CASH
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**TS-450S/AT
HF TRANSCEIVER**

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GET '60 CASH
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PURCHASE!**

Tucker Electronics is proud to announce the addition of Kenwood Amateur Radio products to our ever-growing product line-up!

KENWOOD

We carry the complete line of Kenwood products and accessories ALL IN STOCK & we've purchased thousands of dollars in inventory before the Oct. 1 price increase to assure you of the lowest possible prices!



Tucker Is Your New Kenwood Source! Call, Write or Fax For our FREE Holiday Catalog Featuring the entire Kenwood Line!

**TH-22AT
2M HT**

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PURCHASE PLUS
CORDURA CASE
FOR '99!**

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1. THE BEST CUSTOMER SERVICE AVAILABLE...

From giving helpful advice on choosing the right radio for you to shipping your order as fast as possible, our more than 100 friendly employees are here to help you. Plus, we have the best return privilege in the business-30 days to decide if the product is for you-NO ONE CAN MATCH THIS!!

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We don't solicit your business on our TOLL-FREE lines and then force you to pay for long distance charges if you have a question or problem. Tucker customers call one TOLL-FREE line whether ordering, asking advice or needing technical support.

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Not only will we take your existing AMATEUR RADIO equipment on trade, but we will also take TEST EQUIPMENT, COMPUTERS, SHORTWAVE RADIOS AND SCANNERS. Get that new Kenwood radio you want...today! CALL FOR A TRADE-IN QUOTE!

4. ALL KENWOOD EQUIPMENT IN STOCK...

We carry the complete Kenwood line in stock, from the TS-950SDX to the smallest carrying case or filter we carry all products IN STOCK...no hassles waiting for parts to come in... we have thousands of dollars in Kenwood inventory in stock to assure you of quick delivery.

5. THE BEST VALUES...

We have stocked up our inventory before the October 1 price increase to assure you of the best prices. Plus we always buy in the largest quantities possible further assuring you a fair deal.

OUR SATISFACTION POLICY IS SIMPLE...WE WILL DO WHATEVER IT TAKES TO MAKE YOU A TUCKER CUSTOMER FOR LIFE! ASK YOUR FRIENDS ABOUT OUR SERVICE, QUALITY AND SELECTION...

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**TH-79A
DUAL
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HT**



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**TS-50S
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**TM-733A
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Icom IC-W21A \$299

Dual Band Transceiver (2m/440 MHz)

The Easiest Dual Bander Ever Built! Icom Quality And Features At A Breakthrough Price!!

No, This Is Not A Misprint...Through a special purchase Tucker is able to offer this quality, feature-packed dual bander at a remarkable \$299. Don't let the low price fool you, this is truly an incredible radio...

The Simplest Operation, Lightweight And Dependable...

Operation is the simplest ever, using few switches and independent volume/squelch controls for each band. The ergonomic body design fits snugly in your hand: measuring only 2.2"W x 4.9"H x 1.4"D its small but tough splash-resistant construction endures under severe outdoor conditions.

Whisper Function For Telephone-Style Operation-Built In!

Icom has innovated this new operation style-coined the Whisper Function. You can enjoy telephone-style communication through a microphone equipped battery pack that enables FULL DUPLEX CROSSBAND OPERATION. Forget the push to talk switch and communicate with ease when using this mode!

Easier Repeater Operation With Repeater Memory

Every time you access a repeater, all settings are automatically memorized into a repeater memory that is independent from memory channels and call channels. Recalling the last used repeater information is quick and simple.

Complete 400 MHz and 800 MHz Coverage with a Keypad Modification...

That's right, not only will it receive 100-200 MHz completely, but also 400-500 MHz and 800-1000 MHz with only a keystroke modification (no wires to cut). Yes, we do mean complete coverage!

And That's Just The Beginning...

Look at these other great features:

- Battery capacity indicator that shows the remaining battery capacity
- DTMF operation with optional HM-65A microphone
- Large, easy-to-see function display with 5 second automatic OFF lighting for night operation and 24 hour system clock
- Selectable output power: 5W, 3.5W, 1.5W, 500mW or 15mW of economical low that provides longer operating time (5W requires 12V battery or external 12V source)
- Mono hand capability for easier operation and battery power saving
- High-speed programmed and memory scan functions

- Total 70 memory channels: 32 memory channels and 1 call channel that store repeater information +2 scan edge channels for each band
- Dial select steps for fast frequency changing
- Monitor function to temporarily receive a repeater input frequency
- Lock function that prevents accidental frequency changes
- External DC power jack that is convenient for mobile operation
- Automatic power down function that allows 15mW of low output power transmission just before the dry cell batteries become exhausted
- Built-in subaudible tone encoder

Ready To Operate: Whisper-Mode battery pack (BP-131), wall charger, dual band flexible antenna, handstrap and belt clip are supplied with the transceiver.

Optional Accessories:

Batteries:

Battery-Tech BP-131 7.2V/900mAh \$52 (Icom BP-131 7.2v/900mAh \$96)

Battery-Tech BP-131S 7.2V/1500mAh \$59

Battery-Tech BP-132 12V/600mAh (5W) \$59 (Icom BP-132 \$109)

ALL NiCad Batteries Have Microphone Built-in

Icom BP-130 "AA" Battery Case \$21

Carrying Cases:

Icom LC-103 (for BP-130/131) \$25

Icom LC-104 (for BP-132) \$25

Icom CP-13 Cigarette Lighter Cable With Noise Filter \$22

Icom BC-79A Rapid Charger \$132 (requires AD-28 adapter \$12)

HM-55A DTMF Speaker-Microphone (with DTMF keyboard) \$69

HS-51 Headset \$67

Hurry! At This Price These HT's Are Sure To Sell Out Fast-Get Yours While They Last!

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ICOM

Tucker Announces the Addition of Cushcraft, Comet and Rohn to our Huge Product Line!

Comet GP-9

2M/70cm Fixed-Station Antenna

\$189

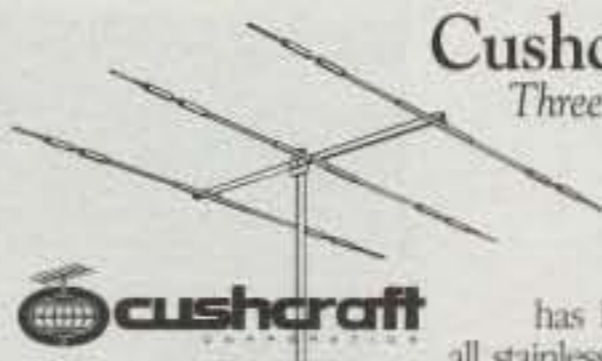
Featuring the COMET exclusive SLC System for maximum gain, and stable resonant frequencies. Wide band, and like all COMET Antennas, pre-tuned. Heavy-duty fiberglass and a compression washer within the ABS connecting joint prevents moisture/pollution contamination. Simply use the included stainless steel mounting brackets and your mast, and you're ready to experience COMET DualBand performance.

- Gain & Wave: 144 MHz: 8.5 dBi 5/8 wave x 3; 446 MHz: 11.9 dBi 5/8 wave x 8
- VSWR: 1.5:1 or less
- Max Power: 200 Watts
- Length: 17' 8"
- Weight: 5 lbs 11 oz
- Mounting to Mast Size: 1 1/4" x 2 1/2"
- Connector: SO-239 or Female N-type
- Construction: Heavy-duty fiberglass, 3 sections

Cushcraft A3S

Three Element Beam

\$339



The A3 World Ranger, has become the A3S with all stainless steel hardware. It's a real power-house in a small space and lets you work the pile-ups with confidence. All you need is a lightweight tower and a rotator to enjoy the benefits of the A3S. It's a proven performer in DX-peditions and contests and handles full power from you linear. Construction features include pinned boom sections, heavy duty element clamps with backing plates plus all stainless steel hardware. When space is at a premium, but you want the benefits of a full size tri-bander, the A3S is right for you!

Export Sales Welcome!

Cushcraft R7

Antenna

\$379



This 22 foot marvel packs a punch on 10 to 40 meters that has to be experienced to be believed. With only 7 short counterpoise rods, the R7 will fit just about anywhere without even using ground radials. If you're looking for the most performance in the smallest package then the R7 is for you. Precisely tuned radio frequency traps optimized for each band and strategically placed X-hats enable the R7 to radiate a low angle signal that makes working DX a snap. Experience 7 band performance anywhere with the incredible R7.



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"Where your dollar goes"



Tucker T-1000 The Best 300 W Tuner

Introductory Price: \$139⁹⁵

The Tucker T-1000 has been designed to give you more than any other tuner currently available for 300 W and its construction will let you appreciate its many features for years to come. Covers the frequency range from 1.8 to 30 MHz; 3.5 to 30 MHz, continuous 300 watts; 150 W on 1.8 MHz. Utilizes continuous rotation capacitors to provide superior transmitter/antenna tuning. Inductance is setup using a 12-position switched inductor. Antenna Selector: six positions: COAX 1 tuned and DIRECT, COAX 2 tuned and DIRECT, bypass and balanced antenna. Power Switch: high and low (300 W/30 W). Comes complete with a 1 year warranty and our risk-free Tucker SatisfactionPlus guarantee. Dimensions: 10.2" (259 mm) W x 9.4" (239 MM) D x 3.5 (89 mm) H. Weight: 3.4 lbs (1.5 kg). Made in the U.S.A! Get the best, order your T-1000 today!

free Tucker SatisfactionPlus guarantee. Dimensions: 10.2" (259 mm) W x 9.4" (239 MM) D x 3.5 (89 mm) H. Weight: 3.4 lbs (1.5 kg). Made in the U.S.A! Get the best, order your T-1000 today!



**NOW AVAILABLE...THE TUCKER T-3000
1500 WATT ANTENNA TUNER ONLY \$399
CALL FOR MORE DETAILS!**



Tucker TF-144 2m Intermod Filter

Reg. \$79

Introductory Special \$59



Don't Let Intermod Ruin Your Hamming...

If you are like most us, your 2m radio becomes filled with the squawks and beeps of intermodulation distortion or "intermod" whenever you get close to an urban area. This is caused by the thousands of high-power pagers, FM broadcast stations, cellular sites and other nearby VHF transmissions that overload your 2m receiver's sensitive front end. Most modern transceivers don't have the helical filtering to stop intermod from getting in.

Our Filter Stops Intermod...

Our team of RF engineers have designed a 3 pole filter that will end your intermod problems forever. Our goal was to design the finest, tightest intermod filter available and, after exhaustive testing, we have done so. The TF-144 automatically switches on during receive and attenuates out-of-band signals by as much as 50 dB or more (see graph).

Easy To Use...

Simply install the TF-144 in-line between your antenna and the antenna input of your mobile rig or handheld and hook up the attached wire to +12 VDC (it draws only minimum current). We even supply a wire connector for attaching it to your existing 12 V transceiver hookup. The TF-144 takes care of the rest. It automatically switches on during receive and off during transmit. Nothing could be easier!

Year Warranty And Our Exclusive Tucker SatisfactionPlus Guarantee...

The TF-144, like all of our other Tucker Brand Products is built to last. It is designed and manufactured to industrial standards, not the typical "amateur grade" quality found in most amateur radio accessories. Our exclusive SatisfactionPlus Guarantee means you will be more than satisfied with the TF-144's performance- if not, simply send it back within 30 days- NO QUESTIONS ASKED!

Specifications...

Passband.....144-148 MHz (2m Amateur)

Connectors.....SO-239

Power Requirement.....10-15 VDC less than 100 mA

Dimensions.....2.5" x 1.75" x 1.75"

MADE IN USA

**FREE! WITH ANY PURCHASE
OVER \$100...WHERE DO WE GO
NEXT? By MARTII LANE...A \$22
VALUE! JUST MENTION THIS AD!**

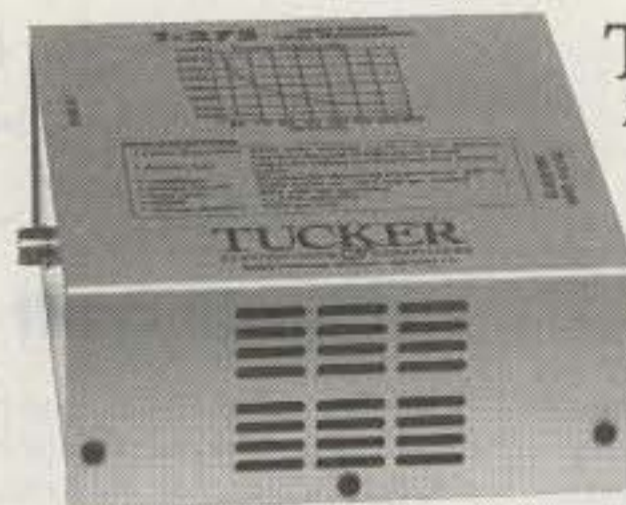


Tucker T-250

1500 Watt Dry Dummy Load

\$54⁹⁵

If you need a full 1500 W dummy load the new T-250 fits the bill. This air-cooled load will handle 100 watts continuously and 1500 watts for up to 10 seconds at a time from DC-650 MHz. Our T-250 utilizes a special ceramic constructed resistor which has stronger composition and offers better performance than the ordinary carborundum resistors used in most dummy loads. VSWR is 1.3:1 or less and it is compact and lightweight. Attractive blue and gray finish. SO-239 connectors. One year warranty and our Tucker SatisfactionPlus guarantee.



Tucker T-275

2500 Watt Fan-Cooled Dry Dummy Load

\$169

The new T-275 is the highest-power rated dummy load on the market today! It will handle 2500 watts average for a full minute! Its quiet fan keeps the load cool for longer life. The resistors used in our T-275 is of a special ceramic construction which has stronger composition and offers better performance than the carborundum resistors used in most dummy loads. Operates from DC-150 MHz with and SWR of 1.3:1 or less. SO-239 Connectors. Compact and lightweight. Attractive blue and gray finish. One year warranty and our Tucker SatisfactionPlus guarantee. Built to last in the USA.

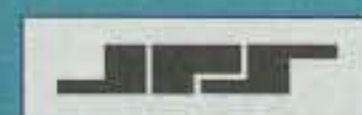


Tucker TA-500

Dual Band (2m/70cm) Magnet-Mount Mobile Antenna

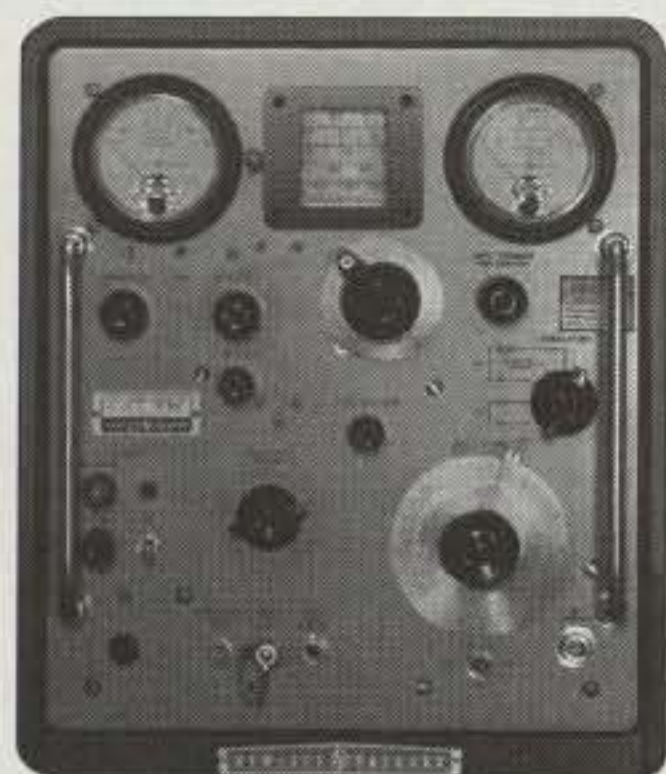
\$14⁹⁵

This inexpensive little dual-band mag-mount will give you great performance for years to come. It features a 19" stainless steel whip with an attractive "cellular look". The 3" magnet is one of the strongest we've seen and has a protective pad on the bottom for scratch-free installation. Handles 200 W with an SWR of less than 2:1 all across 2m and from 435-450 MHz. Unity gain on 2m, 2.1 dB gain on 440. Comes with 14' of coax with PL-259 connector and FREE PL-259 to BNC connector for portable operation with your HT. 1 year warranty and our Tucker SatisfactionPlus guarantee. Made in USA.



As far as your expectations!"

DRSI SIGMA pro-am ASTRON CORPORATION Bearcat EMOTO SANGEAN™ A World of Listening ICOM



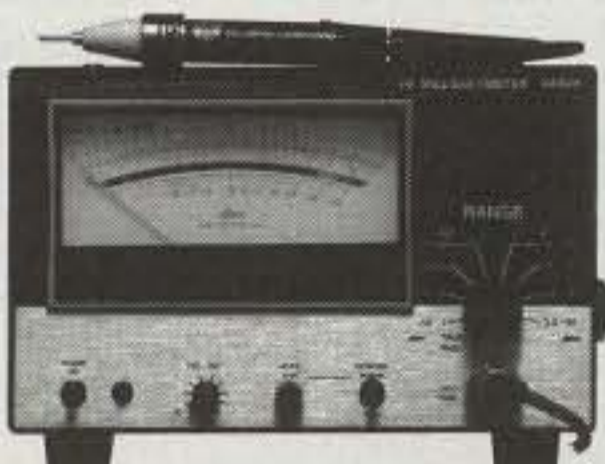
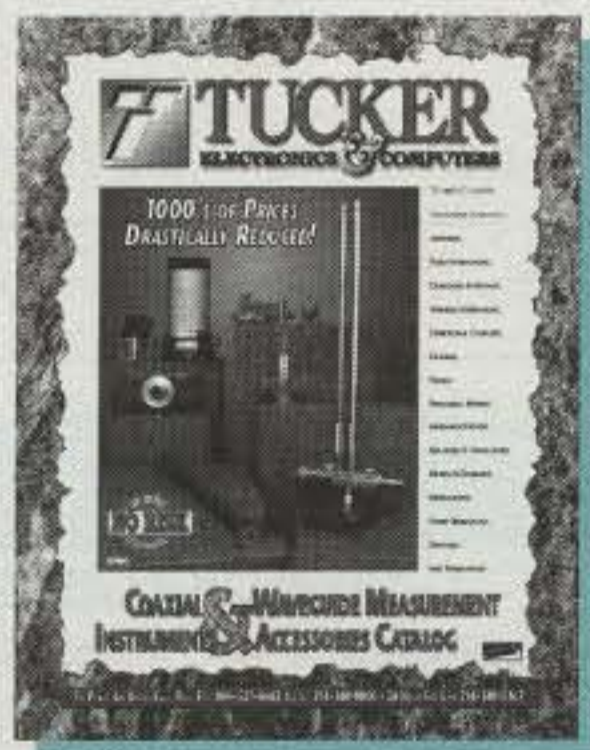
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Hewlett Packard 608E
Signal Generator
\$239

The HP 608E provides high-quality, versatile performance with distinctive ease of operation. Offers an adjustable, calibrated output of 0.1 μ V to 1 V rms from 10 to 480 MHz. 0 to 95% AM, +CW or Pulse modulation. Basic accuracy of \pm 0.5%. Includes a built-in crystal calibrator which provides frequency check points; jack provided for audio frequency output; crystal accuracy better than 0.01%.

0.5%. Includes a built-in crystal calibrator which provides frequency check points; jack provided for audio frequency output; crystal accuracy better than 0.01%.

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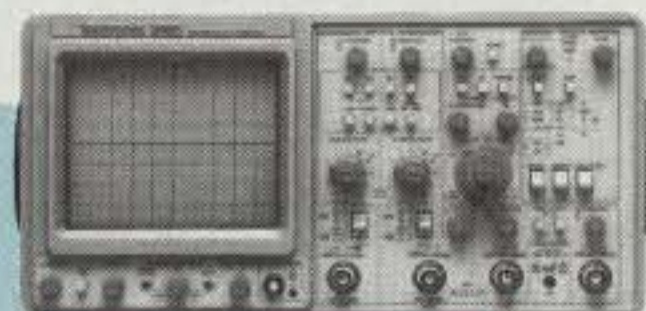


Includes Probe... Measures to 1.2 GHz!
Ballantine 3440A
1.2 GHz RF Millivoltmeter
Original Price \$1850
\$199

Advanced circuitry and probe design exclusive to the Ballantine 3440A provides superior performance, measurement capability, speed and convenience in this RF millivoltmeter. The 3440A measures signals over the frequency range from 10 kHz to more than 1.2 GHz in eight ranges from 1 mV to 3 V full scale. From 100 μ V to 30 mV response is true rms, permitting measurement of distorted non-sinusoidal waveforms. To deliver the best performance possible, the 3440A utilizes an accurate, temperature controlled probe and solid-state chopper. Zero dB reference is continuously adjustable over a 3 dB range making simplified relative gain/loss measurements quick, easy, and accurate.

Your Used Equipment Is Valuable. Call For an Instant Trade Quote!

TEST EQUIPMENT
WANTED



ALL NEW RADIO EQUIP.
AVAILABLE

We made an usually large buy and we're passing the savings on to you!

Hewlett Packard 10833A, B, C, D

HP-IB Interconnection Cables
10833A\$35
10833B\$35
10833C\$30
10833D\$35



We recently purchased a quantity of HP-IB cables and we're passing the savings to you! These are quality HP cables and feature a connector block at both ends. Each HP-IB cable has a plug on one side and a matching receptacle on the other, allowing several cables to be connected in parallel. Cable length: 10833A, 1 meter (3.3 ft.); 10833B, 2 meters (6.6 feet); 10833C, 4 meters (13.2 feet); 10833D, 0.5 meters (1.6 feet).

RS-232 or HP-IB INTERFACE!

Most Popular Digital Plotter...Supports Most Software

HP 7475A/001 or 002 **\$595**
Graphics Plotter



With the HP 7475A, applications are only limited by your imagination! Providing high quality, six color plots on A or B size paper and transparencies, this graphics plot can do it all! Addressable step sizes down to 0.001 in. allow for plotting of as many as 1000 points per inch. This high resolution assures straight lines and smooth curves in any orientation. A 90 degree offset control is provided on the front panel. This graphic plotter uses the powerful HPGL language with over 50 high level commands. The 7475A can also be used to digitize plots for entry into your computer system. Available with either an RS232C (opt. 001) or HP-IB interface (opt. 002). Please specify option when ordering.

All Test Instruments Include Manuals and are Completely Operational Unless Otherwise Stated.

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using the **Battery Saver** function. That calculates to 20 hours continuous regular squelched receive, or almost 54 hours using battery saver.

Two features that are really handy are **Paging** and **Code Squelch** (providing all your friends have radios that also have this feature). With it you can operate at a hamfest, Field Day setup, or any other occasion that involves multiple radios and limited frequencies, yet you only have to listen when someone is calling either you or your group! Here's how it works.

Say you, Sam, and Bill are going to a hamfest together. You all have different specific interests, so you don't want to prowl the fleamarket together, but you do want to be able to keep track of each other and be able to alert one or the other when you spot something of interest. If you all have hand-helds that include a compatible paging feature you can decide on a three-digit Group Code plus individual three-digit Page Codes for each of you.

With the Page feature enabled on your radio, its receiver remains squelched until one of you initiates a Group Page ("Hey, they're about to serve free beer in the prize tent!") or an individual page ("Sam, I've found you a good deal on a 6 meter beam halfway down Row 3."). When your radio is activated by either a Group or Individual Page, you'll hear a "Beep" and be able to see on its display who has

STANDARD C158A SPECIFICATIONS

Frequency Range:	130.0-169.995 MHz (receive) 144.0-147.995 MHz (transmit)*
Operating Voltage Range:	5.0-16.0 V
Dimensions:	5.25"H x 2.2"W x 1.25"D 13.3 x 5.5 x 3.2 cm (standard battery)
Weight:	10.6 oz. (300 gm)

Receiver Performance

Sensitivity:	0.158 μ V (12 dB SINAD)
Quieting (0.5 μ V signal):	Better than 30 dB
Squelch Sensitivity:	0.1 μ V
Audio Output:	250 mw into 8 Ω (10% distortion)
Current Drain (squelched):	35 ma
Current Drain (Power Saver):	13 ma
Current Drain (Auto Off):	5 ma

Transmitter Performance

RF Power Output (12 V):	5 W
RF Power Output (7.2 V):	2 W
RF Power Levels (12 V):	5 W (high), 2.5 W (med), 0.35 W (low)
RF Power Levels (7.2 V):	2 W (high & medium), 0.35 W (low)
Spurious Signal:	Better than -60 dB
Modulation System:	Reactance
Maximum Deviation:	\pm 5 kHz
Transmit Current Drain with 13. V Supply:	1300 ma (5 W output) 950 ma (2.5 W output) 480 ma (0.35 W output)
with 7.2 V Supply:	900 ma (2 W output) 480 ma (0.35 W output)

* Transmit range expandable for CAP and MARS with proper license.

Table I- Specifications of the Standard C158A 2 meter hand-held.



Daiwa, Rugged Reliability for Today's Amateur

DAIWA POWER SUPPLIES



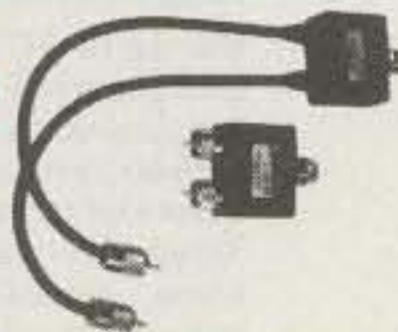
More power, features & quality - for less! Rugged, compact. Fully protected with both "crowbar" overvoltage & current protection circuits, less than 2.5mV ripple. Front panel, fully adjustable voltage is standard on most models! Other models available.

MODEL	VOLTAGE	CURRENT (ICS)	CURRENT (CONT)	SIZE (INCHES)	WEIGHT (LBS.)
RS40X	1-15	40A	32	11x5.5x9	22
RS300	1-15	30A	24A	7x6x9	18
PS120M	3-15	12A	9.2A	5x4x9	11
PS50TM	8-15	5.2A	4.2A	6x3x8	6

* ICS: 50% Duty Cycle

HIGH POWER DUPLEXERS

- DX10M - PL259's With cables on both bands
- DX10N - PL259/N With cables 440MHZ/ Type N
- DX10D - PL259 Without cable on both bands



Duplexer Specs:

PASS BAND	1.6 - 30MHz	140 - 150 MHz	400 - 460MHz
PASS POWER	400 W CW 1 KW PEP	250W CW 500W PEP	200W CW 400W PEP
INSERT. LOSS	less 0.1 dB	less 0.1 dB	less 0.2 dB
ISOLATION	over 60 dB	over 60 dB	over 60 dB

DAIWA'S wide range of accessory products offers more features and quality - for less! Call your favorite dealer for complete details and pricing.

NEW EARPHONE MIC
EX600 EARPHONE MIC FOR CELLULAR PHONES
EX700 EARPHONE MIC FOR HANDHELD TRANSCEIVERS WITH PTT SWITCH



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DP800 series, digital PEP or Avg. pwr reading in three models for 1.8 - 525MHz. • NS660 models covering 1.8MHz - 2.5GHz, all pwr levels, PEP or Avg w/ remote sensor capability. • CN101 series-for PEP & Avg pwr reading, for HF and VHF/UHF. • 410 mobile series compact HF & VHF/UHF models (2 power levels) w/ custom backlit meter for night viewing.

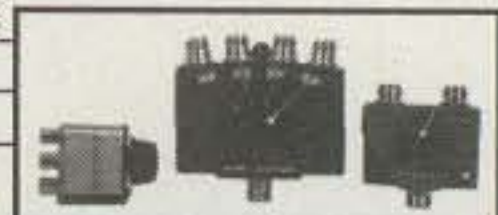
MODEL	FREQ. RANGE	POWER RANGE	CONN. TYPE	MIN SWR DETECT
DP830	1.8-150MHz 140-525MHz	0-1.5kW 0-150kW	UHF & N	< 1W
NS660A	1.8-150MHz	30/300/ 3kW	UHF	< 8W
CN101	1.8-150MHz	15/150/ 1.5kW	UHF	< 4W
CN103M/N	140-525MHz	20/200W	UHF or N	< 4W
CN460M	140-450MHz	15/150W	UHF	< 3W

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VSWR	below 0.12	below 1:1.3 at 1.3GHz
Insertion Loss	less than 0.2 dB	< 1.2 dB at 1-2 GHz
Isolation	60 dB 600MHz	50dB 1 Ghz
Connector	SO239	N
Output Port	2	2

other models available



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paged you! No more bleeps, bleeps, or extraneous chatter!

Reviewing the keyboard, I found all the expected functions plus a few that I haven't seen before on a hand-held but found very useful. For example, the **Lamp** switch not only turns on the display backlight while pressed, it turns it on and leaves it on when pressed along with the Function key—very handy when programming the C158A in the dark. In addition, pressing **Lamp** while transmitting sends a Touchtone® "A." The other five keys to make the C158A's keyboard a full 16-key keyboard are also additional key functions.

SQL Off operates in the Page Mode when the squelch pot isn't functional and is very handy for setting the volume control. **PO** sets power out at three levels: 5, 2.5, and 0.35 watts with the optional 12 volt battery. With the supplied 7.2 volt battery, **H** and **M** power are both 2 watts with 0.35 watt on **L**. Pressing **PT.L** along with the Function key locks out the push-to-talk switch. This key also provides a Touchtone® "B" while transmitting.

Pressing **SC/M** once transports the displayed frequency into the VFO mode, and pressing it again starts frequency scan. The Function key selects memory banks, and when transmitting this is also the Touchtone® "C." The **V/M** key selects VFO or Memory, and with the Function key enters the displayed frequency into memory; this is also the Touchtone® "*" on transmit.

0/SET is the zero digit for channel or VFO frequency selection, and with the Function key provides access to no less than nine different functions, including CTCSS tone selection. Some others include prompt tone muting, 5 kHz keyboard entry enable/disable, Auto Power Off, and 10 MHz keyboard entry. This function highlights what I found to be the weak point of an otherwise excellent manual; there's no index, and none of the nine "Set" functions are listed in the table of contents. In order to find out how to set the CTCSS tones, I literally had to page through the manual to page 51, where I found "Entering the Tone Frequency." Once I found it, no problem; finding it, however . . .

Moving down to the **MS/MS.M** key, **MS** enables scan of all channels in one bank. With the Function key and **MS/M**, only designated channels will be scanned (Preferred Memory Scan). This key is also the "D" Touchtone® key on transmit. **Mode** is used to select the Paging Mode, described above. **Code** (with the Function key) enables selection of the 3-digit Page tones. On transmit, it's also the "#" key.

When the Function key is pressed, the "1" through "9" keys access the following functions:

1/DUAL: Enables monitoring of two frequencies, with the primary frequency interrupted every three seconds to sample the secondary.

2/DUP: Permits transmission and reception on two totally unrelated frequencies.

3/STEP: Permits changing the frequency step in VFO mode from 5 to 10, 12.5, 20, 25, or 50 kHz.

4/T.SQ: Turns on the CTCSS tone and receiver tone squelch functions.

5/SAVE: Activates the Battery Saver function, which puts the C158A in a "Standby" mode which turns on the receiver briefly once each second to check for activity.

6/F.L. (SS): Locks the keyboard and tuning knob so frequency cannot be changed accidentally; when in Scan mode, it changes the scanning mode.

7/RPT: Turns repeater offset on and off; in Scan mode it switches between Pause and Busy scans.

8/REV: Switches transmit and receive frequencies in Repeat mode; in Scan mode it selects down scan.

9/SFT: Permits change of repeater offset frequency; in Scan mode it selects up scan.

If it sounds as if this radio has a lot of neat features, it does. In fact, I used and really enjoyed it for quite a while without realizing just how much there is to it.

The C158A is distributed through Standard Amateur Radio Products, Inc., P.O. Box 48480, Niles, IL 60714. The C158A has an amateur net price of \$339.00. ■

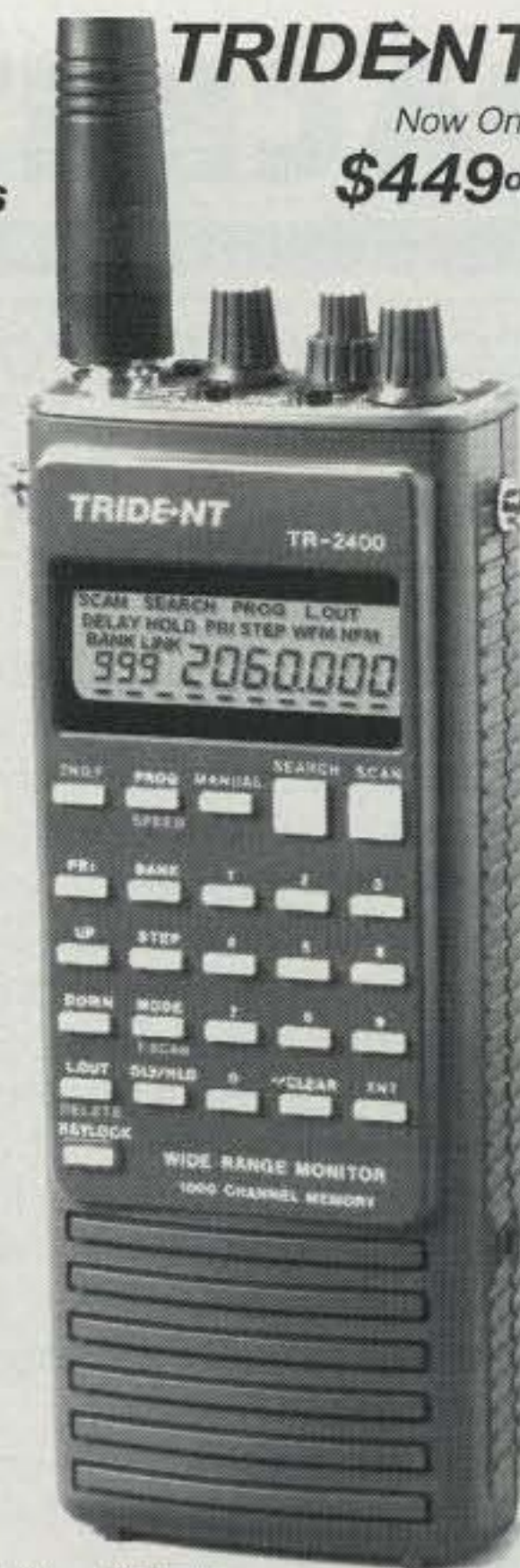
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Send for the video tape and duplicate what you see; then call your electric company and tell them to come take down their wires to your house . . . you no longer need their service and you don't want their monthly bills.

hardware, electrical supply, and auto part stores.

If after viewing the video you still don't feel competent to assemble the components, then simply hire a qualified electrician. This is not a new invention but an innovative design using technology that can be bought off the shelf, that was not available five years ago, which

now makes it feasible and extremely reliable. NOT SOME VAGUE THEORY (not a free energy device).

This is something we have lived with for over two years, 24 hours a day without a single power failure (which is something none of our neighbors who are hooked up to the power lines of the Electric power Company can say).

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PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

9600 Baud From The User's Point of View

We've covered the topic of 9600 baud several times in this column, but mostly at the 9600 baud network node level. In the case of 9600 baud networks and backbones, we have performed our job well.

In looking over our packet columns we discovered that we are long past due covering 9600 baud with respect to user-level transceivers and terminal node controllers (TNCs). Most of our efforts with 9600 baud applications have meant that we chop, channel, and modify our transceiver audio modulation and demodulation circuits to accommodate the use of 9600 baud.

The high-speed data pair described in this month's column will fill the user-level void with flying colors.

Corny Communications

Ever hear the old cliché: "Sooner or later, every ole hawg comes across a good ear of corn?" I picked this one up from Ed, WB4MUL, one morning as he was describing his good fortune of having found a "good deal" on a radio purchase at the Columbus, Georgia hamfest. Hopefully, after you read this month's column you will have the same feeling.

There is no question that we have now gained the attention of the transceiver manufacturers. What used to be a chore that we didn't care to undertake has now been addressed at the OEM level. In this case, it has been handled very efficiently by Kenwood.

Not so long ago we had to chop and modify a transceiver to mold it into one capable of passing a 9600 baud data signal through its modulator circuits without sending the data through the phase-distorting elements of the microphone circuit. The other side of the data path had to have enough room for the 9600 baud data to pass through the receiver IF without rolling off the data to such a degree that it was not recoverable at the discriminator.

Although I've written many articles about modifying transceivers for 9600 baud operation (May 1990 and May 1992 CQ, and in several of my books), I've never been enthusiastic about the idea of modifying and possibly damaging the circuitry of my transceivers.

211 Luenburg Drive, Evington, VA 24550



The AEA PK-96 Packet Controller, a high-speed, single-mode data controller.

The Kenwood TM-251A

With the addition of the new Kenwood TM-251A, the chop and channel job has gone away. Here is a 50 watt transceiver that has the capability for 9600 baud data without sacrificing the voice element or quality of phone operation.

Another one of our plights was centered around the installation of the 9600 baud modem. Most TNC manufacturers of course had built their TNCs with the provision to add an additional modem by way of the TNC modem disconnect header. This header was usually in the form of a 20-pin header that was configured to accept these proprietary devices.

After the James Miller, G3RUH, 9600 baud FSK modem set a clear standard, we then had a target for other systems to follow. This standard is now considered the FSK amateur standard for 9600 baud.

A few months ago I looked over the many new TNCs that were being offered to the amateur digital market. I wanted to see who had taken the plunge to build a truly 9600 baud TNC that would target the end user. The idea was to find a TNC that was being manufactured purposely for 9600 baud.

Enter The AEA PK-96

The AEA PK-96 has been engineered around a different CPU, and it has the features that are not found in other commercial, off-the-shelf (COTS) TNCs. In addition, there is the user full-featured mail-

box, which we will discuss later in this column.

The AEA PK-96 terminal baud rates will vary according to the kind of computer you use and the associated terminal software. When operating the PK-96 at the radio baud rate of 9600 baud, the terminal speed should be set for a speed greater than 9600 baud. I use either 19200 baud, or with the late-model PCs 38,400 baud. The latter is used only when the terminal program (software) will support this rate.

Some of the more popular PK-96 to terminal interface examples are provided in the unit's well-documented manual. I'll have more comments about the PK-96 manual later.

AEA offers several terminal (software) programs for the IBM and compatibles. AEA also has a software package for the Macintosh called MacRATT.

The PK-96 interface to the Kenwood TM-251A dataport is shown in fig. 1. Although I've included the wire colors associated with the PK-96 signals, it is always best to verify the final connector wiring. All hardware level controls and interface connections are made at the rear of the AEA PK-96. In fig. 2 I've drawn a rear view of the PK-96.

Having interfaced the PK-96 and the Kenwood TM-251A, the next step was to determine the optimum timing setup for the PK-96 and the TM-251A. Setting timing parameters in a 1200 baud station is more or less straightforward, and in many TNCs the default parameters will suffice. In the case of this AEA and Kenwood

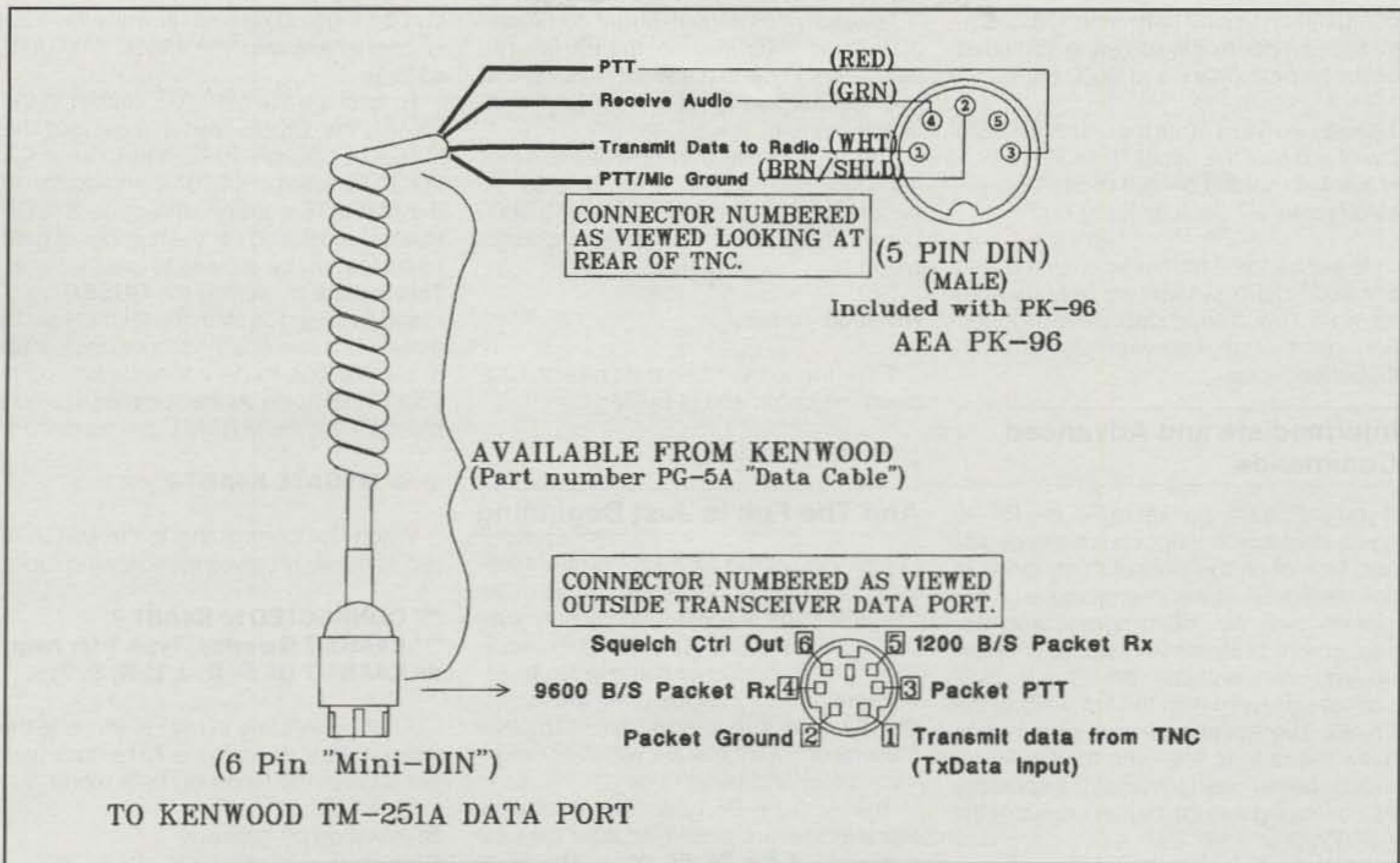


Fig. 1- AEA PK-96 interface to the Kenwood TM-251A dataport.

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combination I found that using TNC parameters similar to the following provided optimum performance at 9600 baud.

TXDelay = 15 to 17 (not the usual 30 or 35)
Dwait = 5 (not the usual 16 to 33)
Frack = 2 (not the default of 5)
MAXFrame = 7 (let it all hang out!)

As we become further acquainted with our 9600 baud system we may try fine-tuning our 9600 baud station even further. For now, though, I am well pleased with its performance.

Intermediate and Advanced Commands

If you are new to packet radio, the PK-96 has a measure of support for the beginner. Use of all the packet commands is not employed at the intermediate or beginner level. As you progress and become more proficient in the use of packet, you can activate the "advanced" command level within the firmware of the PK-96. The advanced level commands allow the user to fine-tune the PK-96 for much better performance, especially when moving into the higher speed of the AEA PK-96.

To make the shift, or advance to the "expert" level, use the **EXPerT** command. At the **cmd:** prompt type:

EXP ON

This activates a much larger command list within the firmware of the PK-96. The user should spend a few minutes looking over the command list in the AEA PK-96 user's manual.

The AEA PK-96 can operate at either 1200 or 9600 radio port baud rates. To switch from 1200 baud (default) to 9600 baud, at the command (cmd:) prompt type:

HB 9600 <enter>

To return to the radio data rate of 1200 baud the command is similar:

cmd: **HB 1200** <enter>

And The Fun Is Just Beginning

In many ways the AEA PK-96 offers features not found in all TNCs. In this case, the term node is reinforced by truly supporting a node within the PK-96 firmware. This node is similar in some ways to the network nodes. It allows other station users to connect to it, and from it, to other stations or nodes that are within its range, frequency, and baud rate.

The AEA PK-96 node has additional features that are displayed after the user connects to the PK-96 node. The node name or callsign is entered using the **MYGATE** command entry. One of the features allows us to connect and issue the **L**, or listen, command. The **L** command

can be toggled on and off while the user is connected into the PK-96 MYGATE callsign.

To activate the MYGATE (node) in the PK-96, the PK-96 owner must set the MYGATE callsign. To illustrate, I'll use the MYGATE callsign K4ABT-7. In addition to the MYGATE callsign, the node SYSOP (owner) must also set the number of gate users that will be allowed to use the node. This is done by setting the **GUSER** command to three (3). With the GUSER set to three, you have enabled three pairs or up to six stations to be connected through your PK-96 node. At the command (cmd:) prompt I set the MYGATE call as follows:

cmd: **MYGATE K4ABT-7** <enter>

When first connecting to the MYGATE call, the user receives the following reply:

***** CONNECTED to K4ABT-7**
***** K4ABT-7 Gateway, Type ? for help.**
de K4ABT-7 (B, C, D, J, L, N, S, ?) >

After connecting to my PK-96 node the user types and enters the **?** The node user will receive the following help menu:

- B**(ye)—Log off gateway
- C**(onnect) **n**—Connect to station "n"
- C n STAY**—Stay connected to gateway when "n" disconnects
- D**(isconnect)—Cancel a connect attempt
- J**(heard)—Display stations heard



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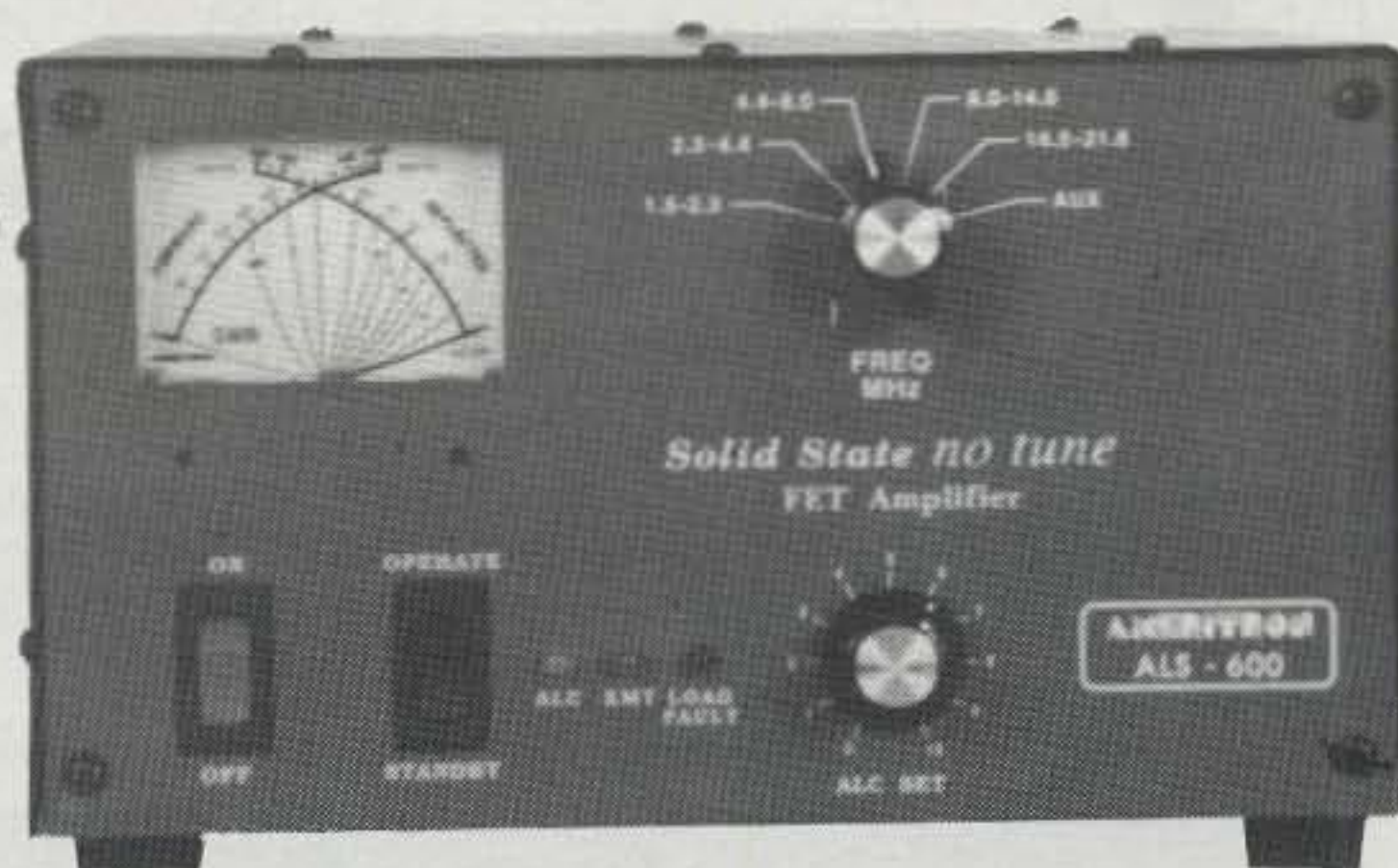
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- Thermal Overload Protection -- disables and bypasses

Exact power output of amplifiers may vary on each band.

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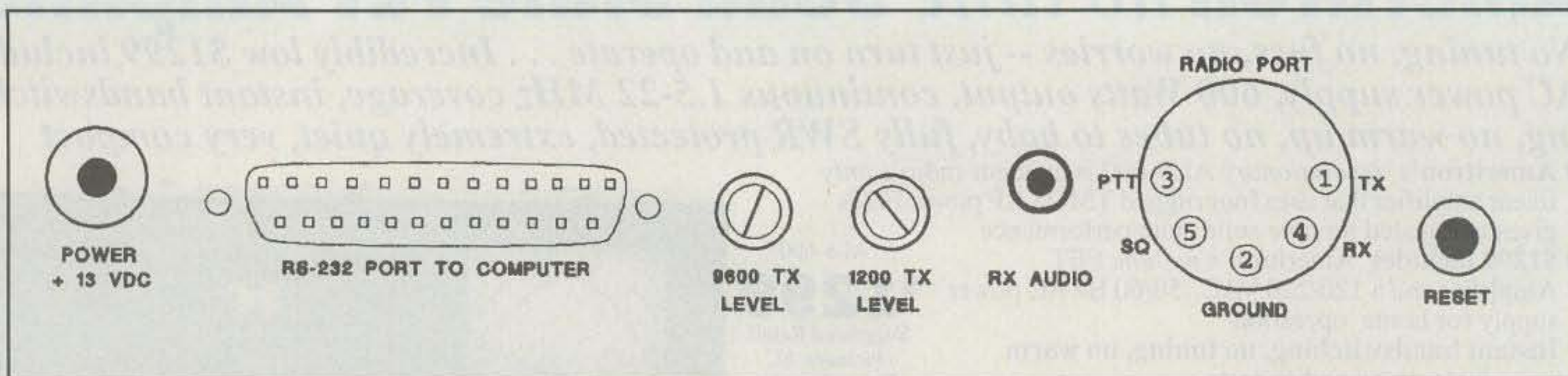


Fig. 2— At the back of the AEA PK-96 are the hardware connections and level adjustments. Note that provisions are made for each baud rate. Be aware of the RESET button at the rear edge of the PK-96. Once you have set the parameters into the PK-96, if you wish to reconfigure the unit from defaults, press and hold down the RESET button while turning on the TNC. Continue to hold down the RESET button for about 2 seconds after switching on the PK-96. The front-panel LEDs should cycle and go out, leaving only the POWER LED on.



The Elko, South Carolina SEDAN node (right, center). SYSOP is Ray, WA4OMM.

L(isten)—Toggle monitoring
N(odes)—Display nodes heard (up to 10 TheNET type nodes)
S(end)—Broadcast unproto (CQ, UI, etc.)
 de K4ABT-7—(**B, C, D, J, L, N, S, ?**)

Having connected to your AEA PK-96 gateway the user may then issue a connect request to another station or another node that is on the same frequency, at the same baud rate, and in range of the PK-96 node.

“Listen” To My Favorite Feature

I’ve already settled on my favorite feature of the PK-96 node. The listen feature allows the user to connect to the MYGATE callsign and issue the L, or listen, com-

mand. This toggles the listen feature on, and while the user is connected to the PK-96 node, the node will deliver the call or station received information to the connected (listening) station that issued the L command.

There is just one minor irritant that I find with the listen feature. It happens when I connect to the PK-96 GATE/NODE CALL from another node. As soon as I toggle the listen feature on, the listen feature of the PK-96 sees the second node sending the Heard text to me and it duplicates the same text again. This can turn into a round-robin that becomes a tiring exercise. To stop it I had to do a hard disconnect (Control C, then D <enter>) from the gateway.

When connecting to the PK-96 node/gate direct, you can have lots of fun watching QSOs by stations on the far side

of the hill that you would not otherwise see. When you are finished with the listen feature, simply issue another “L” to toggle the PK-96 listen feature off.

After the listen feature is off, you may connect to a station callsign that was seen while in the listen mode, or execute another command that is displayed when you view the PK-96 gateway feature menu.

If you have no other command to execute, you may issue **B** for the bye command and exit the node/gateway.

The MailDrop

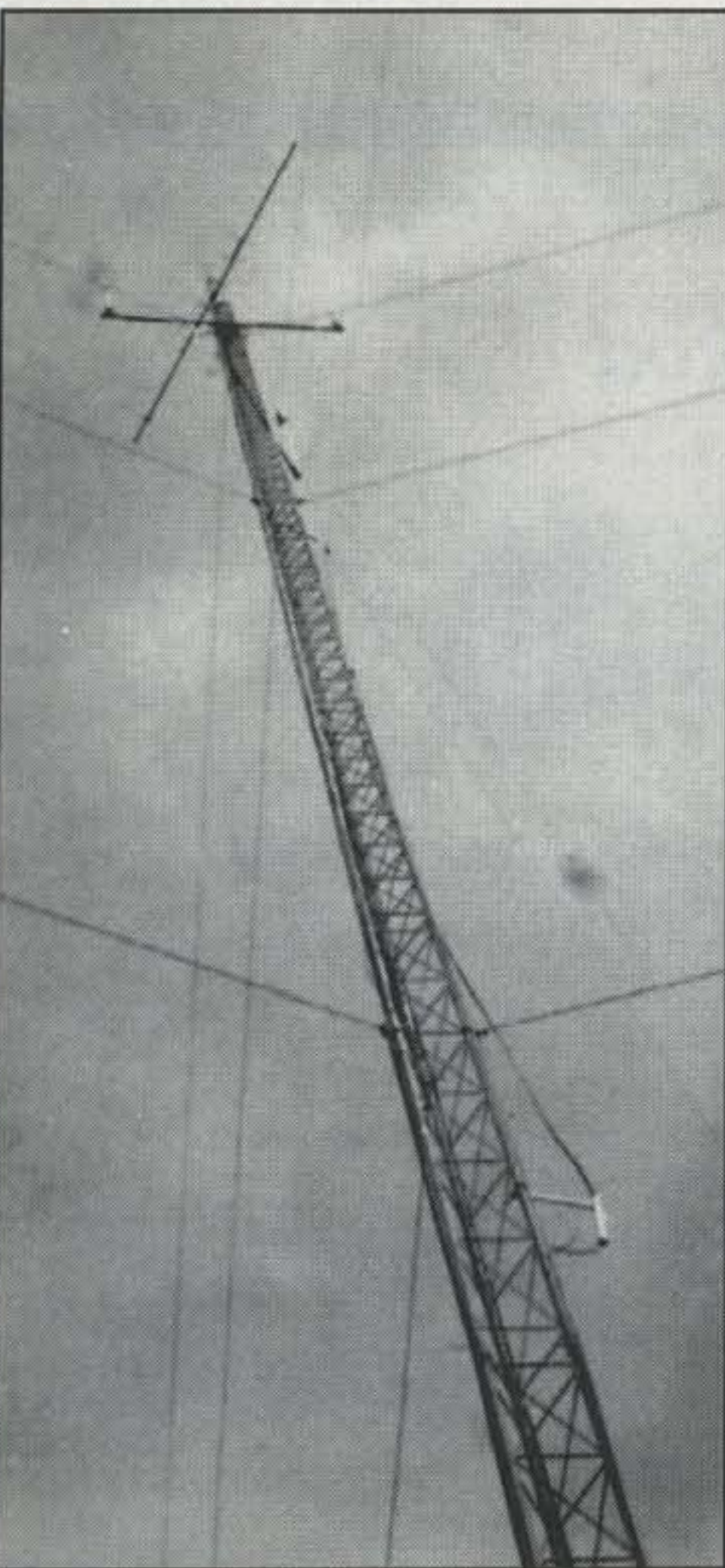
No, you don’t have to leave your computer on while your mailbox is on. I think this is the most often asked question I hear from new packeteers at my forums and packet seminars.

The AEA PK-96 MailDrop enables the users to take the computer off-line to perform other functions such as word-processing, letter writing, games, cadd, etc. The MailDrop also has the capability of forwarding to other MailDrops or to a properly configured bulletin board system (BBS). It will also receive forwards from the large BBSes. Within the firmware of the PK-96 is a means of setting the **KILLONFWD** command on. This enables automatic deletion of messages after they have been forwarded to another BBS.

The PK-96 comes with a large mailbox that can hold over fifteen 1000 byte messages. However, should the PK-96 owner wish to enlarge the PK-96 MailDrop capacity, additional RAM can be ordered from AEA. I like the idea of having more RAM available, since I learned the hard way what it means to limit my mailbox space by forgetting to turn off the additional GUSERS I had enabled.

Case in Point

Bruce Dean, WB4OLD, in Warner Robins, Georgia, connected to my mailbox in Lynchburg, Virginia. He began the usual setup to leave a message. After only one



High atop this tower is the "ELKO" node antenna.

manual for the PK-96 is too much for me to handle, as it doesn't follow the normal manual pattern. This manual is so well written and so organized that I plan to make it a part of my reference library!

You will find that the PK-96 manual alone will become a true asset to you as a 9600 baud user. In addition to providing an easy-to-follow setup and operation procedure for the PK-96, the manual also references many other sources of 9600 baud reference material. I suppose the only thing I find a bit disappointing is that it doesn't reference any of my writings about 9600 baud radio modifications and use. But what the heck; I already have those articles and books anyway.

After you've finished reading the manual text, you reach the addendum section. Here you find almost every interface illustration that I've ever put into the "Packet User's Notebook" in almost 10 years of writing for CQ magazine.

Clear, easy-to-follow schematic drawings of the PK-96 circuitry, pictorials of the

parts placement on the PC board, and more is included in the manual. AEA, you have done the packet hobby and industry a true favor by developing this documentation.

The AEA PK-96 is priced at \$229. For more information about the PK-96 TNC contact Advanced Electronics Applications, 2006 196th Street SW, P.O. Box C2160, Lynnwood, WA 98036 (206-774-5554), and for catalog information call toll free 800-432-8873.

And Now A Word From "Fred"

For now I'm outta here. It's Saturday night here in Taipei, Taiwan, where at this moment, typhoon Fred is predicted to hit Taipei within the next three hours. I'm looking forward to getting back to my native soil and having more fun at 9600 baud with my AEA PK-96.

Happy Packeting!

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sentence sent to my mailbox, he received "OUT OF MEMORY" from my mailbox. I had forgotten to release some memory by setting GUSERS to a lower number. Setting GUSERS (number of PK-96 node-user pairs) too high will consume a "bunch" of memory (RAM) fast. It did!

Unfortunately, all I received from Bruce's message was the callsign and a blinking "Mail Waiting" LED.

Keep It Simple

The MailDrop allows the user to model some of the built-in options by customizing the MailDrop connect text messages. MailDrop configuration in the PK-96 can be as simple as you like, or as the owner quickly discovers, the PK-96 MailDrop can become the community electronic post office. A full chapter of the PK-96 manual is dedicated to application and multiple configurations of the AEA PK-96 MailDrop.

What Happened To The Manual?

I made it a special point to call Kevin Cox at AEA and wage my complaint that the



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CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORYs

The Ever-Useful Ferrite Rod

Ferrite rods have become scarce and expensive on the commercial market. The principle manufacturer is Fair-Rite Corp., a firm that once supplied 0.5" x 7.5" ferrite rods to Amidon Associates. However, the cost of these popular rods skyrocketed a few years ago, at which time former owner Bill Amidon discontinued those items from his product line. He felt it was no longer cost-effective to stock the rods.

All is not lost when it comes to finding ferrite rods or bars to use as cores for linear amplifier filament chokes, balun cores, broadband solenoidal transformers, and cores for small receiving loops. For most amateur MF and HF applications the core permeability is 125 or 850 (known generally as Q1 and Q2 material or No. 61 and No. 43 mix, respectively). Most AM BC-band transistor radios contain loop antennas that are wound on 125 mu ferrite rods or bars. It is not unusual to find used radios of this type at flea markets and yard sales for as little as \$1 each. It doesn't take long to garner a collection of rods and bars for amateur projects. Fig. 1 shows various forms of these loop antennas.

Power Capability

Most round ferrite rods from transistor radios have a diameter of 1/4 inch, although I have stripped a number of radios that contained rods that were 3/8 inch OD. The length of the rod or flat bar may be anything from 3 inches to 10 inches, depending upon the brand and general quality of the receiver.

You can increase the core cross-sectional area by making bundles from individual bars or rods. They can be held together by cementing them to one another with epoxy glue. I made a 4:1 balun transformer from seven 3/8 OD x 7 inch ferrite rods that I collected from junked radios. I arranged them to provide a circular bundle that was held together with epoxy cement. I then wrapped three layers of teflon pipe-thread tape around the composite ferrite core before adding the balun windings. This balun was for use in a very hostile RF environment where ordinary 1 kW rated commercial ferrite baluns would overheat and undergo drastic changes in permeability. The balun was used between my Transmatch and 450 ohm balanced feeders that fed a 160

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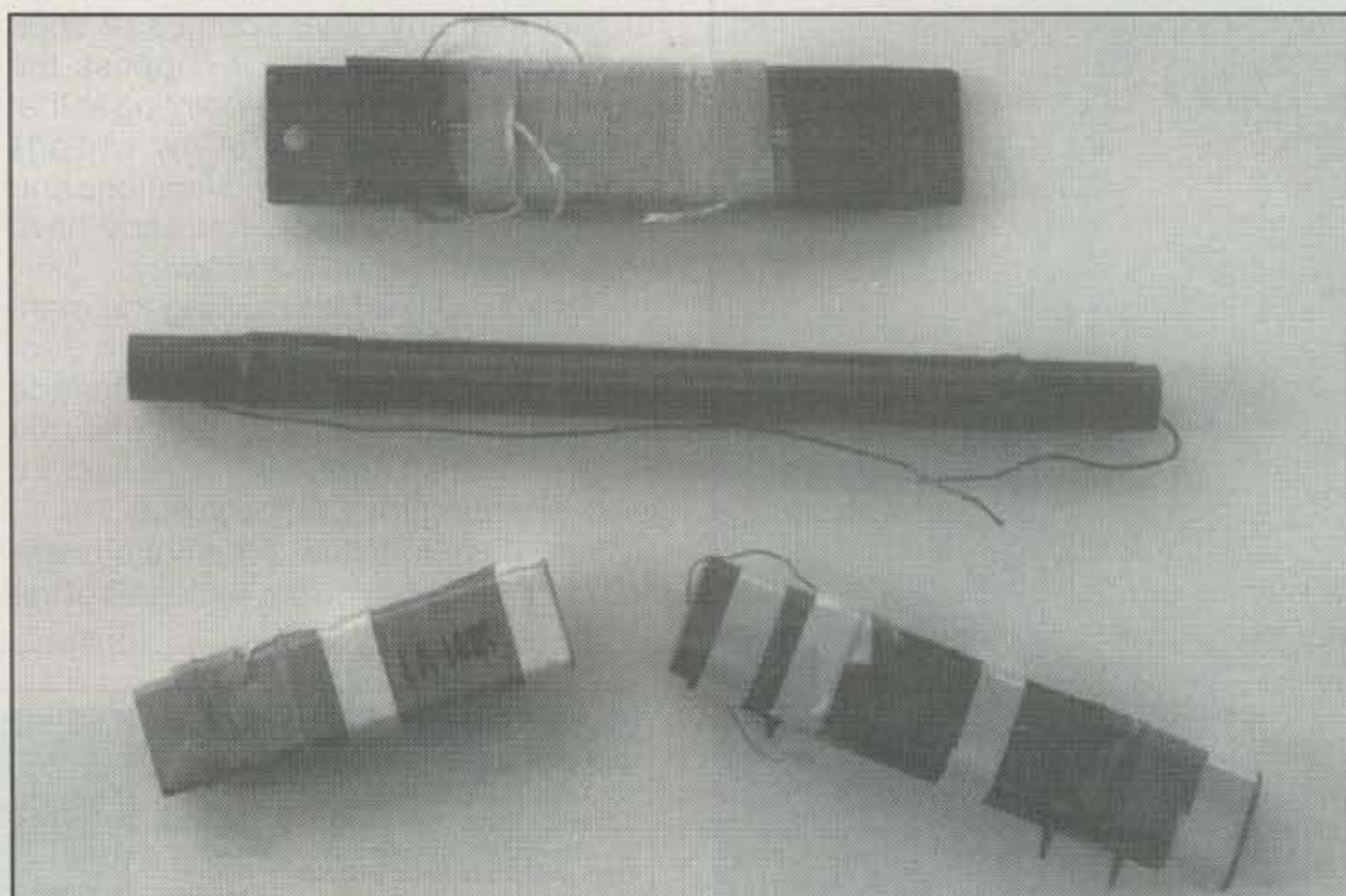


Fig. 1— Examples of ferrite loop antennas removed from junked BC-band transistor radios. They are suitable for many amateur projects.

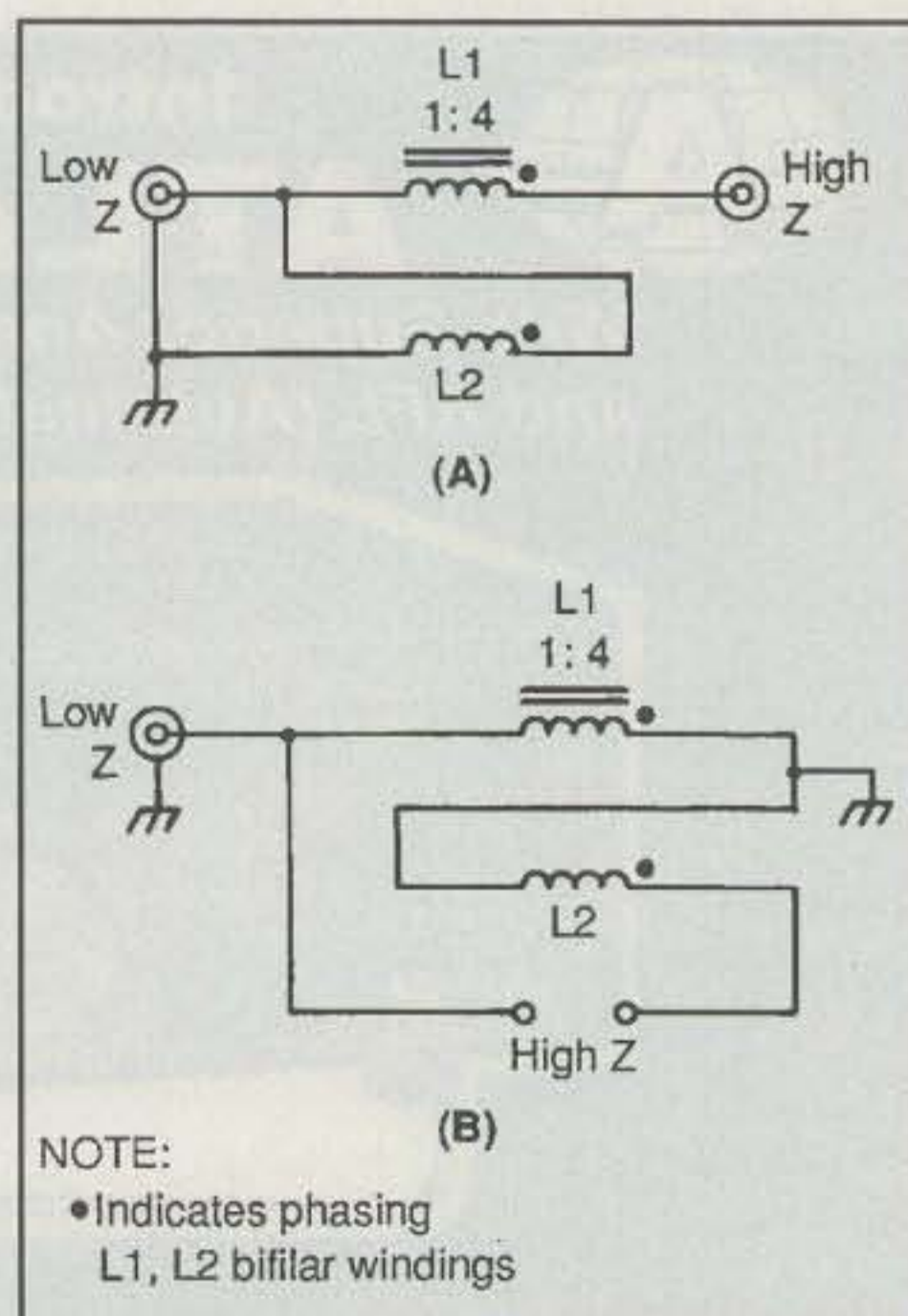


Fig. 2— Broadband transmission-line transformers can be wound on ferrite rods or bars taken from BC-band radios. Example (A) shows the circuit for a 1:4 unbalanced-to-unbalanced transformer. The circuit at (B) is for a 1:4 unbalanced-to-balanced transformer that can be used to match 75 ohm coax to a 300 ohm balanced feed line. The bifilar windings consist of two insulated wires in parallel that are wound at the same time.

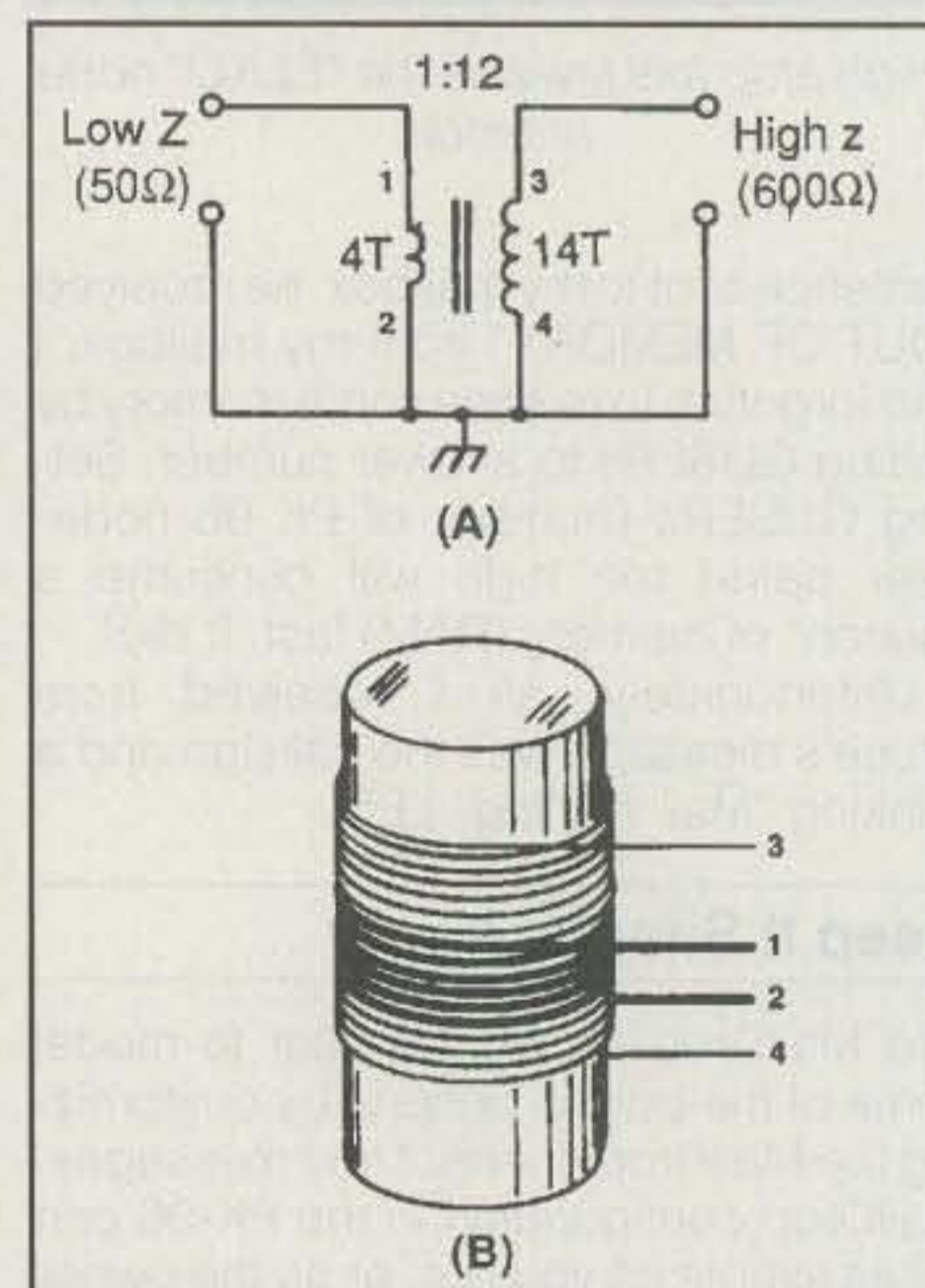


Fig. 3— An example of a conventional broadband transformer that can be wound on a piece of round or flat ferrite core material. Any required impedance ratio can be obtained by using the appropriate turns ratio. The inductive reactance (X_L) of the smaller winding should be at least four times the terminal impedance, such as an X_L of 200 ohms minimum for a 50 ohm port. The smaller winding is wound over the cold end of the larger winding.

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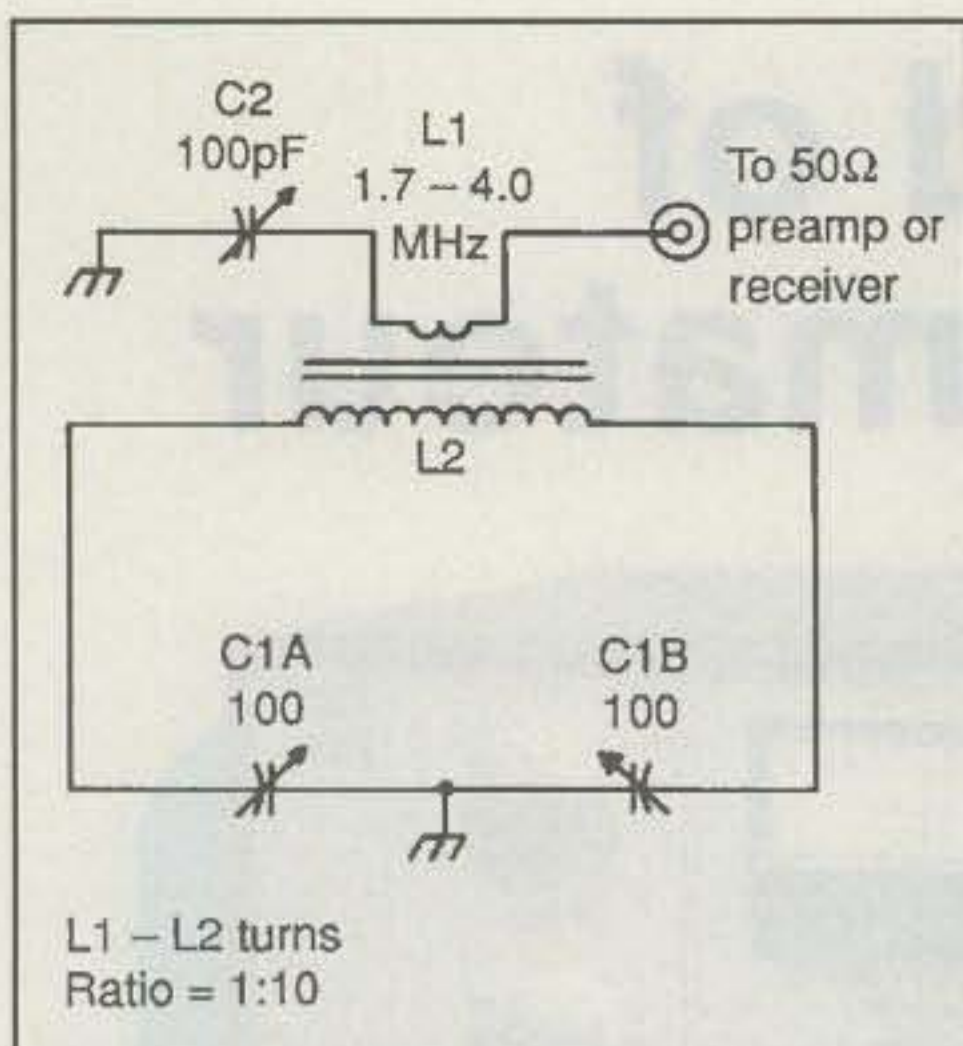


Fig. 4—Schematic diagram of a ferrite loop antenna that can be used for 160 and 75 meters. C1 is a two-section, 100 or 140 pF variable capacitor. C2 is a mica compression trimmer. Both capacitors are adjusted for peak signal strength at the receive frequency. Coil data for a 125 μ_i ferrite rod that has a diameter of 0.5 inch and a length of 7.5 inches is 48 turns of No. 22 insulated wire space wound over 0.75 of the rod. L2 has 5 turns of No. 22 insulated wire over the center of the L2 winding.

meter full-size loop antenna which I used from 1.8 through 29 MHz. The large balun core did not become warm on any operating frequency within the aforementioned frequency range.

The total cost for the balun (with SO-239 connectors and a PC-board case came to \$9). Fig. 2 contains the electrical details of the balun, which were based on a design by W2FMI (*Transmission Line*

Transformers, an ARRL publication). A single small ferrite rod or bar is suitable as a balun core for QRP operation, or power levels up to 50 watts, thereby enabling the builder to keep the size to a minimum.

You can also stack and glue ferrite bars to increase the power-handling capability of the core material. There is no rule that says a magnetic core must be circular. If this were true, there would be no flat loop antennas in BC-band receivers.

Other Applications

I have checked the initial permeability (μ_i) of many bars and rods found in transistor radios for use from 550 to 1600 kHz and found that most of them are in the 125 permeability range. This makes them suitable, in terms of Q, for narrowband circuits that operate up to approximately 10 MHz. Although 850 permeability ferrite is recommended for broadband transformer use from 1 to 50 MHz, the 125 μ_i ferrite works well from 1 to 200 MHz in broadband applications. The major difference in the design approach when using 125 material is that more wire is needed on the core, compared to 850 ferrite, for the lower end of the transformer operating range. In terms of Q and narrowband use, the 850 μ_i ferrite is designed for the range from 10 kHz to 1 MHz, in the event you're curious about that.

You can construct broadband transformers on ferrite rods or bars more easily than when using toroids. It is much easier to place the windings on rods or bars. However, it should be understood that narrowband and broadband transformers that are wound solenoidal, as opposed to toroidal, do not have the self-

shielding properties that are inherent in toroids. Apart from that, they will work just fine if you keep this limitation in mind when laying out your PC board. In other words, beware of unwanted mutual or stray capacitive coupling when using solenoidal tuned circuits or transformers. An example of a solenoidal broadband transformer is provided in fig. 3.

Still another application for rods or bars taken from transistor radios is the construction of a loop type of receiving antenna. The original Litz wire is removed from the ferrite core and a new winding of suitable inductance is added to permit operation on the chosen frequency. The Q of the new loop will be highest up to 2 or 3 MHz. Although I have used this ferrite at 75 meters, the Q is not spectacular, owing to the type of core material found in BC-band receivers. A receiving loop of this kind is shown schematically in fig. 4. This circuit can be modified to provide an electrostatically shielded rod loop by mounting the ferrite bar or rod in a U-shaped aluminum or brass channel. The top of the channel must remain open to prevent it from acting as a shorted turn. This can be demonstrated easily by tuning in a signal and shorting across the channel with a screwdriver blade. Electrostatic shielding is beneficial for eliminating various forms of local man-made noise.

Determining the A_L Factor Of Rods

If you have worked with toroids or pot cores, you are familiar with the A_L factor of ferrite or powdered-iron material. The A_L factor enables you to calculate how many turns of wire are needed to obtain a specific inductance value. This factor varies when using rods or bars, depending upon whether the winding is placed at the center of the rod, or at one end. I detailed this phenomenon in my book *Ferromagnetic-Core Design & Applications Handbook*, chapter 2, published by Prentice-Hall, Inc. (1981). Unfortunately, this book is no longer in print, but you may be able to find a copy in technical institution libraries in your region.

The A_L factor for unknown ferrites or irons can be determined by placing a few turns of wire on the core material and measuring the inductance. Once this and the number of turns are known, the A_L can be obtained from:

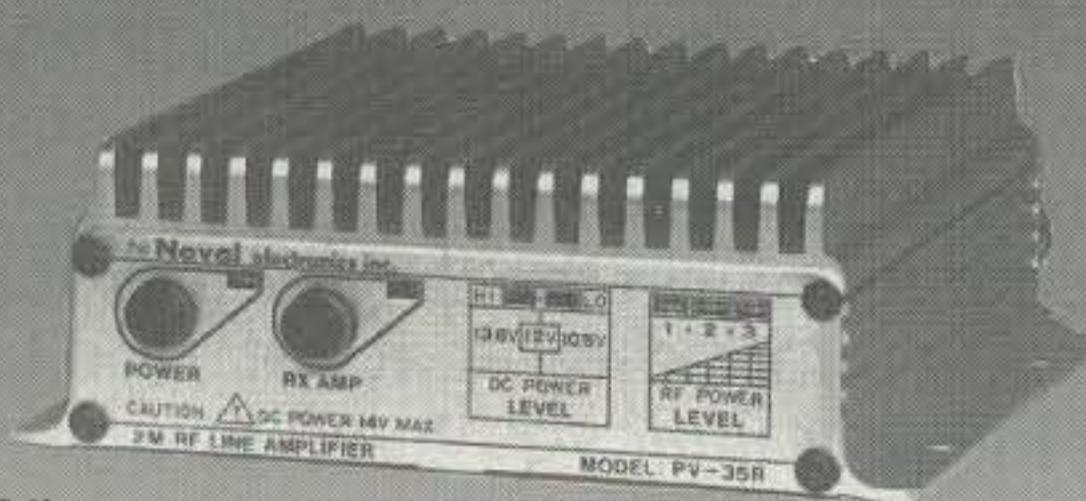
$$A_L = \frac{L_{\mu H} \times 10^4}{N^2}$$

where L is the inductance in microHenries and N is the number of coil turns. Once the A_L is known, you can apply the standard formula for determining the necessary number of turns to place on the rod

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for the inductance you need. This is accomplished by utilizing:

$$N = 100 \sqrt{\frac{L_{\mu H}}{A_L}}$$

where N is the required number of turns. As I mentioned earlier, the A_L will depend upon which end of the rod contains the coil. Experiments I performed with a 0.5" x 7.5" ferrite rod (125 μ_i) revealed an A_L of 750 when a 20-turn winding was placed at one end of the rod. The same coil yielded an A_L of 1250 when it was moved to the center of the rod. The A_L will change also if the coil is spread across all of the rod (space between turns). Making this change resulted in an effective A_L of 448. As the A_L changes, so does the coil inductance. A 20-turn coil at one end of the rod provided 28 μH , whereas the inductance was 50 μH with the same coil at the center of the rod. My ferrite loops are wound so that the required amount of wire occupies approximately 0.75 of the rod area. I use smaller, close-wound windings for tuned circuits and broadband transformers. This permits me to use smaller pieces of bar or rod stock.

Cutting Ferrite Rods

Ferrite is a form of ceramic. Therefore, it is hard and very brittle. Cutting a rod into smaller pieces is no simple task, but it can be done. I find that the easiest method for doing this is to score the ferrite with a hacksaw blade. Make the groove at least 1/16 inch deep. One end of the material can then be clamped in a vise and the remainder snapped off with moderate pressure. The raw edges can be smoothed with a grinding wheel.

Some Closing Comments

Broadband transformers can also be made from the cores of TV receiver fly-back transformers. These cores have a high permeability—on the order of 2000. They are not suitable for narrowband circuits above 1 MHz, but have sufficient cross-sectional area to serve nicely in high-power broadband applications. They are useful also as cores for the transformers in homemade DC-to-DC converters and DC-to-AC inverters.

Keep in mind that the greater the cross-sectional area of a ferromagnetic core the higher the safe power level for the transformer. Cores should never be more than moderately warm to the touch in an operational circuit. If they are too hot to touch, chances are core saturation is occurring and damage is likely to occur. Heat causes changes in core permeability, and this can degrade the circuit performance markedly.

73, Doug, W1FB

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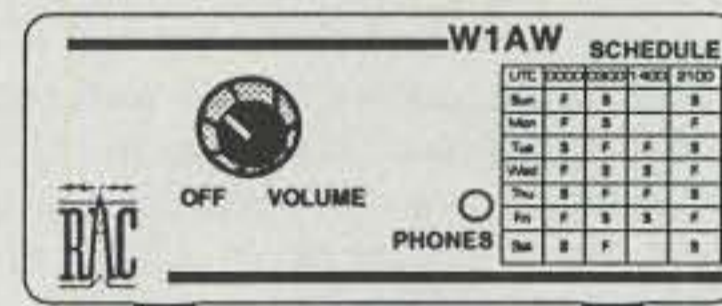
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ALL ABOUT THE WORLD ABOVE HF

New North American 10 GHz Record Set

It seems that this is the month to report new records. Three of the past four years I have led this column with "New Record Set" as a headline. The following record is from **Frank Kelly, WB6CWN**.

A new North American 10 GHz DX record of 698 miles was established on 25 August 1994 between Frank Kelly, WB6CWN, and Jack Henry, XE2/N6XQ. Frank was operating in the central California coastal range on 5200 foot high Santa Rita Peak, and Jack was operating at a 2000 foot elevation in the Sierra Los Indios Mountains on the Vizcaino Peninsula in Baja California, Mexico. The path was approximately one third over land and two thirds over water and employed both troposcatter and water ducting. Frank was using a 15 watt TWT amplifier into a 4 foot dish with a scaler feed with a 2 dB system noise figure. Jack had 1 watt into a 4 foot dish with a 2.5 dB system noise figure. Jack's own 3 watt radio was left home for repairs, so he was using a radio built by Dave Glawson, WA6CGR. Dave and Jack held the previous North American record of 635 miles set last year.

Jack reported that Frank's 15 watt signals were copyable most of the time. However, Jack's 1 watt output required brief periods of propagation enhancement to copy at Frank's QTH. The CW contact was completed in about two hours of trying. A number of southern California X-band operators waited around after the end of the contest to listen and offer encouragement. A special thanks goes to Robin Critchell, WA6CDR, who assisted in netting both DX stations on frequency from his Mt. Wilson perch.

Perseids Meteor Shower, Three Perspectives

The following three perspectives are from the "West Coast VHFer."

Perseids From Phoenix

By Ned Stearns, AA7A

The *Perseids* meteor shower was surprisingly good down here in Phoenix. It's either that or my year-long preparations for the event panned out better than expected. I used the 2 meter EME antenna this year on randoms. I used to hold the belief that the array was too sharp for meteors (six Yagi array arranged three high by two wide of DJ98V 3.2 wavelength designs) and used it only sparingly before this year.

"Well, this year I was in the right place at the right time with the right stuff. Worked 40 stations on randoms between 0900 and 1545Z on the 12th of August with the peak clearly cen-

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VHF PLUS CALENDAR

October 29-30	First weekend of ARRL EME contest, 0000 UTC 29 October to 2400 UTC 30 October.
October 30	Very good EME conditions.
November 3	New moon.
November 4	Perigee.
November 5	<i>Taurids</i> meteor shower predicted peak 0656 UTC.
November 6	Very poor EME conditions.
November 10	First quarter moon.
November 13	Moderate EME conditions.
November 16	Apogee.
November 17	<i>Leonids</i> meteor shower predicted peak approximately 1600 UCT.
November 18	Full moon.
November 20	Very poor EME conditions.
November 25	Last quarter moon.
November 26-27	Second weekend of ARRL EME contest, 0000 UTC 26 November to 2400 UTC 27 November.
November 27	Good EME conditions.
December 2	New moon and Perigee.
December 4	Very poor EME conditions.

tered around 1030Z. During the peak I felt as if I was in the middle of a sporadic-E opening. I had callsigns from over 70 stations and was methodically working the stations one by one as they came through. I actually conducted chats on and off with some of the other ping jockeys in Oregon and northern California during the peak hours.

I made the following observations from this year's shower:

1. This shower definitely favored north-south paths. East-west paths were supported but with much less frequency. The path to the north-east was nonexistent. For the first time in many years, I didn't work a single station from the Denver area—didn't even hear any partial calls. I worked W0KEA but never even heard W2CRS. That was very unusual.

2. I never heard calls from any station at a distance of over 1100 miles. This may be a result of living in a valley, but I can work sporadic-E out to 1400 miles, and I figure that I ought to hear something off the rocks. Not in this shower—at least for me here in central Arizona.

3. EME antennas do work on meteor scatter. I found an extremely interesting benefit from using mine this year. I ran the antenna elevation up to 10 degrees or so and improved my ability to receive incoming signals in two ways. First, the array's first null in the pattern is directed at the horizon where the dominant sources of noise are located. In this way, I obtained quite a bit of noise reduction. Second, given my observation in point two above, I used the array in a way that favored the shorter scatter paths. The scatter paths to the closer-in stations can use trails that are well up from optical horizon. Using elevation on the antenna increases the volume of space that is sampled for incoming signals.

4. Something has to be done to spread out the traffic on 144.200. During the moments of the shower when there was a long burn, I was hearing as many as 20 stations simultaneously on the frequency. When I heard a pair of stations in the process of completing a QSO, I would stand by. At all other times, though, I was making noise. Spreading out the traffic off of 144.200 would help, but I have found from experience that if you stray even 5 kHz off of the calling frequency, you have the frequency to yourself. Maybe the notion that I saw in print in the Rocky Mountain VHF+ newsletter makes some sense. Maybe we should adopt a method of assigning a channel on either side of 144.200 for direction random calling (for example, 144.195 for north-south random calls and 144.205 for east-west). This would leave 144.200 free for rover/mobile stations or for modestly equipped stations. However, the modestly equipped stations might find it advantageous to look for random contacts from the beaconing stations on the directional random calling frequencies.

See you all in the *Geminids*, for sure! 73 de Ned Stearns, AA7A.

Monitoring the Perseids And Other Meteor Activity

By Todd Evans, KB6IGC

Once again this year, I found great merit in being able to monitor the rise in activity of the *Perseids* shower. However, this year I was in for a pleasant surprise. You might remember that last year I monitored the 162 MHz NOAA weather frequencies and recorded the 'pings and burns' on a VOX recorder, but this was only somewhat informing because of working full time and not having an electronic time stamp on the recordings.

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- ← Incoming data
- ← Outgoing data appears here

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Dave Eubanks, NR6E, stands between his truck (right) and Tim Marek, NC7K's truck during their coincidental operation from DN00 during the recent Perseids meteor shower. (Photo courtesy NC7K)

This year was different. This year I had two VOX recorders and two simple little digital voice clocks with audible voice announcement that would electronically announce every hour on the hour (enough audio to easily activate the VOX recorder and time stamp the recordings). One setup was similar to last year's. I hooked up the homebrew four-element Yagi for 162 MHz to the scanner, and oriented it to be vertically polarized. I programmed all seven of the NOAA weather stations on 162 MHz into my scanner, then turned up the volume, put the VOX recorder next to the speaker, along with the audible clock, and let it run.

The second setup produced better results yet. It consisted of a specially modified FM radio tuner with better than stock selectivity (i.e., aftermarket 150 kHz IF ceramic filters) to help control desensitizing from close-by strong stations. After interfacing with Al Van Buren, K7CA, and telling him my needs, he got on his computer and modeled up a tuned 103 to 108 MHz Yagi for my system. I visited the aluminum pile at my house and constructed a fine three-element Yagi, oriented it horizontal, pointed it due east from my California QTH, and hooked it up to the FM tuner.

Having the wide 60-degree beamwidth helped to capture a big part of the meteor range FM stations throughout North America. I set the receiver on 106.9 MHz (where I have no local station), turned up the volume on the amp, pointed the speakers into the microphone of the VOX recorder, installed the electronic time stamp near the mic, and activated the Mute switch on the receiver to keep it quiet in between pings and burns. When a ping or burn was strong enough, it would break through the mute on the receiver, activate the VOX recorder, and get time stamped every hour on the hour.

This went on for 24 hours a day from July 26th through Aug 14th. Every day I would painstakingly listen to the tapes and record the amount of pings and burns from the tape onto a graph form. The following is a brief description of the results. Keep in mind, this is a reference of activity, not an actual real total count.

Also, I did not notice any tropo enhanced signals that were strong enough to open up the mute on the receiver, so the following is a count of just meteor activity alone.

From July 26, 27, 28, and 29, I noticed an average of 27 burns per hour, all peaking between 1 and 5 AM local everyday. July 30 and 31 produced slightly lower rates (24/hour), but peaks remained at the same times everyday.

August 1st and 2nd showed an average of 22 per hour. Peaks at the same time August 3rd and 4th came back up to 27 per hour. Again, peaks around 1 to 5 AM local out of the 24 hour period.

August 5th came alive with 33 per hour between 3 and 4 AM local. August 6th was back to 22 per hour with a peak at 1 to 5 AM local. August 7th through the 11th the average counts went way down (16 per hour), still with peaks between 1 and 5 AM. August 12th produced a peak of 26 per hour between 3 and 4 AM local. August 13th produced 33 per hour between 2 and 3 AM local.

I then noticed a sharp decline in activity on August 14th (15 per hour max). My pleasant surprise came as soon as my graph was done, and confirmed by radio schedules days before the predicted peaks. If you notice in my findings, there was as much activity days before the peak as there was during the peak times. I confirmed this by running 2 meter schedules during this period and hearing comments like 'Gee, this propagation is as good as the normal peak times of the past.'

My overall hope here is that meteor enthusiasts who enjoy meteor contacts will make schedules many days before and during the peak times, instead of just during the peak times. After all, this may fit many people's work and home schedules better. I have a complete graph available, and I'm working on getting it formatted to convey all of the info and not just the highlights that I have mentioned here.

There were other peaks around 8:00 AM local on many days that produced many contacts, but getting all the details into one article is yet to be done.

How did I do? I made seven skeds and com-

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Aerial view of the KH6HME beacon site on the side of Mauna Loa volcano. Paul operated from this site during the record-breaking Hawaii to California opening in July. (Photo courtesy WB6NOA)

pleted with three 100 watt stations running single Yagis. I completed with the following on 222 MHz, all on the 12th: Rick, NU7Z (CN87) at 0910 UTC; Randy Simons, NØLRJ (DM98) at 1016 UTC; and Len Parsons, W5AL, (DM95) at 1523.

If there are any questions on my many hours of work and or setup, please feel free to give me a call at 619-371-4864. If you get my message machine, leave a message and I will return your call as soon as I return. 73 from the upper Mojave Desert de Todd Evans, KB6IGC, DM15.

A Perseids Odyssey

By Tim Marek, NC7K

August 5th, the UHF Contest weekend, found me under the truck rebuilding the rear end! I dearly wanted to participate but had to make the repairs or not operate the *Perseids*, something that I was not about to miss. Because of a major goof by the auto parts store, the repair time went from one to three days, forcing me to finish fixing the truck Tuesday instead of going to work. Fortunately, my employer is an understanding sort and allowed the extreme time off.

I planned to activate DM19 for two days prior to the peak, then make my way back to DM09 for the remainder of the week. I finished packing at 3 PM. I headed into town to go shopping and pick up my paycheck. I was finally on the road by 4 PM, and arrived in Austin just before sunset. Gassed up, I headed up to the mountain in twilight. The view was breathtaking. I was setting up with the light from a 500 watt lamp when it started to spit lightning!

I threw everything back in the truck and scrambled down the hill in the dark. I decided to check into a motel and get a good night's sleep. The next day, after a great breakfast, I headed back up the hill.

This time I was a bit gun-shy and set up in a saddle below two peaks. I ran two skeds with no sign of any rocks falling. However, I start-

ed to hear rumbling in the distance. Hiking to the summit, I worried about what I'd find. Sure enough, one of the biggest thunder boomers I've ever seen was 20 miles south and headed my way!

Rushing back to the sight, I hurriedly lowered the antennas and started packing—again! By the time I'd finished, the it was pouring. As I started the engine to leave, a ridge 100 yards away got blasted by lightning. I was running off the mountain again for the second time in as many days.

Next I found myself needing a site from which to operate my skeds later tonight. Bob Scott Summit campground is just down the road with a decent view to the east and southeast. From there I worked Al Van Buren, K7CA, in DM26; Jim Frye, NW7O, in DMDM18; and Roger Wagner, K6LMN, in DM45 on tropo. Roger was at 10,000 feet with only a dipole and 170 watts.

During the night I had ten skeds with four partials and completions with Ned Stearns, AA7A, Len Parsons, W5AL, and Phil Kirchbaum, WØKEA. Throughout the night lightning and rain came and went with great fury. I found the camper shell leaked, but fortunately only at two corners.

Around 11:00 AM I packed up and headed back into Austin for some great food, then back to DM09. Taking the long way back through Reese River Valley, I drove through a thunderstorm so intense it was *white out* conditions for 5 minutes. I had to slow down to 15 mph and creep my way out of its path.

The next valley was beautiful! What a place to operate EME! On a continuous downhill grade I put the truck in neutral and coasted the next 20 miles. Arriving home at around 4 PM, I took a long hot shower, grabbed more food and ice, and headed out to the hills—again!

Finding out that Virginia Peak was socked in with thunderstorms, I decided that in no way would I put myself in the path of lightning again. In the years I've lived here, I found many dif-



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If you think Standard's new C5718DA shown on the adjacent page is perfect for easy mobiling, wait until you install and use it in your own auto. That is when you will discover all of its unadvertised features and special assets!

This 2m/70cm transceiver's hot performance (exceptional 0.158uV receiver sensitivity and unsurpassed intermod immunity) is equalled only by its cool operation (we even tested it "key down" on transmit for a solid hour with no problems!). The C5718DA's split modular design makes it ideal for mobiling in any size vehicle, and installation takes only minutes. The main/RF unit just slips under a seat, behind a center console or in a trunk, and all operating controls are right on the speaker/mic in your hand. There are no fumbles, external speaker mounting, entanglements or stretching to tune frequencies.

A unique memory system is included in the C5718DA. You can store different scan actions, pause/hold/stop right along with selected frequencies, TX offsets and PL tones in any memory. You can thus set up the memories according to your exact needs for local (or distant!) area use. The digital squelch system with its audio level and RF level adjustments is another treat. You can set it for high or low receive sensitivity and even mix selections between bands. Standard's C5718DA truly makes FM activities great! It is amazing!

The C5718DA also features extended receive coverage right out of the box (no mods required!), great audio, Marantz world-famous quality and 1200/2400/9600 baud Packet capability. It is truly today's best VHF/UHF buy, and it is waiting to make your FM operations more exciting than ever before. Try it at your dealer today, or call us at 312-763-0081 for information and literature.

73 from Standard

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For a detailed description of the new features, call, write or FAX Timewave after October 25, 1994. Don't worry, the cost of this upgrade is not high - only \$10.00 will cover the cost of a new program EPROM delivered post-paid in the United States. FREE upgrade EPROMS will be available for DSP59+ or DSP9+ purchased after September 1, 1994. Upgrade EPROM kits, as well as DSP-9+ and DSP-59+ units with the new EPROM installed will be shipped from Timewave on Nov. 1, 1994.



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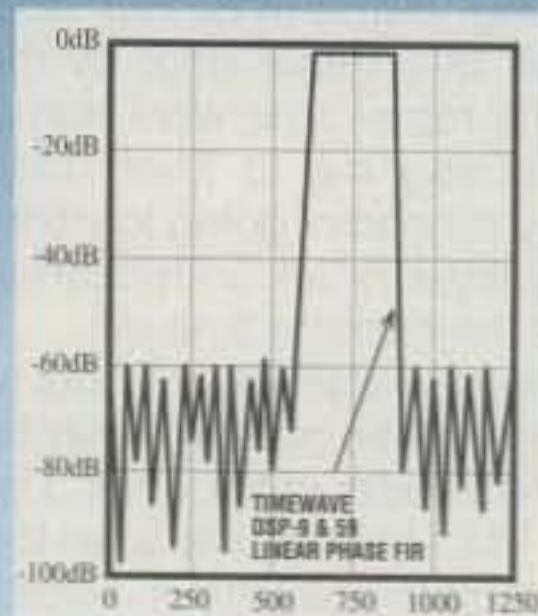
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AA3GM	5739	WPA	22	21	27	1,161
K3ZO	5191	MD	32	13	23	1035
AA4DY	5724	AL	16	21	17	629
WB4MLE	4503	AL	34	15	24	1,176
KC4SUS	5658	FL	134	61	78	15,050
WS4F	2656	GA	22	12	20	680
W1ICW/5	3787	NTX	116	109	89	20,025
KB5IUA	5487	STX	194	151	117	40,365
W3XO/5	800	STX	206	124	112	36,960
W5OZI	5038	STX	76	46	50	6,100
W5NZZ	3201	OK	63	31	47	4,418
KB5IZJ	5780	NM	20	9	15	435
W6YLL	5662	SCV	4	8	16	72
K1FJM/6	3553	SB	4	10	9	126
K7ICW	15	NV	32	1	14	462
W7HAH	5575	MT	48	40	48	4,224
WB7OHF	2196	AZ	72	57	58	7,482
WB7QBC	5652	UT	52	36	38	3,344
N8AXA	3603	OH	48	28	39	2,964
N8ZAT	**	OH	2	0	1	2
N8ZAW	**	OH	2	3	4	20
N8OPE	5733	MI	8	3	5	55
WB8YFE	2693	IN	20	9	15	435
W9VA	5601	IL	38	25	34	2,142
N9PBA	5738	WI	26	27	31	1,643
NØLL	751	KS	118	62	77	13,860
KSØF	803	MO	76	54	56	7,280
NØYNP	5741	NE	46	27	36	2,628
WDØBQM/Ø	4939	NE	16	7	13	299
WAØSSN	224	MN	26	0	11	286
CO2OJ	5775	CUBA	28	42	38	2,660
VE7XO	5715	BC	8	6	10	140
XE1J	5749	MX	6	2	4	32

Note: ** is not a SMIRK Member. N1QKE, VT, received an award as the only entry from VT. The following are the top five scorers in the world in descending order, from top scorer to fifth place: KB5IUA, W3XO/5, W1ICW/5, KC4SUS, NØLL.

ferent hills to operate from—some very high, some not so high, but all with good views of the horizon. I had three choices within easy range, but recent growth had blocked access to all but one. Arriving 45 minutes before sunset, I set up an 80 meter inverted Vee and a 2 meter Yagi. For the third night in a row, I was up until 5 AM.

My first sked was at 0500 UTC, running through 0900 UTC. Nothing—no pings, bubbles, no nothing! Between the long drive and lack of sleep, it was very hard to stay awake. My 0900 sked with Arliss Thompson, W7XU, portable in Wyoming completed on a 10 second burn at 0906 UTC. Then at 0915 UTC Clyde Secaur, KA7GUX, came screaming in on a minute-long burn. Finally! Rocks! I worked Clyde random at 0920 UTC. Richard Glaese, N7ANL, in DN18 was my next sked at 0930 UTC. We completed at 0938 UTC with a 15 second burn. My last sked was with Joe Lynch, N6CL, EM15. At 0948 UTC I got calls. About five minutes later I thought I got "Rogers" from Joe, but later he said not so.

I don't remember going to sleep, but at around 10:30 AM I was startled awake with my pulse racing and my heart in my throat. The sun was streaming in and I was close to melting! My midday sked with Bill Parmley, KR8L,

got enough rocks for calls and S-2s, but no further.

Dave Eubanks, NR6E, was set up in DN00. He invited me to join him, so I packed the truck—again—and headed out to Lovelock, Nevada. I stopped to top off the tanks, grab a pizza and drive up to the hill with Dave.

Dave was at 6500 feet near Ragged Top mountain with my old 32-19 and 900 watts on 2 meters. I set up four elements on 6 meters and 16 elements on 70 cm. Again, I was up until 5 AM, this time working folks on 6 meters while Dave made 20 QSOs in 19 grids on 2 meters. When things slowed up, for the first time I looked for meteors visually. I saw maybe ten per hour.

My impression of this shower? Wimpy at best! Only productive period was 0900-1030 UTC on the 12th. Maybe better next year! 73 de Tim Marek, NC7K.

A Few More Perseids Reports

The following are a few more reports sent to me by you and gleaned from Internet and the "West Coast VHFer."

Shep Shepard, W7HAH, reports that the shower seemed about normal. He ob-

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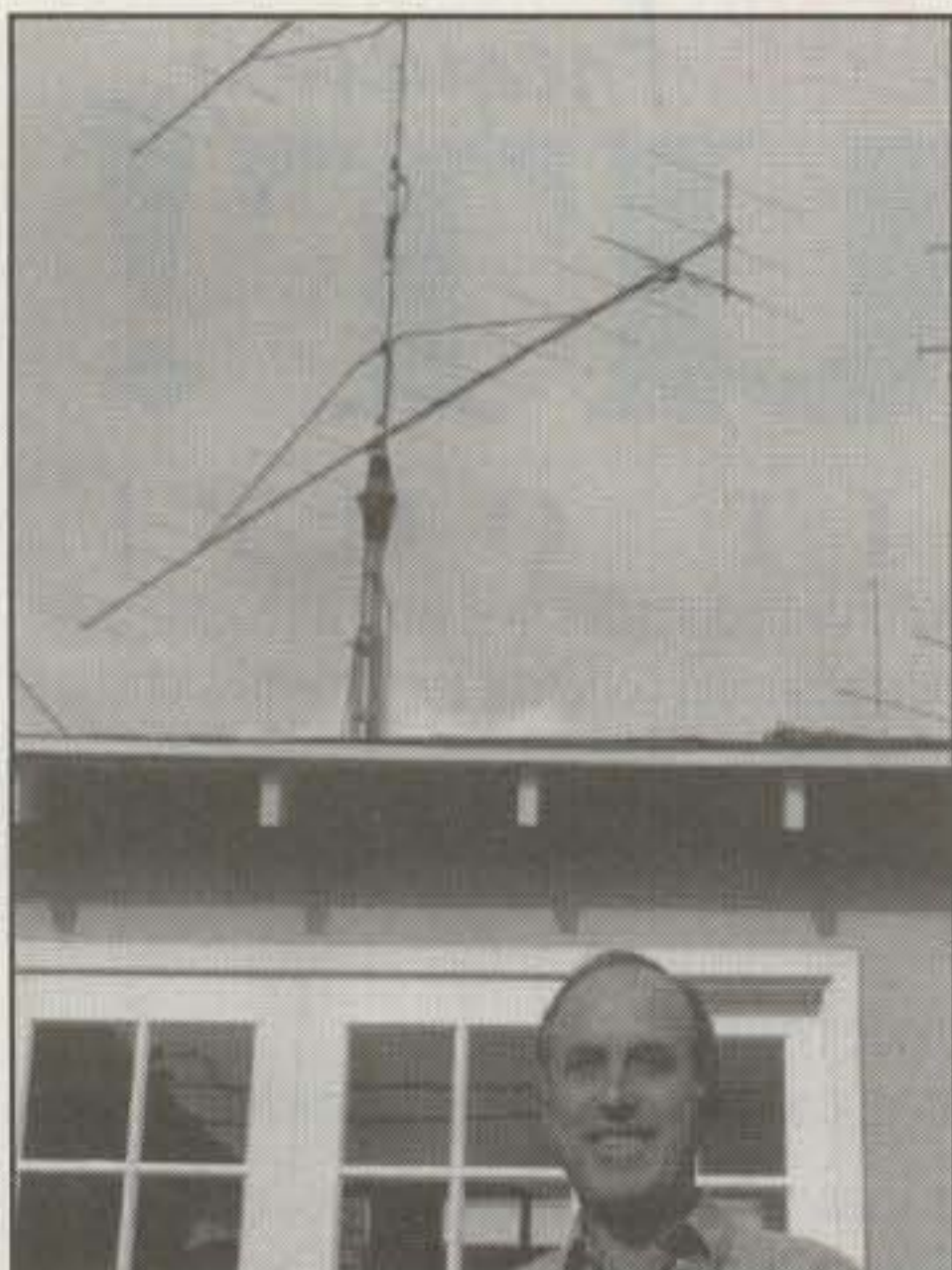


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Paul Lieb, KH6HME, at the Mauna Loa beacon site. (Photo courtesy WB6NOA)

served that the beak was between 1540 and 1710 UTC on 12 August. The number of stations worked was 13.

Roger Wagner, K6LMN, says that he drove up to the Flagstaff snow bowl and operated from there on 10 August. He gave out DM45 to 25 southern California

stations. He had a real treat when he worked Tim Marek, NC7K, in DN09, and Jim Frye, NW7O, in DM18. He was using a two-element beam and 150 watt brick. His best DX was 410 miles in Austin, Nevada. He stayed on the mountain until lightning drove him off.

Phil Kirchbaum, W0KEA, reports the following:

I was operational between 0300 UTC 11 August and 2000 UTC 12 August. I ran 600 watts to a KLM 13LBA up 35 feet on top of 9,000 peak near Aspen, Colorado in grid locator DM69mh. Between 0900 and 1830 UTC 11 August I completed seven of eight skeds. Time to compete, 3, 6, 7, 21, 28, 47, and 55 minutes. Between 0500 and 0800 UTC 12 August I only completed one of five skeds, and that took 77 minutes with Shelby Ennis, W8WN, at around 1150 miles. There was very little heard on some of the skeds.

At about 0945 UTC 12 August I started hearing lots of bursts on 144.200 MHz. Between 0952 and 1515 UTC I made 15 random QSOs. Several schedules run during this time took between 15 seconds to 7 minutes to complete. Things were so jammed up on 144.200 MHz that successful QSOs were limited.

This surge of activity agreed nicely with the 1020 UTC peak predicted by the OH51Y software. I wonder what it says for 1995? Conditions had dropped to almost nothing by the 1800 UTC W9IP prediction. I had to QRT the shower at 2000 UTC 12 August.

During the "peak" or "surge," when headed west, or southwest, I heard the following sta-

tions very strong, with a slight flutter: W1XE (DM79), W2CRS (DM78), N0LL (EM09), and W5OZI (EM00), all on apparent backscatter.

The surge started well before local sunrise but nothing was visually observed because of a 50 percent cloud cover at my remote mountaintop station. I'd be interested in what people west of me with clear skies saw. (See Tim's report above—ed.)

Results: Completed 14 of 22 skeds and 15 random QSOs on 2 meters. Also worked at least 14 new grids (don't know yet where some of the randoms were).

Ken Ramirez, KH2F/W2, reported 17 completions, with three of five skeds being completed. His observations are as follows: (1) A mountaintop is much better to operate from during *Perseids*; (2) signals from sea level are weaker and the burns much shorter than a mountaintop location. Next year he will operate from a mountain top; (3) The mosquitoes at sea level are hungrier than the ones at mountain level. (Hum, I wonder if there is an Aesop's Fables story in Ken's conclusion—something similar to the "Country Mouse and the City Mouse" story maybe.)

Dave Eubanks, NR6E, reported that he had a great time. He went to DN00 to get away from local QRM. He says that he had clear skies for the visual show. He worked 20 stations on meteors as well as a number on tropo, out to 500 miles. All contacts were on 2 meters. His best heard DX was Sam Hutson, K5YY, on random. He reported that he had a few 1400-1500 mile skeds that did not pan out. His best worked DX was Larry Lambert, N0LL, or N5RZ, both about 1100 miles. His total included 19 grids and 12 states and provinces.

Larry Lambert, N0LL, reported that the *Perseids* were very good for him with nine new grids. Larry completed 23 QSOs altogether, 10 skeds were made, including two 222 skeds. He says that the morning of the 13th was very good with 4 for 4 skeds made. He observes, however, that there was less random activity than from last year.

SMIRK Contest Results

The following is printed courtesy of Pat Rose, W5OZI, SMIRK Contest Chairman.

Great propagation and excellent participation describe the 1994 Six Meter SMIRK Contest. Over 1000 six meter amateurs participated, among them more than 200 SMIRK members. All of this resulted in a great deal more logs submitted to Contest Chairman Pat Rose, W5OZI. Log entries were three times that of last year, with entries from Cuba, Mexico, and Canada representing the foreign operators. The certificate winners are shown in the accompanying table.

Several logs were received from amateurs who, at the time, were not members of SMIRK, and because of the new rules, at least one received a beautiful award certificate because there was no other entry by a SMIRK member from that state.

John Godwin, KB5IUA, was the big winner

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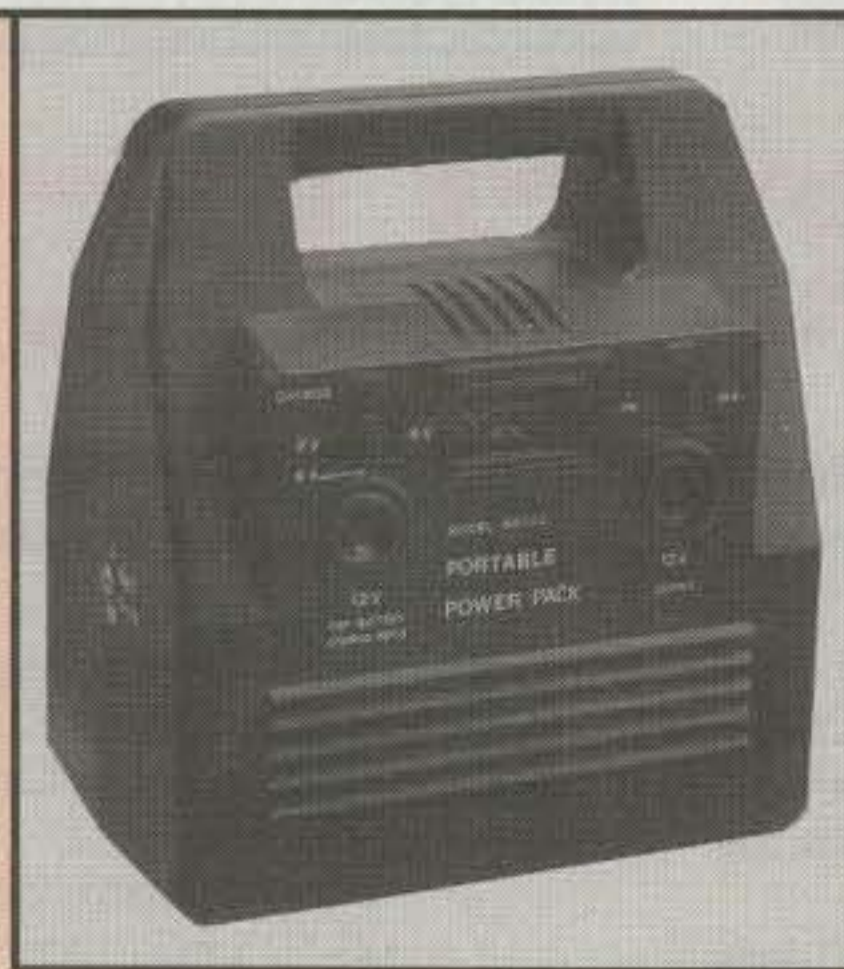
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this year with QSOs with 97 SMIRKS, 117 non-SMIRKS, and 117 grids.

The 48-hour annual SMIRK contest is usually held on the weekend between the June ARRL VHF Contest and Field Day, and next year's will be announced in all major amateur radio publications, as well as VHF newsletters. Watch for details of the 1995 SMIRK Contest in this column. It is a great way to pick up some of those badly needed grid locators but moreover, it is a lot of fun!

SMIRK currently has almost 6000 members worldwide and its goal is the promotion of 6 meter activity. SMIRK has donated equipment to amateurs in rare DX countries and to DXpeditions to put new countries on 6 meters.

To become a member of SMIRK, send your list of six SMIRK members you have contacted on 6 meters with their call signs, and SMIRK numbers, to the SMIRK secretary, Pat Rose, W5OZI, P.O. Box 393, Junction, TX 76849, along with a check payable to SMIRK in the amount of \$6.00. You will receive your attractive SMIRK certificate with your life-long SMIRK number, and the knowledge that your dues and membership payment will contribute to providing information and equipment to a worthy amateur in some DX location who may be soon giving you a new DXCC country on 6 meters.

Current Meteor Showers

Two minor meteor showers, the *Taurids* and the *Leonids*, will peak this month. The *Taurids* is scheduled to peak around

0656 UTC on 5 November and the *Leonids* is scheduled to peak somewhere between 1630 and 1830 UTC on 17 November. Peak activity is not much above sporadic levels at 10 to 15 meteors per hour for either one of these showers.

Current Contests

The second weekend of the ARRL EME Test is scheduled for November 26-27. Complete rules are in the September issue of *QST*.

Sept. VHF QSO Party Reports

Traditionally, the September VHF QSO Party has at least one surprise in store for its participants. This year was no exception. An unusual (for this time of year) sporadic-E opening gave stations in the southwest propagation on 6 meters nearly all weekend long. Bill Tynan, W3XO/5, reported over 400 contacts on 6 meters, and John Godwin, KB5IUA, reported more than 500 QSOs in almost 45 states!

On the west coast Bill Jenkins, W6JEX, also reported sporadic-E into the southwest.

From Colorado, Randy Simons, NØLRJ, reported that he traveled to a record 20 grids and amassed a score in excess of 184. Randy also reports that Ron Gal-



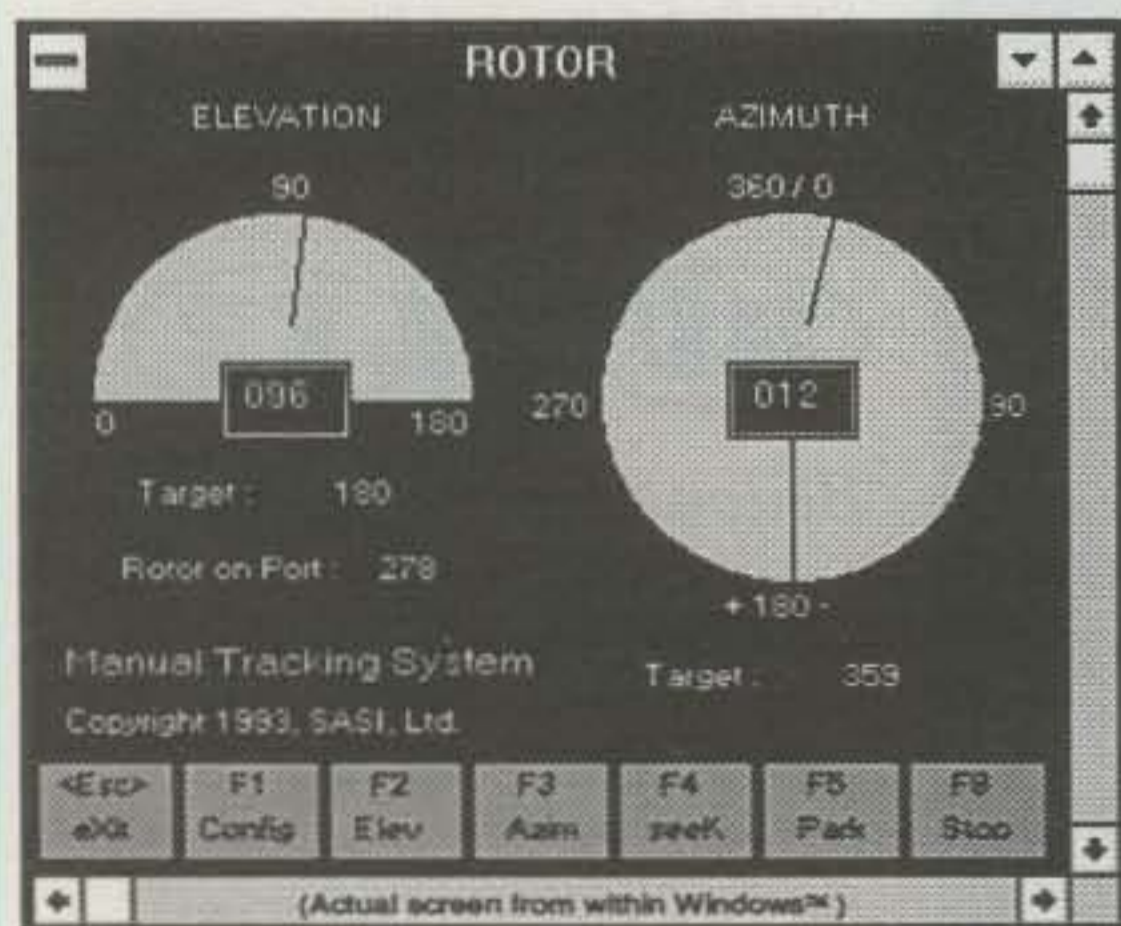
Chip Angle, N6CA, during a relaxing moment after setting the new Hawaii to California 2304 MHz tropo record in July. (Photo courtesy WB6NOA)

braith, KDØDW, seems to have broken the Rocky Mountain record with a score in excess of 50k. Randy also reports that Larry Lambert, NØLL, may have broken the Midwest record.

On the east coast Ricky Tharrington,

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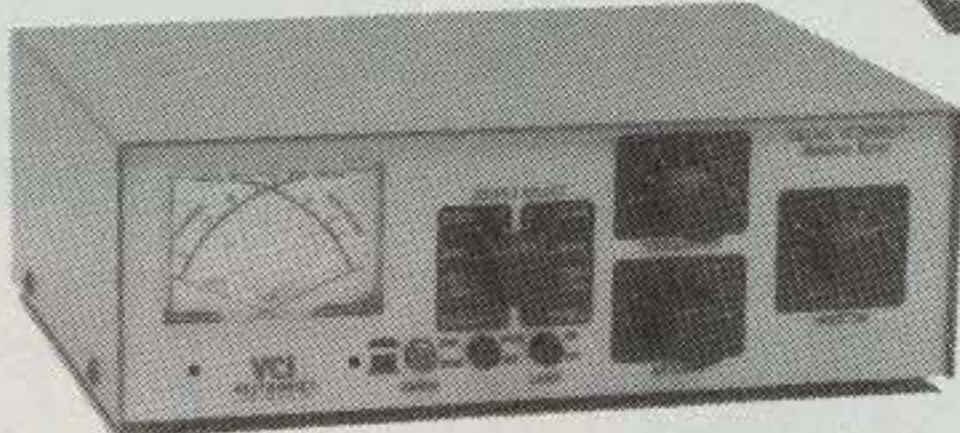
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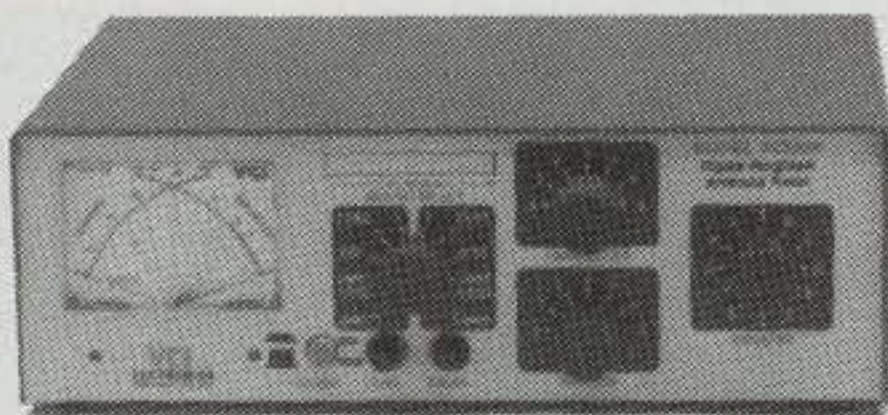
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DL300M
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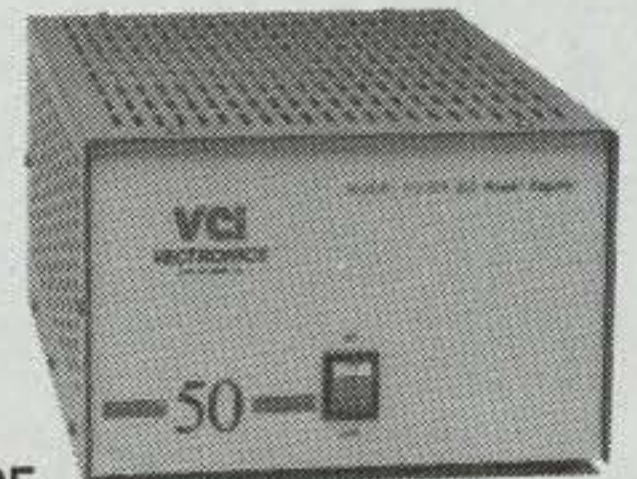
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LP30
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DL650M
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Load



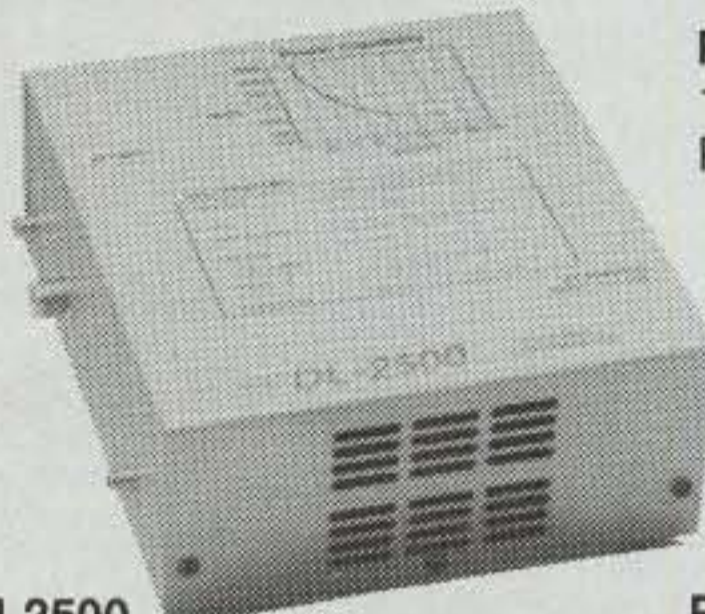
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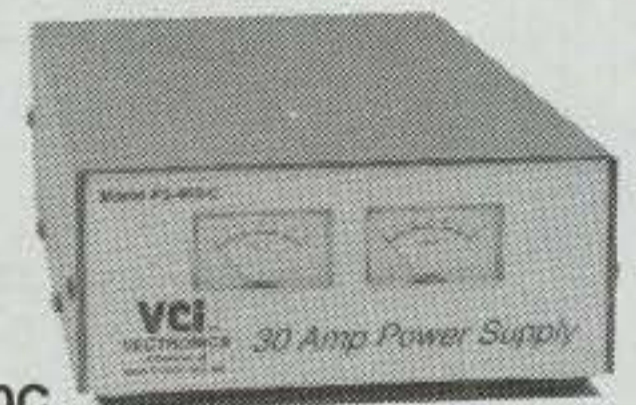
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KD4JRX, also got in on sporadic-E, as did Ted Goldthorpe, WA4VCC, and Thomas McAllister, WB4TLX, who roved through five grids.

From Cuba, Oscar Morales, CO2OJ, reported that it was wall-to-wall QSOs from 50.125 to 50.160 MHz during the short sporadic-E opening he experienced. He stated that with his 10 watts he made 91 QSOs in 51 grids.

Certainly, some record-breaking activity will be reported when the contest results are published by *QST*.

New V44 Beacon

Joe Pater, WB8GEX, and John Walker, WZ8D, are planning to leave a 6 meter beacon on St. Kitts later this month following an HF expedition. The call will be V44K, and the frequency will be 50.0555 MHz. It will be operating on 3.5 watts with a dipole at 1580 feet. The beacon was donated by Jerry Baker, WA8R. Thanks to the "50 MHz DX Bulletin" for this report.

Nine Great Things About VHF Contests

Thanks to Jack Troster, W6ISQ, I received the following, which appeared in "Flash," the newsletter of the Mad River Radio Club of Michigan, and was written by Jim Stahl, K8MR.

Nine Great Things About VHF Contests

Early June is to the VHF guy what late October is to the HF contester—time for the *big one*, the June VHF QSO Party. This year the big one got moved a week earlier to accommodate the ARRL National Convention in Texas. But normally the second weekend in June is the main event for those who operate the nosebleed frequencies. It's a different cup of tea than the HF contests, but not without some advantages, such as:

1. You get to operate three more contest per year [than on HF]. Or more, if you count the CQ VHF WPX, ARRL VHF Sprints, UHF Contest, EME Contest, etc.
2. You can leave the radios for 30 seconds without losing your frequency. (*You can sometimes leave the radio for the entire contest and not lose your frequency!—ed.*)
3. You can put up very competitive antennas without having to arrange a major crew to help.
4. 150 watts makes you a big gun. A kilowatt makes you a *really* big gun.
5. You can go on a contest expedition in your car, and probably get there on less than a tank of gas.
6. If you work everyone, you can go to a new grid and start all over.
7. You can get a night's sleep. You don't care when the comes up in Europe (*only the moon—ed.*)
8. The casual operators actually like the contest. They're on several days before and after talking about it. Nobody complains about the extra contest activity.

9. IF the solar flux isn't 250, who cares what it is!

HUMVEE? On 50 MHz?

"On Monday the 12th of September I was scanning around with my ICOM 2SRA-HH and found RMY convoys using 50.50 MHz FM. They were parked less than 100 yards from my office. I went down to the ship where they were loading, and looked at some HUMVEEs and saw the frequency readout of their FM radios. Hum . . . 50.50 MHz FM. How about that!" 73 de Ricky Tharrington, KD4JRX.

No More Contest Date Shifts

Before and following the June VHF QSO Party this year, the ARRL received numerous complaints about the date shift. Because of the overwhelming response, the following press release was issued by Billy Lunt, KR1R.

"The ARRL Membership Services Committee (MSC), in response to input from League members, has voiced their opposition to changing contest dates to avoid conflicts with conventions or hamfests. The MSC reached this decision during their July 14 meeting in Newington, Connecticut.

"Technical problems have created a delay in printing the minutes of that meeting. However, MSC members wish to assure League members that their voices have been heard."

And Finally

This month begins the holiday season. I am particularly looking forward to a visit from my brother and sister-in-law during the Thanksgiving holiday season.

Both my brother and sister have had recent bouts with serious illnesses. Their problems and the passing of my girlfriend, Carol King, K5CPZ's father, have impressed upon me all the more the importance of family. Remember, this amateur radio stuff is only a hobby. Far ahead of it in priority should be family. Take time this holiday season to be with yours.

Thanks go to all of you who have sent me reports. Thanks also go to the newsletter editors for copies of their productions. Please keep them coming so that this, your column, can be the best in the VHF world. As always, you can send them to the address on the first page of this column; you can e-mail them to my Internet address(72124.2734@compuserve.com) you can FAX them to 405-528-0746; or you can call me at 405-528-6625 and chat about your great accomplishments. Until next month . . .

73, Joe, N6CL

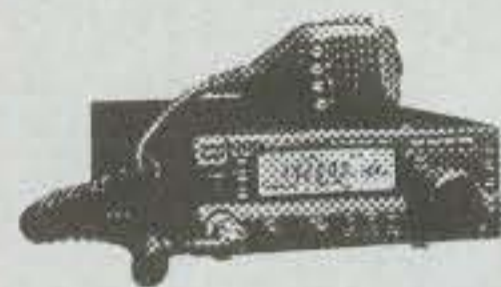


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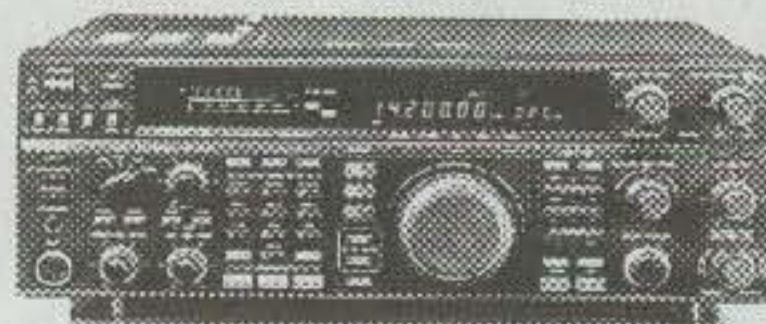
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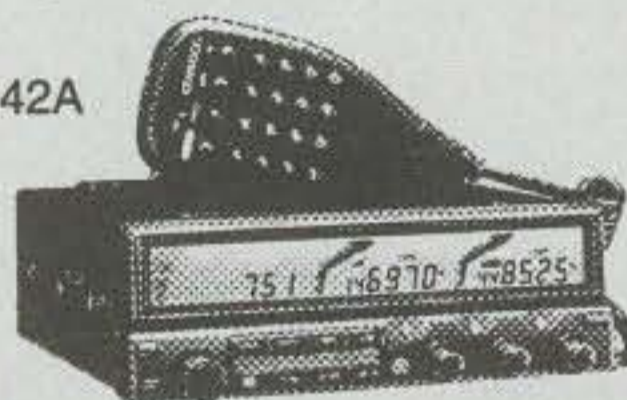
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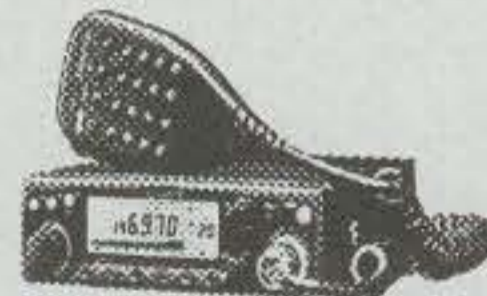
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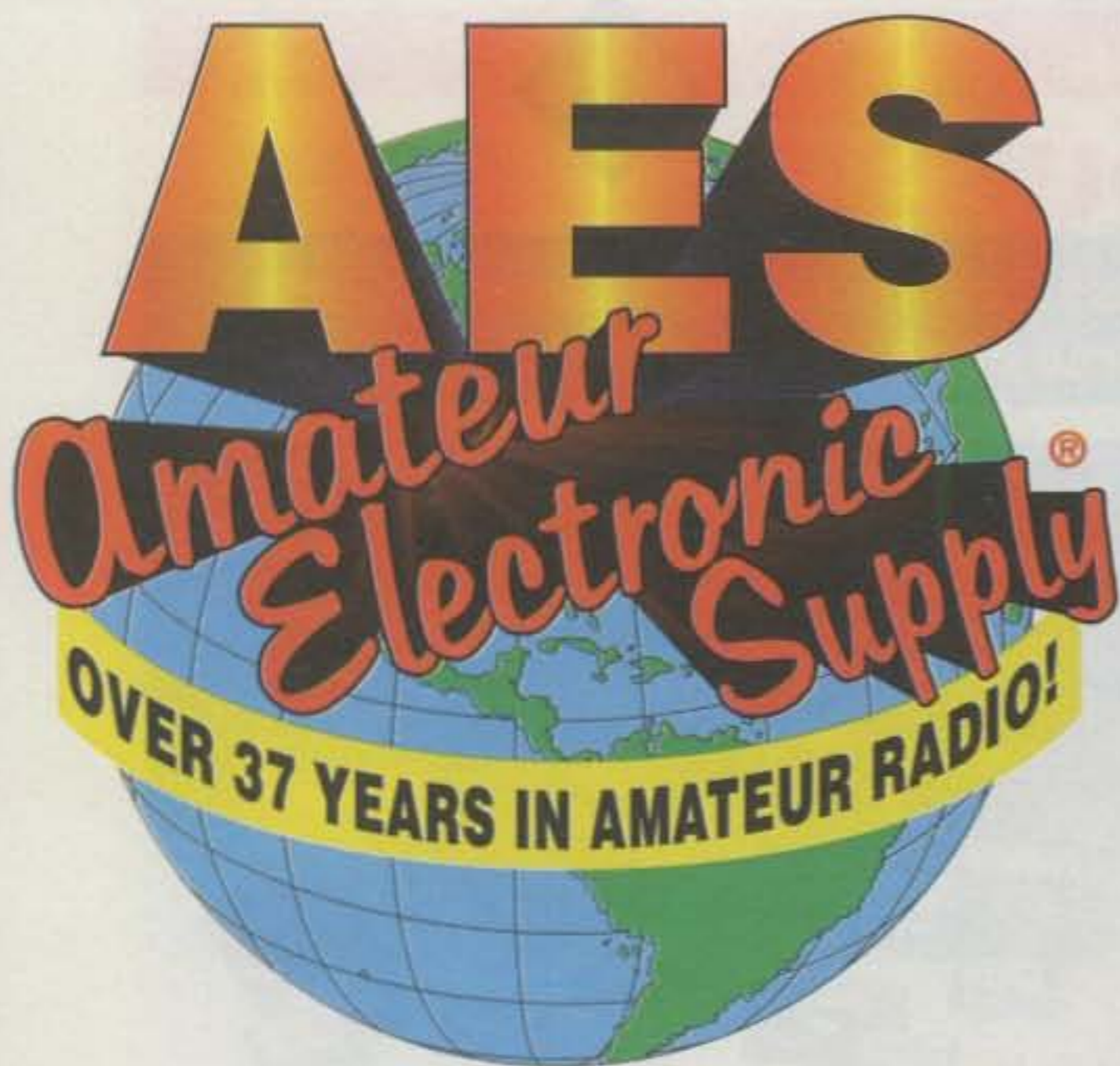
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FT-1000D Deluxe • dual bandpass filter • temp. compensated xtal osc. • 2.4kHz/2KHz SSB filters and 500Hz CW crystal filter.



FT-990 HF Transceiver • tx: 160 to 10m Amateur Bands • rx: 100kHz to 30MHz • 90 memory channels • SCAF • FSP • DDS • high speed antenna tuner w/memories • AC power supply. 12" w x 4 1/2" h x 11 1/2" d, 30 lbs

FT-990DC • DC version w/o built-in AC ps.



FT-840 HF Transceiver • rx: 160 to 10m Amateur Bands • rx: 100kHz to 30MHz • 100 memories (independent tx/rx per memory) • Twin band stacking VFOs • optional FM • automatic 10M repeater offset with selectable CTCSS encode • 100W • 13.5V @ 20A • 9 1/4" w x 3 1/4" x 9 1/2" d, 18 lbs.



FT-890/AT HF Transceiver • tx: 160 to 10m Amateur Bands • rx: 100kHz to 30MHz • 32 memories plus two VFOs per band • 100w • automatic antenna tuner • IPO • DDS • FSP • automatic 10 meter repeater offset • selectable CTCSS encode • requires 13.5VDC @ 20A • 9 1/4" w x 3 1/4" x 9 1/2" d, 12.3 lbs.

FT-890 • above, without antenna tuner.



FT-900/AT HF Transceiver • tx: 160 to 10m Amateur Bands • rx: 100kHz to 30MHz • 100W • 100 memories • built-in antenna tuner • front sub-panel optionally mounts separately from the main body • CTCSS encode with repeater offset • twin stacking VFOs.



FT-736R Multi-Mode U/V Full Duplex Base 2 meters: 144-148MHz; 70cm: 430-450MHz • optional modules for 50, 220MHz and 1.2 GHz • 100 memories • full duplex crossband with inverted tracking (AO-13) • data in/out jack • 25w (144, 220 & 440MHz) 10w (50 & 1.2GHz) • built-in AC power supply or 13.5 VDC • 5 1/4" h x 14 1/2" w x 11 1/2" d, 19.8 lbs.



FT-5200/6200 Dual Band Mobiles 32 memories • CTCSS encode • dual receive • built-in duplexer • cross band repeat • remote capability • 5 1/2" w x 1 1/2" h x 6" d, 2 lbs.

FT-5200 • 2M/440MHz (50/35w).

FT-6200 • 440MHz/1.2GHz (35/10w)

FT-5100 • Like FT-5200 w/o remote capability.



FT-2200/7200 Mobiles

50 memories • DTMF page/coded squelch • backlit DTMF mic • 5 1/2" w x 1 1/2" h x 6 1/4" d, 2.8 lbs.

FT-2200 • 2m with 110-180MHz rx (50w).

FT-7200 • 440MHz (35w)



FT7400H Mobile (left) • 440MHz (35w) • 31 memories • alpha display • track tuning • CTCSS encode • backlit DTMF microphone • 6 1/4" w x 1 1/4" h x 7" d, 3.3 lbs.

FT-912RH Mobile (right) • 1.2GHz

FT-2500M 2m Mobile (not pix) • 50w • 31 memories • CTCSS encode • scan • backlit DTMF mic • 6" w x 1 1/4" h x 7" d, 1 1/2 lbs.



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FT-290R • 2m (25w) **FT-690R** 6m (10w)

FT-790R • 430-450MHz (25w)



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FT-811 440 HT/TTP **(with Coupon) \$234⁹⁵**

FT-815 440 HT/batt/chgr **CLOSEOUT \$299⁹⁵**

FT-816 • 440 MHz HT/batt/chgr, black HT

FT-23R-17 • 2.5w 2 meter FM HT

FT-23R-12 • as above but 2 meters, 5w

FT-33R • 5w 220 MHz FM HT

FT-530 • 2m/440 FM HT w/TTP

FT-11R • 1.5w 2 meter FM HT

FT-11R/HP • 5w 2 meter FM HT

FT-41R • 440MHz FM HT

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• **Mobile Radios**

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• **Handhelds**

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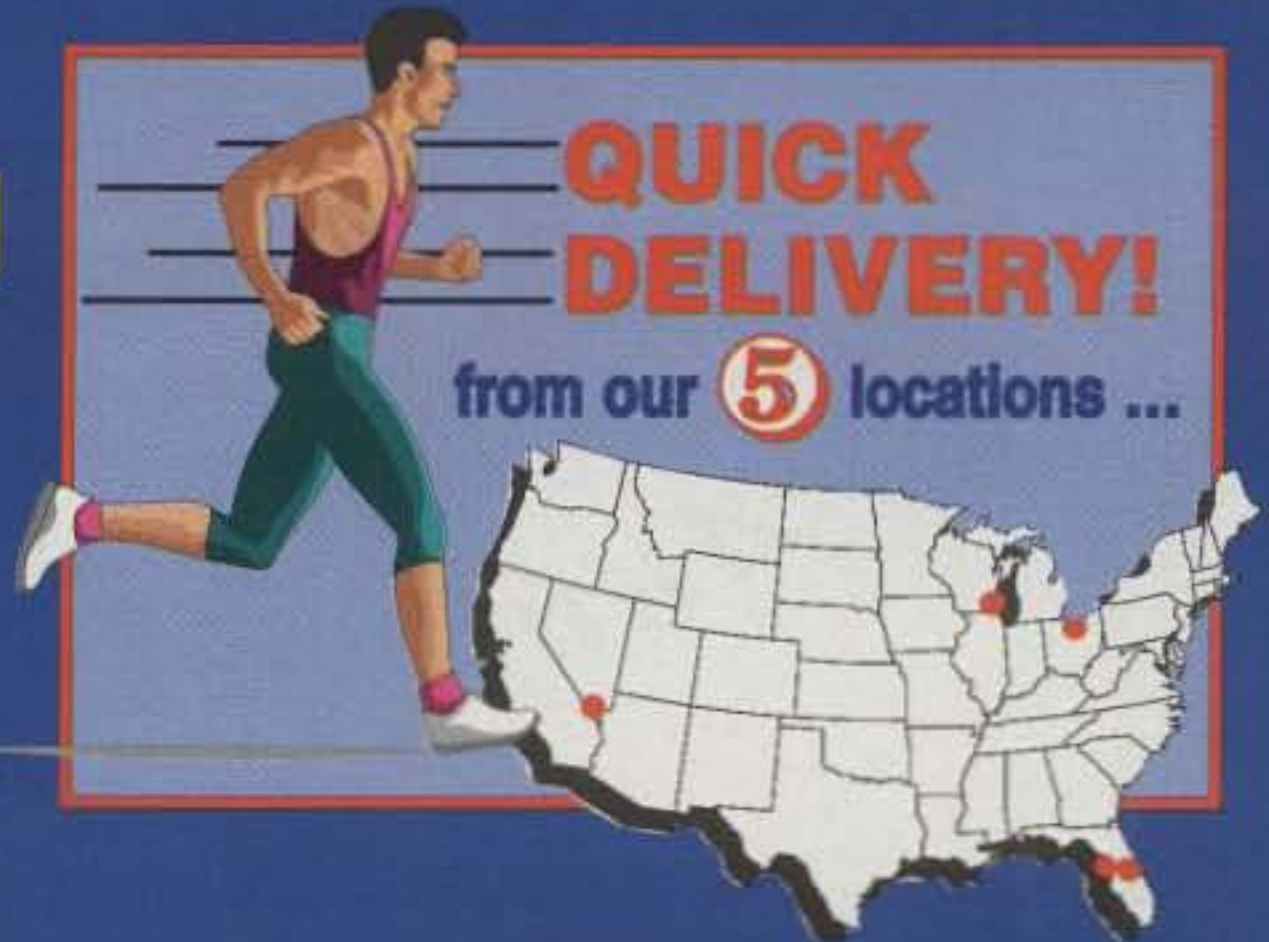
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DR-600T 2m/440MHz Twin Band Mobile 45W (2m)/35W 440 MHz • receives 118-174 (including AM and 410-470 MHz) • 40 memories • scan • full duplex cross band operation • remotes from any DTMF capable 2m or 70cm unit • separate VHF/UHF outputs • separate controls for each band • CTCSS and DTMF encode • 5 1/2" w x 2" h x 7" d, 3 1/2 lbs.

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DR-570T 2m/440MHz Twin Band Mobile 45/35W • 130-170, 340-470+ MHz receive • Full duplex cross band • 20 memory channels, 4 scanning modes • CTCSS encode/decode • internal duplexer • Separate controls - each band • 5 1/2" w x 2" h x 6" d, 3 1/2 lbs.



DR-1200T 2m Data Radio • Optimum Packet • 25W • 1200/2400 baud • 14 programmable memories • 4 scan modes • programmable CTCSS encode/decode • voice transmission with optional microphone • 5 1/2" w x 2" h x 6" d, 2.2 lbs.
DR-1200TH2 • The 9600 baud version.



DJ-180T 2m HT • E-Z to operate! • receives 130-174 MHz • 2.0W, 5W with optional battery. Illuminated LCD display • 16 digit DTMF • 10 memories • 5 1/2" h x 2 1/2" w x 1 1/2" d.
DJ-180TH • Same as DJ-180T, 5W standard.
DJ-580T 2m/440MHz Twin Band HT • 2.5W • receives 130-174 & 410-470MHz. Modifies for MARS/CAP tx, + 118-136MHz+ • 40 memories • CTCSS encode/decode • DTMF encode • DSQ • full duplex cross band repeat • scan • autodialer • back-lit keypad • simult. rx on both bands-separate controls • 6 1/2" h x 2 1/4" w x 1 1/4" d, 0.97 lbs.
DJ-F1T 2m Mini HT • 2.5W • receives 130-174MHz and 118-136MHz • scanning • autodialer • back lit keypad, 40 memories • call channel • CTCSS • DTMF encode • DSQ paging • 4 1/2" h x 2 1/2" w x 1 1/2" d, 14 oz.
DJ-F1T/HP • Same as DJ-1FT but 5W • 12V 600mah nicad battery standard.
DJ-G1T 2m HT • 2m tx/rx + 440MHz and AM aircraft receive • Channel Scope spectrum analyzer • 80 memories -5 for autodialer • Crossband semi-duplex operation • DSQ paging • Scan • 4 1/2" h x 1 1/4" w x 1 1/2" d, 12.6 oz.

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Coming Soon! ...

New Alinco DR-M06T 6-meter FM mobile transceiver. As of the date this ad was prepared the unit was not approved for sale by the Federal Communications Commission. But, as soon as it is ... AES will have it!

ALINCO CLOSEOUTS

- DR-119T 50W 2m FM Mobile ... \$344⁹⁵**
- DJ-560T/A 2m/440 FM HT. ... \$299⁹⁵**
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Announcing:



The "CQ Gang" Award A Golden Anniversary Kickoff Event!

BY RICHARD S. MOSESON*, NW2L

CQ is celebrating its 50th anniversary in 1995, and to get the festivities started, we're offering everyone a chance to work the people who are most responsible for our success: the writers, editors, and everyone else who has been associated with *CQ* throughout the past half-century. For the first 15 days of January current and former *CQ* staffers and associates will be authorized to sign "/50" after their call-signs. And you can earn a nice piece of wallpaper for contacting these members of the "CQ Gang."

The "CQ Gang" award is easy to earn. Just contact stations signing "/50," tell them your name, signal report, and where you live, and write down their call-signs, names, signal report, and *CQ* position held. You get five points for each contact with a "/50" station, plus bonus points for working top *CQ* staffers. When your point total is 50 or higher, you qualify! It's as simple as that! There are even endorsements for higher scores, up to 500 total points. The only catch is you have to do it all in the first half of January, the month that the first issue of *CQ* was published, back in 1945.

Complete rules for the "CQ Gang" award follow. Note that this award is separate from the "CQ/50 Gold" awards announced last month, although all contacts for the "CQ Gang" award will count toward the "CQ/50 Gold" awards. (You will have to file separate applications.) Have fun and CU in January!

The CQ Gang Award

Eligibility

1. Any radio amateur or shortwave listener anywhere in the world may participate in this award program.

2. The following amateurs are authorized to sign "/50" after their call-signs as part of this program:

(a) Current and former staff members, columnists, and writers of *CQ: The Radio Amateur's Journal*, *Popular Communications*, *Communications Quarterly*, and the *CQ* and *Popular Communications Guides*;

(b) Current and former *CQ* Award Managers, Contest Directors, award and contest committee members, *CQ* award checkpoint stations;

(c) Authors of *CQ* books, production staff of

**CQ* 50th Anniversary Coordinator

Who's Who At CQ

Following is an alphabetical list of the various titles held by "CQ Gang" members you might meet on the air, along with recommended CW abbreviations (in parentheses). "CQ Gang" members with more than one title should choose one to use for award contacts:

Advertising Manager (ADM)
Anniversary Coordinator (ANN)
Author [Books] (AUT)
Award Checkpoint (CHK)
Award Committee (AC)
Award Manager (AM)
Columnist (COL)
Contest Committee (CC)
Contest Director (CD)
Editor (ED)
Editorial Review Board (ERB)
General Manager (GM)
Photographer (PIX)
Publisher (PUB)
Specialty Product Staff (SPS)
Technical Editor (TE)
Video Production Staff (VID)
Writer [Magazines] (WR)
Other *CQ* staff/associates not listed above (CQS)

CQ videos, producers of *CQ* specialty products, and

(d) Any other employees of *CQ* Communications, Inc.

Award Rules

1. All contacts/receptions must be made between 0000 UTC January 1, 1995 and 2359 UTC January 15, 1995.

2. Contact (or monitor) stations signing "/50" after their call-signs in accordance with these rules. "/50" stations may contact any stations, including other "/50" stations."

3. A minimum of 50 award points must be earned to qualify, with endorsements available for each 50 additional award points, up to a maximum of 500 points.

4. Award points are determined as follows:

(a) All stations: Five (5) points per valid contact with a "/50" station, plus any applicable bonus points (see below).

(b) "/50" stations: As above, plus 1 point per valid contact with a "non-/50" station.

(c) Bonus points: Ten (10) additional bonus points for contacts with any of the following stations:

K2MGA—President/Publisher, *CQ*

K2EEK—Editor, *CQ*

K1AR—General Manager, *CQ*

N2IQO—Advertising Manager, *CQ*

NW2L—*CQ* 50th Anniversary Coordinator

WA1G—*CQ* Golden Anniversary Awards Manager

5. Exchange

(a) "/50" stations: Transmit your call-sign, name, signal report, and position held. (If status is "former," so indicate.)

(b) Non-/50" stations: Transmit your call-sign, name, signal report, and QTH (US state, VE province, or DX country).

6. Each "/50" station may be contacted once per band and mode for award credit. The use of repeaters and digital store-and-forward devices (e.g., digipeaters and PBBSs) is permitted.

7. QSL cards are *not* required. Applications must be accompanied by log forms indicating date, time, band, and mode for each contact, plus the required exchange information (see rule 5 above). Use of official application and log forms is recommended, but is not mandatory. Only paper submissions are acceptable. Official application and log forms are available for a large SASE from: *CQ* Gang Award, c/o *CQ* Communications, Inc., 76 North Broadway, Hicksville, NY 11801 USA.

8. Completed applications/logs must be mailed to the *CQ* Golden Anniversary Awards Manager by March 31, 1995. A single submission for all qualifying contacts is recommended.

9. There is no fee for this award.

Entry Procedure & Deadline

All applications and logs must be post-marked on or before March 31, 1995 and must be mailed to:

Bruce Marshall, WA1G
CQ Golden Anniversary Awards Manager
52 Cornell Street
Roslindale, MA 02131-4524

Applications will be processed in the order received. If you would like confirmation that your application has been received, include a self-addressed, stamped, postcard with your submission (US only).



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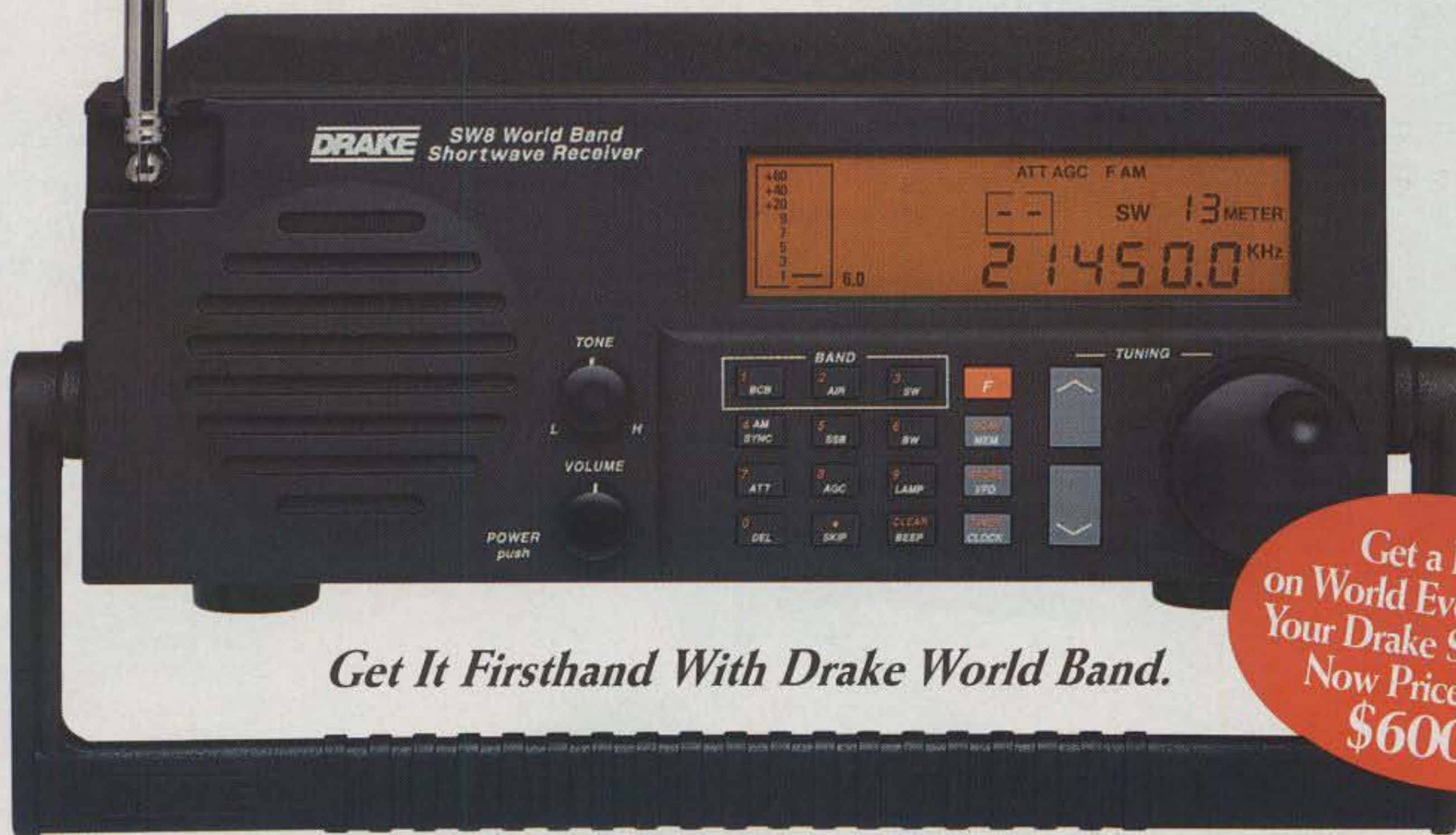
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Extensively revised, this 17th edition features a new chapter on HF Yagi Arrays. You'll find a suite of 72 optimized Yagi designs for the HF amateur bands, from a tiny 8-foot-long, 3-element, 10-meter beam to an 80-foot-long, 20-meter monster.

The Radio Wave Propagation chapter now includes comprehensive statistical data on the range of elevation angles needed for communication from all areas of the US to important DX locations around the world. You'll also find an upgraded VHF and UHF Antenna Systems chapter with K1FO optimized Yagi designs.

Nearly 1000 drawings make it easy to follow the text, which was written by ARRL HQ staffers and an impressive list of outside antenna experts. Photos, tables and bibliographies for further reading make the 28 chapters in this book an invaluable tool for you.

This new 736-page edition of *The ARRL Antenna Book* comes bundled with another handy brand new tool—a 3 1/2-inch IBM-format disk with programs to help you design and analyze Yagi antennas, forecast propagation, evaluate transmission lines and more.

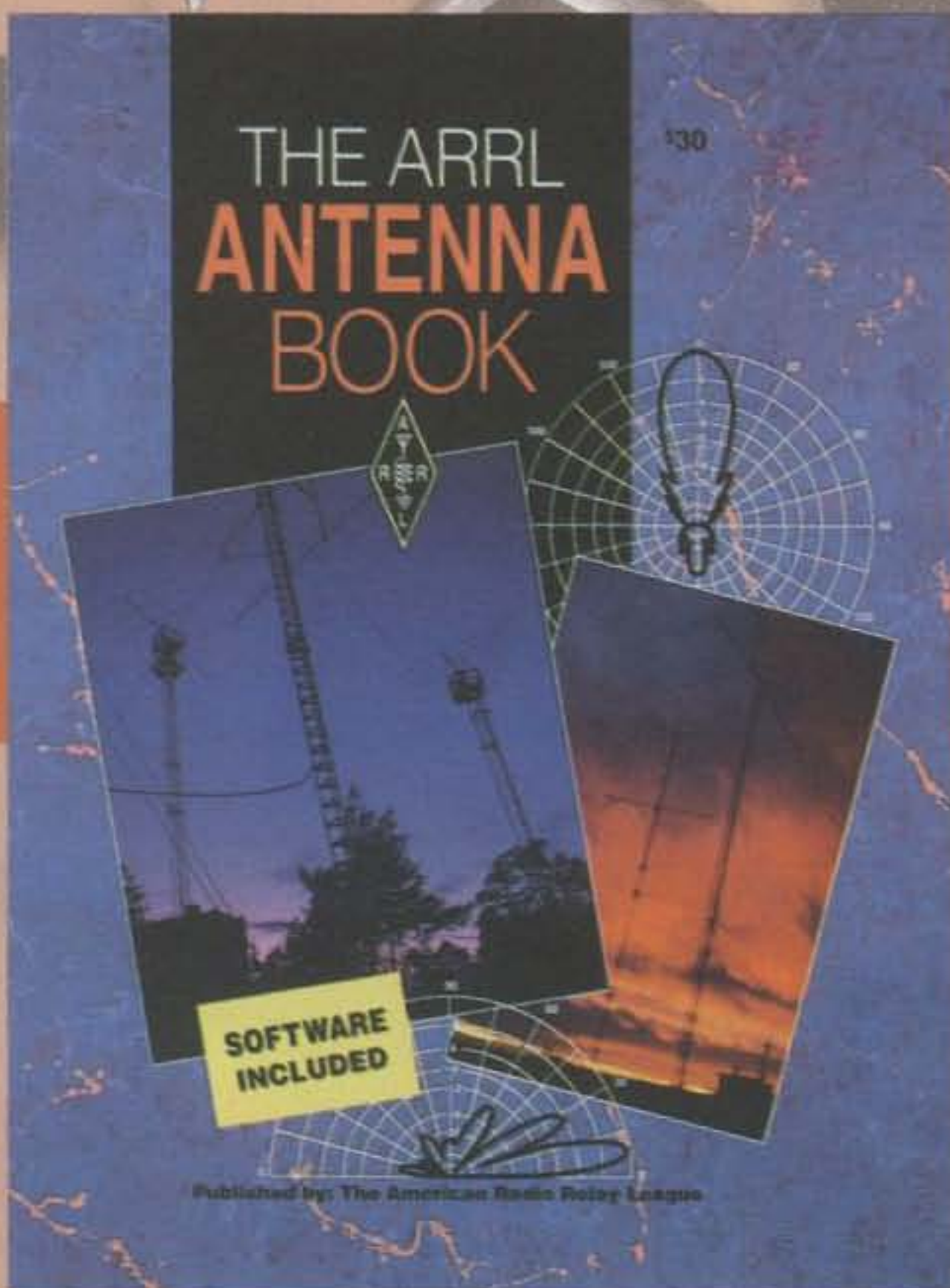
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ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Antenna Notebook—Part IV

Last time we got together we featured a variety of antennas and accessories topics. We're still on the same track this month, so let's get started. First we turn to antennas.

Antenna Notes

Centaur Baluns and Antenna Kits. Centaur Electronics has launched a line of amateur baluns and HF wire antenna kits. According to Centaur's Daniel Kuz, the B11W10 series baluns are designed to match 50 ohm unbalanced coax to low-impedance balanced wire antennas such as dipoles and inverted Vees. The Centaur baluns are equipped for extended operation at power levels up to 3 KW PEP, over the range 0.5 to 50 MHz.

The toroidal-core baluns are manufactured of Acrylonitrile-Butadiene-Styrene body components and use stainless-steel hardware throughout. The units, which are 3 inches in diameter and 7 inches long, are equipped with a mil-spec SO-239A connector. Custom connectors are available. The baluns are \$79.00.

The Centaur baluns also are available in ready-to-install antenna kits. Two kits are offered: one kit covers 80 and 40 meters, while the other spans 20, 15, and 10 meters. Other band combinations can be furnished. The antenna kits include a balun and are priced at \$124 each.

Something else that attracted my interest was Centaur's full-page "customer bill of rights," which is included in the product literature they mail out. Six specific customer rights are enumerated. These include the right to (1) expect quality materials and workmanship, (2) have a lifetime warranty, (3) test products for 30 days with the option to return them, (4) receive good customer service, (5) return products that don't live up to expectations, and (6) speak directly with the company president. This is a nice touch, and one many industry vendors might do very well to emulate!

For more information, contact Centaur Electronics, 3720 S. Park Avenue #604, Tucson, AZ 85713 (602-622-6672).

The BOBBER 45™. If you're interested in a super-heavy-duty mast that according to the manufacturer "is designed to survive the next hurricane to hit Florida," the BOBBER 45™ may be for you, despite its hefty \$5995 price tag. The mast is also engineered to help meet with the approval of housing, architectural-review, and building-code officials who often oppose amateur mast or tower installations.

The 7000 lb. mast's physical description is interesting and impressive. The BOBBER 45 is a counterweighted, 45 foot mast made of two 20 foot square, thick-wall 6061-T6 aluminum tubes placed end to end. These tubes are held rigid by shrouds and spreaders. The bottom of the lower aluminum tube is connected to a rota-

289 Poplar Drive, Millbrook, AL 36054

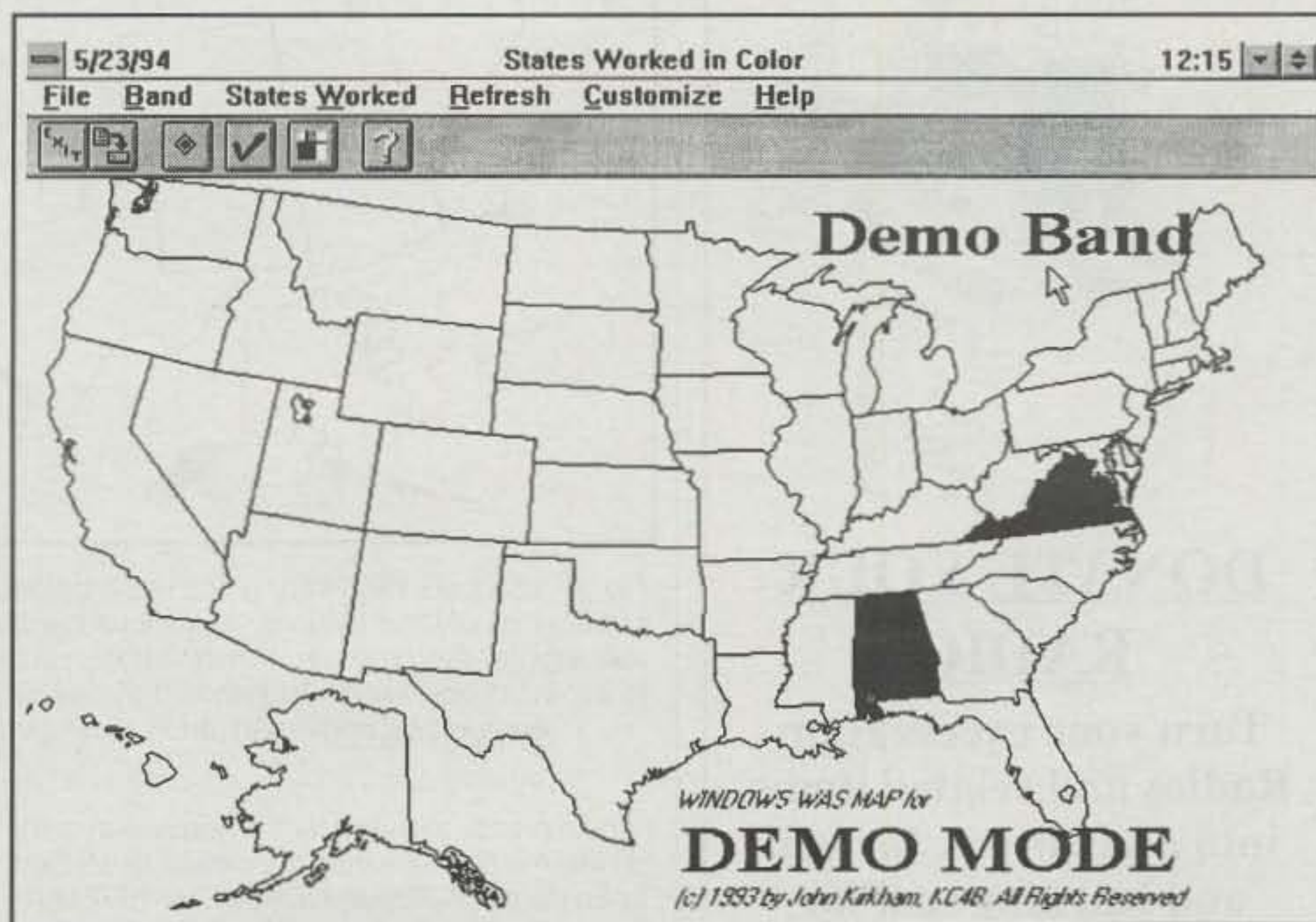


Fig. 1—Windows WAS Map is a computerized version of the blank U.S. maps that amateurs color in as they work new states. The program easily tracks your status, and it works well with manual record keeping and with computer logs. The shareware demo version lets you keep up with a single band, appropriately called "Demo Band." See the text of this month's column for details.

tion bar which is free to pivot on two bearings mounted on top of two heavy-duty, sand-filled, 55-gallon, mil-spec steel drums. A steel counterweight (approximately 5800 lbs.) hangs between the two drums.

An aluminum cage designed to accommodate many popular rotators is fastened to the uppermost end of the aluminum tubing. The assembly is freestanding and requires only a 5' x 7' flat concrete pad on which to rest. There are no guy wires.

Four replaceable trim tabs are used to adjust the tubing into a vertical position. The tabs provide a safety feature by bending when the wind load on the mast and antenna exceeds approximately 30 MPH. When bent, the tabs allow the tubing and counterweight to sway, relieving the bending torque on the steel drums.

The square tubing and counterweight rotate together much like a giant teeter-totter, and they allow you to quickly rotate the mast from vertical to horizontal or vice-versa. Two 4 ton jacks support the counterweight and relieve stress on the tubing when the mast is in the horizontal position.

Despite the mast's very heavy weight, it is portable and breaks down into manageable pieces. According to the manufacturer's Ted Herrman, AE8G, the entire mast can be disassembled, carted to a new location, and reassembled in one day by two people.

For more detailed specs, contact Standup

Mast Corp., 507 East Coast Drive, Lantana, FL 33462 (407-585-3466).

RF Industries Catalogs. RF Industries (RFI) has been a big player in the coaxial connector industry since 1979, when it started operations in Miami and became known as a leading supplier to the land-mobile and two-way radio businesses. In 1987 the company moved to expanded facilities in San Diego.

This year RFI entered the general coax, sub-miniature, and broadcast/video marketplaces, and offers several catalogs in these areas. While directed mainly at communications equipment manufacturers, the catalogs are quite useful to amateurs for their connector selection and cross-reference listings, connector installation guides, and cable-stripping specification tables which cover many unusual RF connectors. The catalogs are free of charge from RF Industries, Ltd., 7620 Miramar Rd., San Diego, CA 92126-4202 (1-800-233-1728).

Metal & Cable Corp. Update. This Ohio enterprise offers a variety of products and services for the amateur radio and commercial markets. A major product line is the company's aluminum stock, which includes both 6061-T6 drawn seamless tubing (in 12 ft. lengths) and 6061-T6 extruded seamless tubing (in 12 and 24 ft. lengths). Stock is available from 1/4 inch to 3 inch diameter.

The company also offers the popular W3BMW Model 2.1 "Impossible Dream Whip HF Mag Mount." The mount includes the alu-

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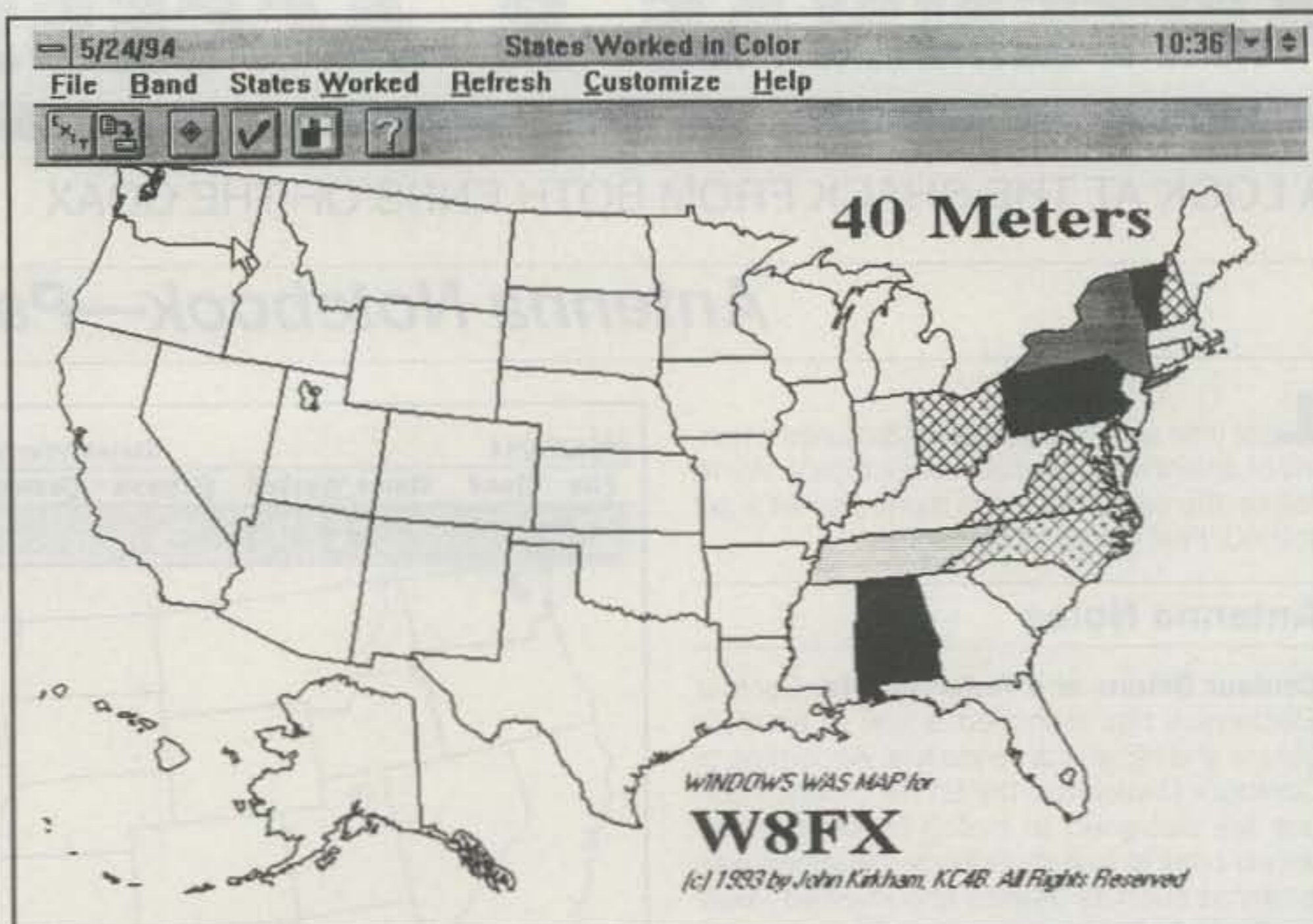


Fig. 2- Windows WAS Map gives you a colorful display of your "states worked" status for each of 20 types of WAS awards, on various bands and using a variety of operating modes. When you register the program with its author, you get a serial number that works with your callsign to allow full operation. On the map the blank states are not yet worked, colored-in states are worked and confirmed, and crosshatched states are worked but not confirmed.

minum pieces required for the heavy-duty metal H-frame at the heart of the device described by Ed Karsin, W3BMW, in December 1992 *QST*. The mount is available completely assembled and ready for use right out of the box for \$69.95 plus \$8.25 shipping & handling. A stud kit (bolt, lockwasher, and threaded fitting) is \$3.

Also available from stock is high-quality copper grounding strip. The strip is .011 inch thick by 2 inches wide and is made of pure copper. It has a machined edge for safe handling. A 40 ft. coil is \$43.50 postpaid; other lengths are available.

The firm also is a full-line distributor of ferrous and nonferrous metals and custom-manufactured wire and cable. It also offers metallurgical engineering services, metal fabrication, custom machining and processing, and heat treating and brazing. Hard-to-find products are a specialty of the house.

For more information and a flyer, contact Metal & Cable Corp., Inc., 9241 Ravenna Road, Unit C-10, P.O. Box 117, Twinsburg, OH 44087 (216-425-8455).

1994 "Radio Adventure" Catalog. On several occasions we described the wide range of HF, VHF, and UHF antenna and antenna accessory products offered by Jim Stevens, KK7C, of AntennasWest, most recently in December 1992. The AntennasWest products heavily emphasize casual, on-the-go, and practical antenna needs.

Some of the many AntennasWest products include the VHF Walking Stick Fox Hunt Beam; Corner Beam for UHF/VHF; BumbleBee HF Coaxial Dipoles; TNT HF Window; G5RV all-band "QuickKits"™; Short KansasDipole; G4EZG Variable Radiation Angle Delta Loop; "Slinky" HF indoor antenna; several loops, including the OmniLoop, SwissLoop, Random-Loop, and NotchLoop™; Grab-N-GO AntennaPacks; CurrentForcing™ and In-Line™ Feedline Baluns; solar power supply products;

several other novel antennas, many for on-the-go operating; and even QSL cards.

The 64-page 1994 AntennasWest "Radio Adventure" catalog is more than just a product listing: it's nicely organized and entertainingly written. The catalog is divided into seven sections: features, antennas, hand-held and portable operation, solar power, build-it-yourself components, QSLs, and ordering information. It's available for \$1 from AntennasWest, Box 50062, 1500 North 150 West, Provo, UT 84605 (801-373-8425).

Soft Side Notes

LOG201. Bill Stockett sent us a basic amateur contest logging program that he wrote, LOG-201, which is still in development. Bill is not a licensed amateur, but wrote the program at the request of a friend who is an amateur.

The contest-specific program covers several major operating events on 160, 80, 40, 20, 15, and 10 meters. These include the ARRL DX, ARRL Sweepstakes, CQ WPX, CQ WW, and IARU HF contests, and the California QSO Party. Various reports are available for each contest, including a contest log (commented and not commented) and a dupe sheet (by callsign or by both callsign and band). Easily restorable backup files are available.

LOG201 is \$29.50, including shipping & handling, from Bill Stockett, 4618 South U. St., Fort Smith, AR 72903 (501-484-0420).

FCC Callsign Database Update. We have said it before, and we'll say it again: If you have a CD-ROM drive on your PC, you know that a good way to build up your amateur radio software collection is by obtaining several CD-ROM discs of shareware and public-domain programs. A CD-ROM unit opens up new and exciting opportunities because of the massive amount of programs and data (up to about 680 MB) that a disc can store. Another of the advan-

Say You Saw It In CQ

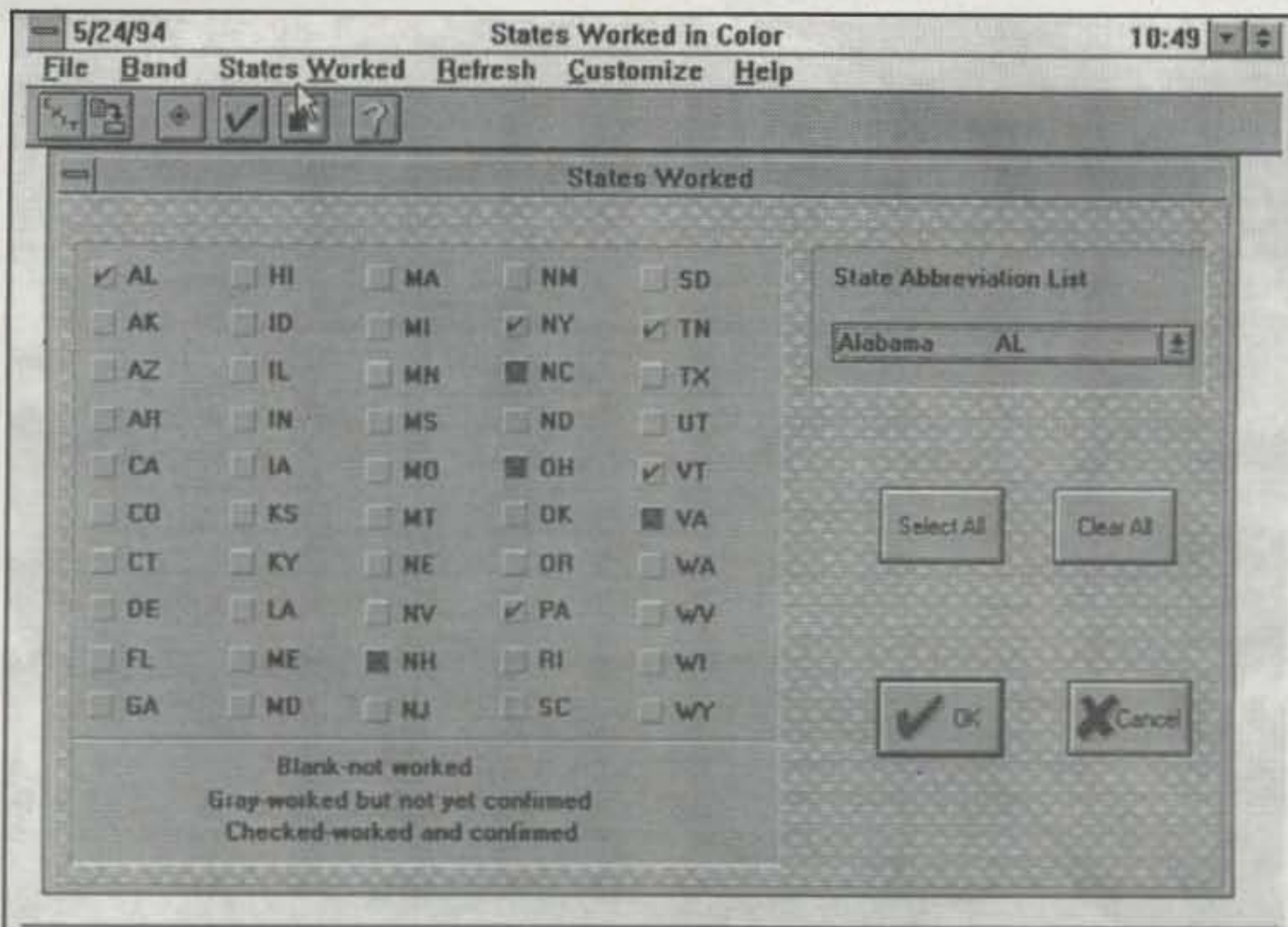


Fig. 3—Windows WAS Map is designed to be run entirely with a mouse. You set each state with a mouse click. Since it's a Windows program, you can have it available on call to check your status by running it in the background, bringing it up as needed. The states-worked dialog box is used to update the display: blank boxes are states not worked, grayed boxes are worked but not yet confirmed, and checked boxes are worked and confirmed.

tages of CD-ROM based software is the ability to use large databases and extensive graphics that would otherwise fill up one's hard drive in a heartbeat.

In several previous columns we noted the "World of Ham Radio" shareware CD-ROM of-

fered by Pete DeVolpi, KC3TL. This disc, which is updated regularly, gives you more than 500 MB of amateur radio software; there are no non-ham files on the CD.

The disc now includes the complete FCC amateur callsign database. Almost 1,000,000

callsigns are found in seconds using an included "smart" search engine (CALLSIGN.EXE) that lets you find an amateur radio operator by callsign, a prior callsign, or name. You can even perform partial searches in case you're not sure of the exact name or callsign. The user interface eliminates the need for you to use DOS commands. (You can load the program and data on your hard drive if you wish, but it requires about 125 MB of disk space.)

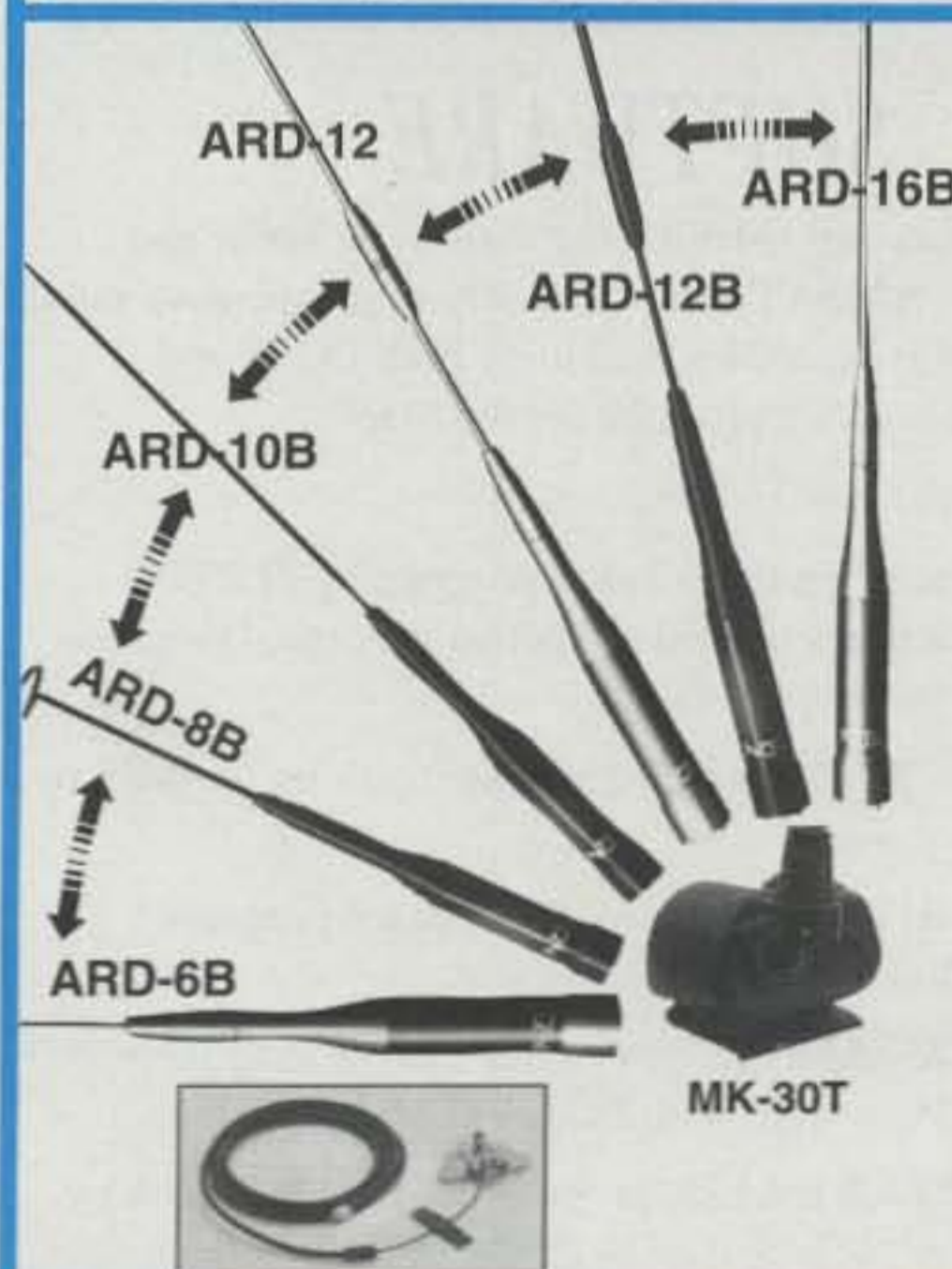
The AmSoft CD-ROM is driven by a front-end menu system called CDVIEW. This interface lets you easily maneuver through the more than 7000 public-domain and shareware files on the disc. You can place any of the files onto diskettes or your hard drive, or use CDVIEW to preview the software without ever requiring the use of any other disk drive. Online help is available, including a new "Info-Text" feature that lets you find file information by just pressing a key for assistance.

The 7000 program files cover many of the latest amateur radio software program releases. Subjects include antennas, scanning, Morse/CW, engineering, examinations, formulas, logging, propagation, packet, RTTY, satellites, weather tracking, and more. Over 1000 equipment modification files also are included.

The current edition of the CD-ROM is \$40 plus \$3 shipping. The disc now is available on a subscription basis as well, being published three times a year (every four months, distributed in January, May, and September). A newsletter keeps users up to date. For more information, contact AmSoft, P.O. Box 666, New Cumberland, PA 17070-0666 (717-938-8249).

CAPMAN Version 2.0. In the May column we described CAPMAN, a professional-quality propagation analysis and prediction program. CAPMAN is shorthand for "Computer

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ARD11/11B	41.5"	2m:3.7/70cm:6.1	120w
ARD12/12B	48.2"	2m:4.3/70cm:6.8	150w
ARD16/16B	64.8"	2m:5.0/70cm:7.7	150w

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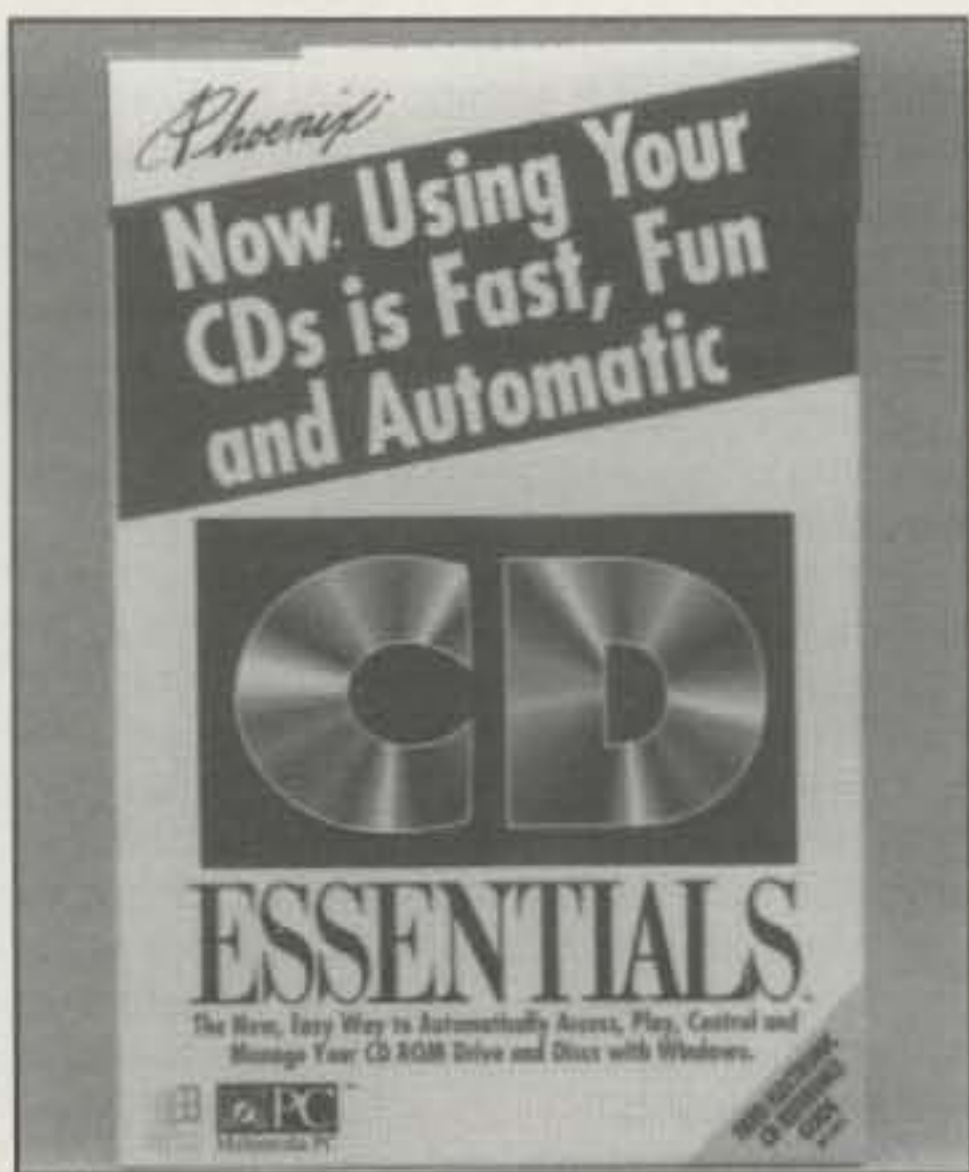
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CD Essentials is a collection of CD-ROM and multimedia utilities with several tools to make the process of installing and using CD-ROMs fast and automatic. The program learns how you use your discs and automates the steps needed to automatically access, play, control, and manage them. For example, the program constantly scans your CD-ROM drive, senses when you insert a disc in the drive, and provides you with step-by-step prompts on what to do next. (Photo Phoenix Technologies, Ltd.)

Assisted Prediction Manager," and it was developed by Jim Tabor, KU5S, and Don Lucas, W00MI. The new version builds on the earlier program we discussed and is a step forward in HF communication system analysis.

As we noted, CAPMAN was developed by the prime author of IonCAP (Ionospheric Communications Analysis and Prediction Program). As many CQ readers know, IonCAP is a standard or yardstick by which other propagation prediction programs are judged. However, IonCAP is admittedly notorious for being difficult to learn and cumbersome to use. CAPMAN is an attempt to solve these problems.

Some of the features in CAPMAN 2.0 include many user customizable capabilities; the ability to use MiniNec or Elnec output, or custom antenna gain patterns; the ability to play "what if" with parameters such as antennas and power; and a "quick execute" function that allows you to select a target location and automatically obtain custom prediction data.

Other features include the ability to display propagation prediction data in either tabular or graphical form; the ability to use solar flux or smoothed sunspot number (SSN) with an optional K-index; automatic SSN history from 1940 to 1993 and predicted SSN data through 1997; and many more features in a friendly yet powerful communications analysis package.

CAPMAN incorporates the latest full commercial version of IonCAP, used by more than 450 government agencies and communications departments in the U.S. and more than 100 other countries. CAPMAN, a 32-bit program, requires an IBM PC or compatible with an 80386 or higher microprocessor. It's \$89 postpaid from LUCAS Radio/Kangaroo Tabor Software, 2900 Valmont Road, Suite "H," Boulder, CO 80301 (303-494-4647).

Windows WAS Map. John N. Kirkham, KC4B, tweaked us ever so gently by congratulating us on *finally* getting aboard with a PC running Microsoft Windows, rather than the plain, unadorned DOS that we have long loved

so well. Just to make his point on the joys of Windows in the hamshack environment, John enclosed his Windows shareware program, Windows WAS Map. It's rather neat.

The program is a computerized version of the blank U.S. maps that amateurs have long colored in as they work new states. Windows WAS Map gives you a colorful display of your "states worked" status for each of 20 types of WAS awards, on various bands, and using a variety of operating modes. The program easily tracks your status, and it works well with manual record-keeping systems and with computer-based logs.

The program is designed to be run entirely with a mouse (you set each state with a mouse click), though shortcut keys are provided should you wish to use them. Since it's a Windows program, you can have it on call to check your status on-the-go by running it in the background and bringing it up as needed. A few nice touches include hypertext help and a control bar.

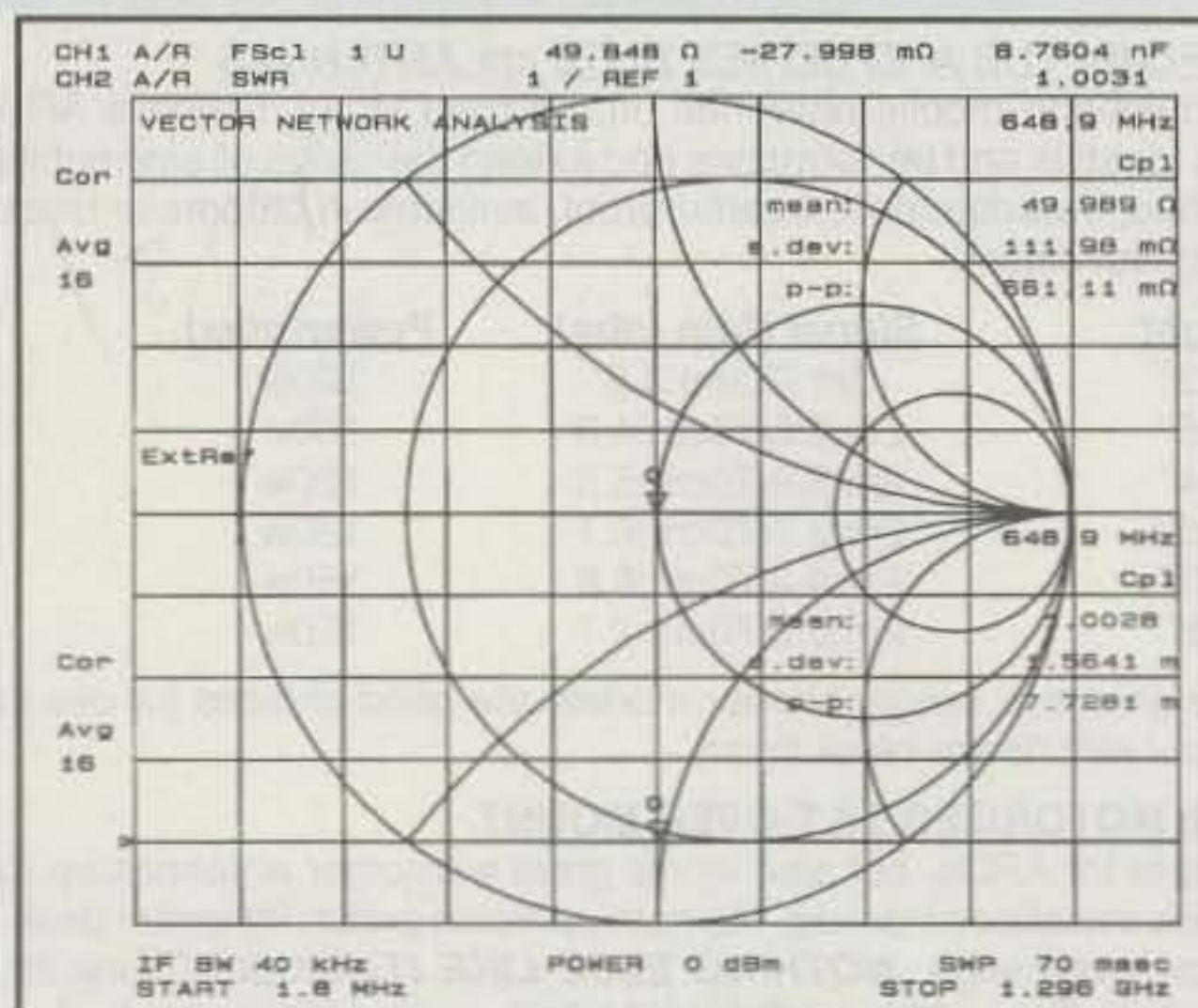
Windows WAS Map is shareware. It's available in a demo version on CompuServe (look for WWAS20.ZIP) and on many ham BBSes. The shareware demo version lets you keep up with a single band, appropriately called "Demo Band." When you register the program (at \$10), you get a serial number that works with your callsign to allow full operation. In demo mode you can try all the features but you can save only the states in the Demo Band.

You also can obtain the program directly by remitting the \$10 registration fee to its author; the fee includes shipping. Contact John N. Kirkham, KC4B, 10920 Byrd Drive, Fairfax, VA 22030 (703-273-2519). (See figs. 1, 2, and 3.)

CD Essentials. As we noted just a moment ago, CD-ROMs are great, but using them is

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much different than using hard-disk-based software, and it can be confusing to the user. Using CD-ROMs on a PC is essentially non-intuitive, especially for those who are more used to audio-style CDs. Unlike an audio player, on a PC nothing happens when you insert the disc in the drive.

CD Essentials a unique collection of CD-ROM and multimedia utilities that includes several useful tools. It's designed to make the process of installing and using CD-ROMs fast and automatic. The program effectively learns how you use your discs and automates the steps needed to access, play, control, and manage them. For example, the program constantly scans your CD-ROM drive, senses when you insert a disc in it, and provides you with step-by-step prompts on what to do next.

Some key program capabilities include automatic CD-ROM launch; an integrated multimedia (sound, images, and video) player; control of PC sound hardware using a familiar stereo interface; and an integrated database that organizes your CD-ROMs and allows keyword searches to help find the right disc. The program is designed to load automatically from your Windows Start-Up Group; the program remains a small desktop icon until you double-click or place a disc in your drive. It requires a multimedia PC with a 386SX or higher microprocessor.

CD Essentials is \$49.95 and includes a free CD-ROM reference guide. It's offered by Phoenix Technologies, Ltd., 846 University Ave., Norwood, MA 02062-3950 (1-800-452-0120).

Book Nook

Hidden Ham Antennas. Okay, what do flag-

poles, fences, tomato-growing supports, and arbors have in common? As you might guess, all of them can (and do) hide amateur radio antennas!

Many amateurs face significant antenna restrictions in their neighborhoods or apartment/condo complexes. They're always looking for good ideas for hidden and disguised transmitting antennas the neighbors or the landlord won't complain about because they won't know they're there. These folks likely will discover a vast reservoir of ideas in Frank P. Hughes, VE3DQB's new book, *Hidden Ham Antennas*. Out-of-doors, inside, HF, and VHF/UHF antennas are all discussed, along with clever ways to disguise them. Also covered are antenna tuners, grounds, counterpoises, and some easily disguised commercially available antennas. The book is illustrated with over 40 diagrams.

Hidden Ham Antennas is published at \$12.95 plus \$2 shipping & handling by Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147 (414-248-4845). (Two other VE3DQB books, also published by Tiare, are popular with SWLs. They are *Limited Space Shortwave Antenna Solutions* and *Easy Shortwave Antennas*.)

TAPR Packet Status Register. Are you really into packet radio? Then you might want to join TAPR, the Tucson Amateur Packet Radio Corporation, and receive its interesting newsletter, "Packet Status Register."

TAPR, as you probably know, is one of the cradles of amateur packet radio civilization. It's a nonprofit, scientific research and development corporation, chartered in Arizona, for designing and developing new systems for packet radio communications in the amateur

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May 1994

Volume 3, Number 2

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New Earth Radiation Belt Has Interstellar Matter

NASA's Solar Anomalous and Magnetospheric Particle Explorer (SAMPEX) has confirmed the location of a new belt around the Earth that is composed of different particles than the Earth's two Van Allen belts. Within the inner (Dowd) Van Allen belt which is mostly composed of protons, the SAMPEX shows a belt of cosmic

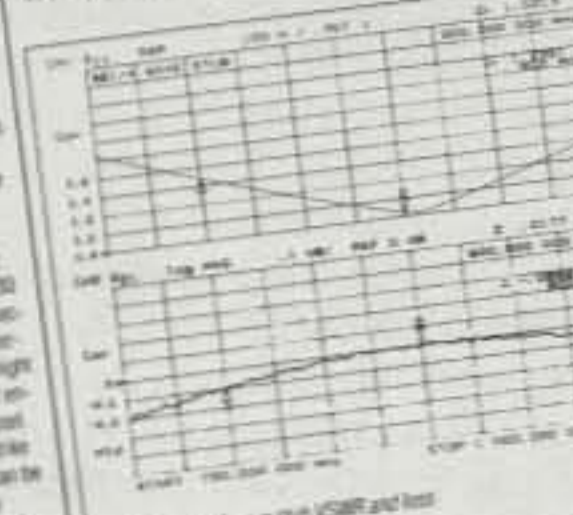
ray nuclei composed of so-called anomalous cosmic rays. These rays are the result of solar wind interacting with interstellar atomic nuclei. At roughly 6000 km elevation, at the equator, was the start of the nuclei detection. The density increases with the timing of sunset activity. The greatest density was about 6000 km over

the South Atlantic anomaly. This is where the Earth's tilted magnetic field brings the belts closest to the surface. This is also where there is a high incidence of lightning. This find may lead to a further understanding of the Earth's upper atmosphere which affects our lightning and weather patterns.

Why dc Continuity Protectors, Like Simple Gas Tubes and 1/4 Wave Stubs, Don't Work

The dc type gas tube protector covers a large bandwidth, from dc to 500 MHz (higher is possible). Few need this bandwidth, the military being the exception. Since lightning has most of its energy in the low frequency band below 1 MHz, the equipment connected to such a protector will have to endure the peak voltages prior to the gas tube's firing as well as the tube's arcing voltage for the duration of the strike. First, if the connected equipment has a dc path to ground, the gas tube will never fire. Typically receivers and cables are a few of the kinds of equipment with dc paths to ground. In the case of receivers, the short to ground is from a static drain inductor. The incoming surge will follow the dc path to ground. The equipment will have the strike energy delivered to its chassis or shell. The only way to get the gas tube to fire is to have a very fast transient (nanosecond) voltage waveform of a very large current (5-10,000 A) across the gas tube. Once the coil opens, the current will become a very high voltage pulse through caps and other components. Even if the gas tube could fire, the arcing voltage would be from 10 to 50 microvolts. This would be present across the equipment input for 50 microseconds to 500 milliseconds or longer. In the case of cables, the equipment might be able to handle the current. However, the fact that the surge current enters the equipment room could cause other equipment damage or upset. The goal of lightning protection is for you to be in control of the strike. By spreading the strike's charge into the earth, the energy can be lowered to survivable levels. In order to do this, the charge must be spread away from the equipment and prevented from entering the equipment. This cannot be done with a protector which, by design, shunts

strike energy with the equipment. By taking a conventional 1/4 wave section of coax line and shorting the center conductor to shield, a 1/4 wave stub can be made. Since the stub section has a high impedance at the cut frequency, it may be used with a tee connector as a short across the transmission line. The lower frequencies of lightning are attenuated. Like an antenna, the stub is a



Do You Know...

- ▶ 1/4λ stub protectors ring with lightning energy?
- ▶ which material shields lightning's H field?
- ▶ dc continuity RF protectors don't work?
- ▶ why single point grounding works best?
- ▶ about latent equipment damage?

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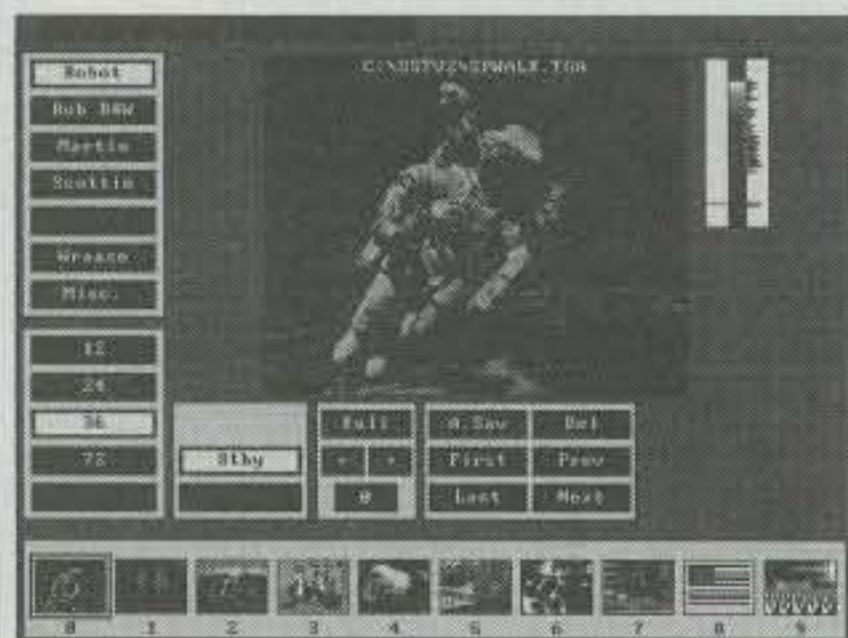
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"Packet Status Register" is TAPR's official organ. It's published quarterly, and each issue typically runs about 28 pages. Membership in TAPR includes a subscription to "Packet Status Register." Annual membership is \$15 in the U.S. and possessions (\$18 in Canada and Mexico; \$25 elsewhere).

Membership and subscription mailing information are available from Tucson Amateur Packet Radio Corporation, 8987-309 E. Tanque Verde Rd. #337, Tucson, AZ 85749-9399 (817-383-0000).

TPRS Quarterly Report. Another very active packet research and information dissemination organization is the Texas Packet Radio Society (TPRS). The organization was founded in 1985 as an educational, public-service, and scientific research nonprofit corporation. Its goals are twofold: first to design and research amateur radio packet networks; and second to provide education in general packet usage. The "TPRS Quarterly Report" is the official newsletter and is published every three months.

TPRS membership is widespread, with most members located in Texas, but members are located in many other states and in foreign countries. If you're interested in membership and receiving the "TPRS Quarterly Report," contact the Texas Packet Radio Society, P.O. Box 50238, Denton, TX 76206-0238. Membership, which includes the newsletter subscription, is \$12 per year.

Ramsey "New for 1994" Catalog. In a recent column we described the 20-page, 8 1/2" x 11" format 1994 Ramsey Electronics catalog, with its many inexpensive, fun-to-build, and well-documented amateur radio and electronics hobby kits. Now Ramsey has issued a revised 1994 catalog that's 48 pages in an attractive 5 1/2" x 8 1/2" format.

The revised catalog is full of new kits and other products, including several introduced since the previous catalog was issued. New 1994 kits include a radio direction finder, 800-950 MHz scanner converter, low-power AM broadcast-band transmitter, LED peak-hold bargraph meter, 20 meter SSB/CW transceiver, 6 meter FM transceiver, 20 watt QRP linear amplifier, microprocessor-controlled fox-hunt transmitter, touch-tone decoder, several antennas, and many accessories. Other suppliers' products (mostly wired-and-tested units) are available.

We should note that the "radio kit industry" is fragmented today and made up mostly of small firms. As a result, kit quality varies greatly, although firms such as Ramsey Electronics (which has been in the hobby kit business for over 17 years) are working to emulate the kit standards set by the Heath Company and its competitors, such as Knight-kit and EICO.

Ramsey's kits are designed to instruct and to be fun to build (I've built a few myself). They include clearly detailed, step-by-step instructions that carefully guide you to a finished kit. Complete hookup instructions are provided as well as good ideas for additional uses and even user modifications.

For a catalog heavy on kits, contact Ramsey Electronics, Inc., 793 Canning Parkway, Victor, NY 14564 (1-800-446-2295). (Although primarily a mail-order house, Ramsey's factory showroom is open weekdays and its surplus

outlet is open on Saturdays.)

Fair Radio Sales Surplus Catalog. As a newly-licensed Novice in 1954, I remember rummaging through the many radio surplus emporiums in lower Manhattan's Radio Row district. Colorful stores such as G & G Radio, Cortlandt Radio, and Blane the Radio Man are gone now, bulldozed and paved over by the World Trade Center and its environs. Not just in New York, but around the country, fabled "Radio Rows" sprouted up in major cities and provided countless amateurs and amateurs-to-be many enjoyable Saturday parts-collecting excursions.

Radio surplus itself is almost a thing of the past. There isn't much left of "the good old radio surplus days" in which the pages of the amateur radio and electronics magazines were chock full of ads from radio surplus houses touting their post-World War II and Korea electronic bargains.

Still, a few mail-order firms carry on with radio surplus. One of these is Fair Radio Sales which incidentally celebrates its 47th year in the business this year. While shopping their 1994 catalog isn't quite the same as perusing a dusty surplus store, flipping through its 36 pages comes close.

While there are a few pages devoted to "computer surplus," much of the catalog is devoted to government and commercial radio surplus. You'll find antenna couplers, backpack transceivers, panoramic receivers, portable antennas, loops, power inverters, command transmitter sets, meters, microphones, headsets, keyboards, test equipment, telephone test sets, and much more.

What is arguably "the world's finest electronic surplus" catalog is free from Fair Radio Sales Co., Inc. 1016 E. Eureka St., P.O. Box 1105, Lima, OH 45802 (419-227-6573).

JAN Crystals Catalog. The 1950s-era Novices shared several rights of initiation and mutual experiences, ones most of them still cherish. "Rock-bound" Novices looked forward fondly to tossing out their "rocks" (crystals) and opting for variable frequency oscillator (VFO) control and higher power. But the widespread use of inexpensive frequency-synthesis techniques has reduced the scope of the "ham band crystal" business these days. Still, crystals are used for frequency control in certain clocks, computers and other microprocessor equipped devices, transceivers, receivers, scanners, pagers, and other equipment.

One of the most comprehensive sources of supply is JAN Crystals, which has been in the business for decades. Their 1994 catalog shows a number of different type crystal "cuts" and mounts. There's even the Novice's favorite, the classic FT-243 crystal (though now priced at \$25). If you have an "oddball" or unidentified crystal in your equipment and need a replacement crystal but don't know the necessary specifications, JAN's engineers and technicians will analyze the working crystal to determine the needed specs for \$10.

A free catalog is available from JAN Crystals, 2341 Crystal Drive, P.O. Box 60017, Fort Myers, FL 33906-6017 (1-800-526-9825).

FBEnterprises Update. In a previous column we described offerings of this Washington State firm founded in 1991 by Bob Martin, N7JXN. These products include inexpensive but fairly unique amateur and SWL hobby items, mostly books and other paper operating aids.

Some of the items are QUICK-N-EASY DXCC, a laminated card listing all DXCC countries; QUICK-N-EASY repeater maps; a series of four shortwave listening broadcast frequency cards; a beginner's SWL guide; a "QSO Helper" card; a QSL kit with everything you need to use the ARRL Incoming QSL Bureau; and other QUICK-N-EASY series aids.

I notice in a recent flyer that the firm has a new mailing address and telephone number. It's FBenterprises, 23801 N.W. First Ave., Ridgefield, WA 98642-8830 (1-800-377-2339).

Short Bursts

More on Lightning Bolts. We have discussed lightning in the column on several occasions, usually in connection with station protection and safety. We primarily have been concerned with the effects of lightning, rather than with the phenomenon itself. Though a very dangerous phenomenon, it's also a very interesting one, some aspects of which we'll consider here.

Air movement in weather patterns builds up static voltages in clouds. Before the discharge, the clouds develop strong potentials in relation to adjacent clouds or the earth by accumulating charges through falling snow or rain.

Regions of charged particles develop within the clouds. When the static voltage reaches a level where the air between a cloud and either the ground or another cloud can't insulate the charged cloud, a lightning bolt results.

The power of a lightning bolt is enormous. The currents passing through the air in the discharge path are immense, and they can vaporize many materials. The intense fields created cause surrounding molecules to ionize; the lightning strokes attempt to equalize the potential differences by moving along the highly conductive paths between the oppositely charged regions. Usually this occurs inside a cloud, but it often occurs cloud-to-cloud or cloud-to-ground. When this happens we see lightning.

Lightning comes in different sizes and shapes. You can see and hear the result of many different forms, such as sheet, ribbon, bead, and ball lightning. Each produces unusual and often spectacular visual effects.

Some very special and elusive types of lightning have been detected, evidencing discharges that are much broader, more diffuse, and less bright than ordinary lightning. On Space Shuttle mission STS-31 on April 28, 1990 its low-light-level television (LLTV) camera captured unusual "cloud-to-space" lightning that's quite unlike conventional forms.

In this incident the Shuttle video images showed a vertical discharge upward into a clear night sky from a thunderstorm over the Ivory Coast; the height of the discharge was estimated to be over 31 KM. This type of above-cloud upper atmospheric discharge was predicted by scientists as early as 1925, and was sighted by amateur observers as early as 1886.

A similar lightning-related phenomenon was detected by a scientific team from the University of Alaska's Geophysical Institute aboard a NASA DC-8 on September 23, 1993. Again using a LLLTV camera, the team recorded 19 flashes lasting less than 1/30 second above a midwestern thunderstorm. These "scintillations," which were not visible to the naked eye, were about 25 miles tall, 6 miles wide, and over 240 cubic miles in volume.

These shapes were the brightest where the

flashes top out, typically at about 40 miles high. The visual effect was that of the body of a jellyfish at the top with the tentacles trailing down. There is some evidence that the flashes could be "glow discharges" resulting from an interaction between the cloud tops and the ionosphere, something like that from a neon tube. Some neon tube, eh? Keep you posted!

Wrap-Up

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

Overheard: Finally we get the truth: Ol' Murphy was an optimist! 73, Karl, W8FX

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Say You Saw It In CQ

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WHAT'S NEW AND HOW TO USE IT

Some New Single-Chip FM Radio Receivers

Several months ago we wrote a couple of columns describing simple VHF receivers using ICs from GEC Plessey developed for the emerging commercial wireless marketplace. The response was overwhelming, and many of the amateur experimenters I have spoken to since have indicated a real interest in such devices. As a result, I am pleased to describe two additional devices this month. Both are FM receivers and both contain almost all of the necessary circuitry on a single chip. In this case, they are manufactured by Signetics/Phillips.

The first is the TDA7021T. This device is a complete FM receiver on a chip that is usable from 1.5 to 110 MHz. Although normally intended for use as an FM broadcast-band receiver, the unit is suitable for 6 and 10 meter FM applications as well. The TDA7021T operates at power-supply voltages from 1.8 to 6 volts and only draws about 7 ma. Sensitivity is typically 4 microvolts for -3 dB limiting, and recovered audio is 90 millivolts across 100 ohms with

±25 kHz of input deviation. A simple one-transistor amplifier can easily raise this level to drive a small earphone. An output for a tuning indicator and mute function (squelch) is also provided.

Fig. 1 is a schematic of the test circuit for the chip, and as you can see, it doesn't require much in the way of additional circuitry. The chip itself is supplied in a 16-pin surface-mount package, so the use of surface-mount components for the rest of the circuit will result in a very small receiver. Values shown are for use in the standard FM band, but you can scale them for use at other frequencies.

The second chip is the TDA7000. This device is similar to the TDA7021T, but has an input sensitivity of 1.5 microvolts for -3 dB limiting and comes in a standard 16-pin DIP package. The circuit for a receiver using this chip is shown in fig. 2. The TDA7000 is also designed for FM band use, but can be scaled for any frequency from 1.5 MHz to 110 MHz as well. Operating power is 2.7 to 10 volts at about 8 ma, and audio output is 75 millivolts across 22K with ±25 kHz deviation.

Two application notes that relate to the above chip are available from Signetics/Phillips. The AN192 covers complete details of operation, while the AN193 covers narrow-band FM applications, suggested printed circuit board layouts, operation of muting circuits, etc., in detail. For further information and a source for the chips, contact Signetics/Phillips at 811 East Arques Ave., Sunnyvale, CA 94088-3409.

When you do contact the company, see if you can get a copy of their *RF Communications Data Book*. This publication covers not only the above chips, but many other devices intended for commercial wireless applications. Any true RF experimenter will appreciate it, but beware, as it is highly technical and does not contain "do-it-yourself" type projects. If you are not a technically adept person, don't request the book. If the company is overloaded with requests from non-commercial users, those of us who really would benefit from such publications will have a problem getting them in the future.

c/o CQ magazine

73, Irwin, WA2NDM

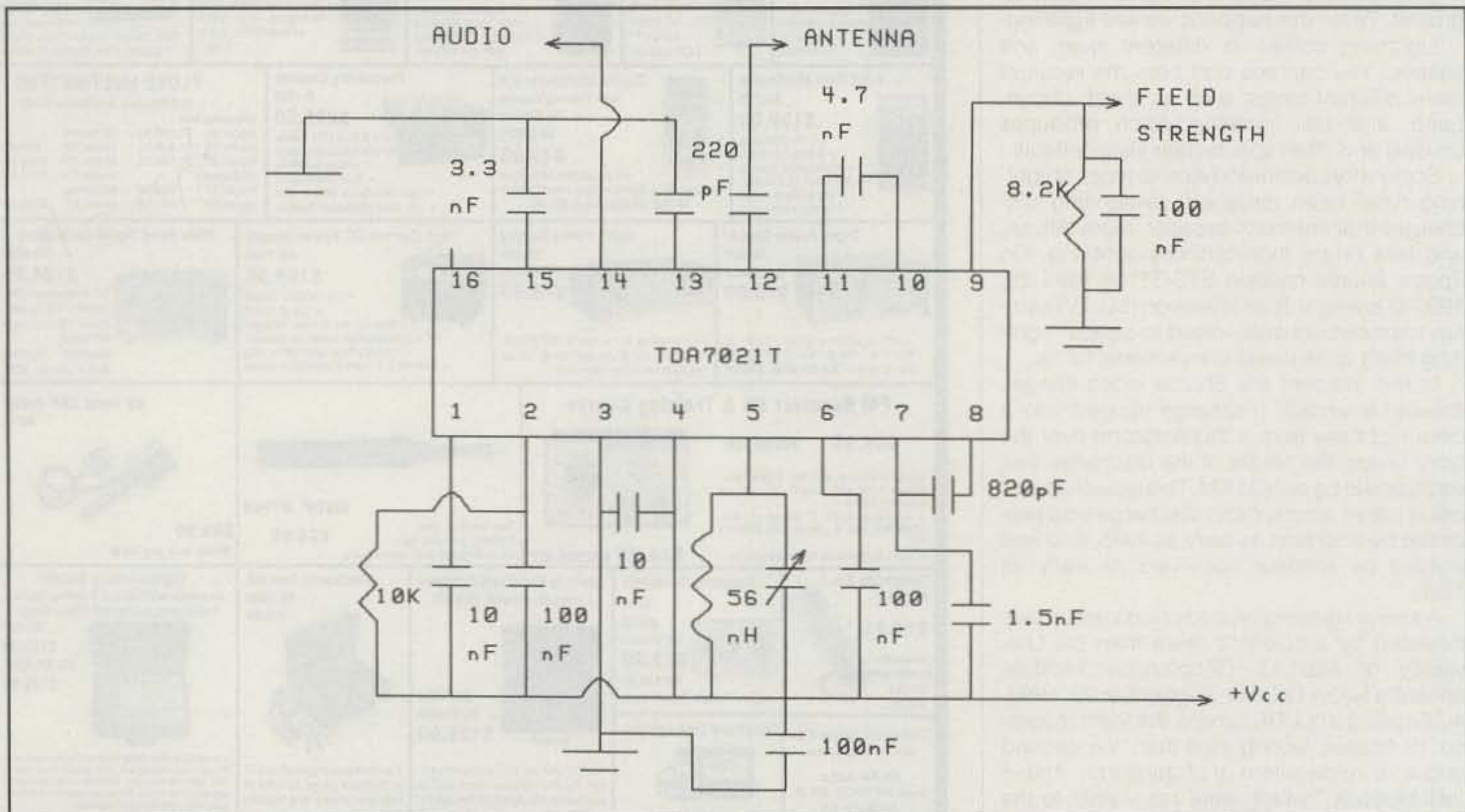


Fig. 1—Simple FM receiver described in text.

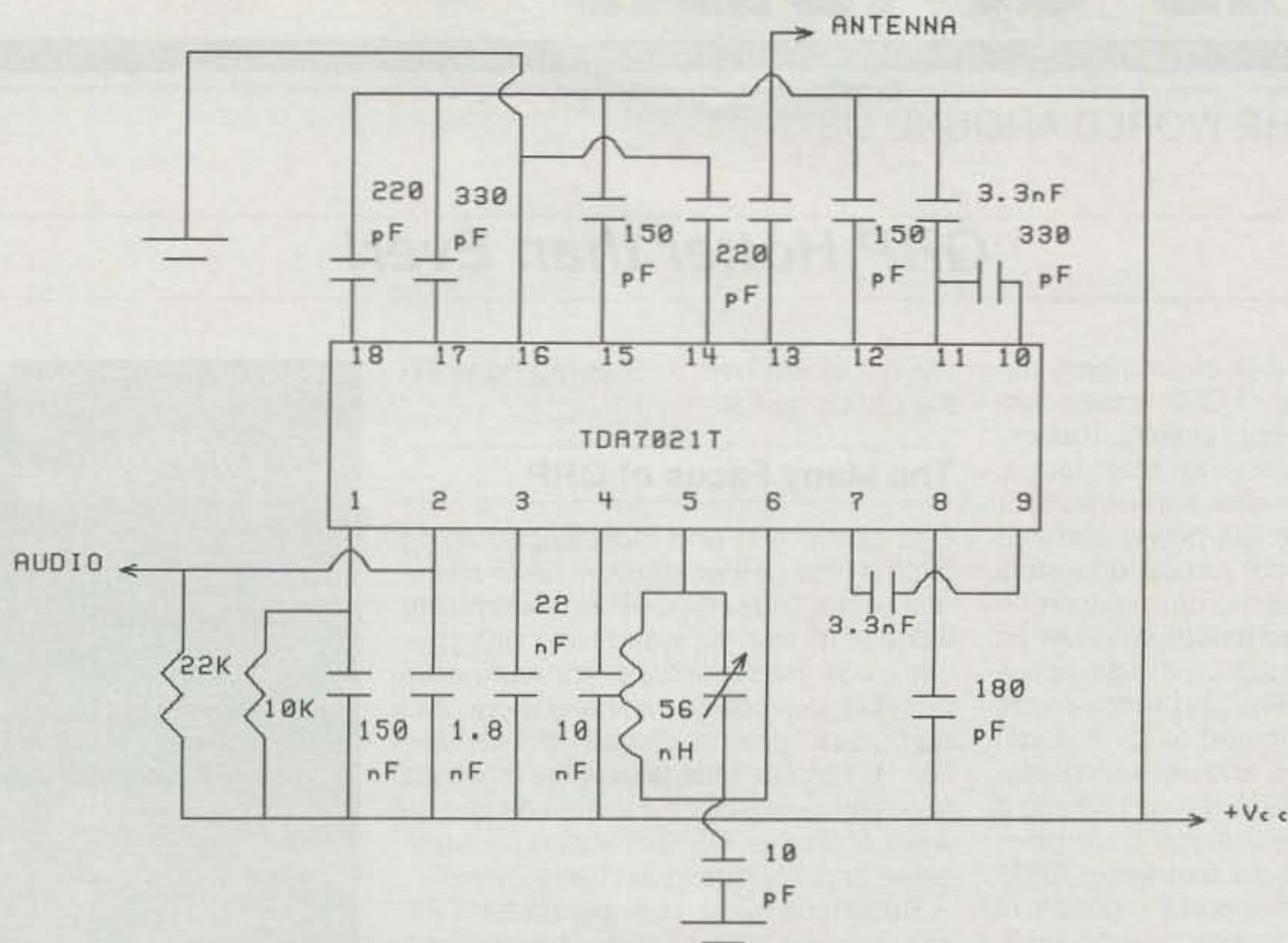


Fig. 2- Second FM receiver described in text.

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(A) MUF, (B) 2.0 MHz, (C) 3.8 MHz, (D) 7.2 MHz, (E) 10.1 MHz, (F) 14.2 MHz
(G) 18.1 MHz (H) 21.2 MHz (I) 24.9 MHz (J) 28.5 MHz (K) 29.6 MHz


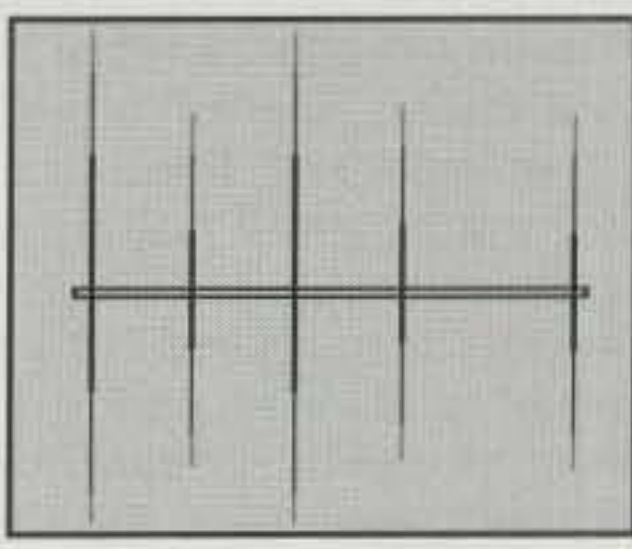
Select Output by Function key
(F1) SEP 37 (F2) OCT 25 (F3) NOV 24 (F4) DEC 23 (F5) JAN 31 (F6) FEB 20
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A LOOK AT THE WORLD AROUND US

QRP Hotter than Ever!

A surprising number of amateurs assume the popularity of QRP wanes during years of low sunspot activity. That assumption is not proving true today, however. Indeed, overall enthusiasm for and appreciation of low-power communications among both casual operators and serious devotees is definitely on an uphill swing. That fact makes sense when you think about all the on-the-air activities, easy-to-build kits, and ready-made rigs presently dedicated to QRP. Even mobileers, bicyclists, and weekend vacationers are joining the fun—and having a ball. What about you? If you have been visualizing getting your feet wet in QRP, right now (yes, even now at the bottom of the sunspot cycle) is the perfect time to begin!

What is the special attraction of QRP? Why voluntarily work with a handicap and chance missing a good DX contact with low power when you can get quick replies using higher power? First there is the unique challenge and pride that comes with using the smallest possible rig to cover the longest possible distance. Second is the new dimension of total portability—to operate outdoors with a lantern battery for power and the sun or stars above rather than being confined to a crowded indoor shack. There is also the thrill of making those first QRP contacts (Wow, I really did it!), reaching the 1000 mile-per-watt marker, and taking on the supreme challenge of communicating with only milliwatts of power. Now that's a feat anyone would envy!

Need more coaxing? A 5 watt signal is often stronger than you realize: it is only 12 dB below an 80 or 100 watt signal. Stated another way, if a distant station is copying your 100 watt signal at S9, he/she will hear your 5 watt signal around S5. Don't just take my word for this; prove it to yourself. Here's how.

Tune in a station that is S9, and then switch in your rig's attenuator for 10 or 12 dB. Listen to the signal, and notice how copyability remains fairly high even when S levels are low. Finally, remember being a QRPer does not mean you must sell your other gear and use low power exclusively (the sign of a true devotee!). You can

always switch over to your big rig when the bands go flat.

The Many Faces of QRP

One of the first and most encouraging facts a new QRPer learns is he or she is not alone. Indeed, QRP is a complete world of its own—a world filled with special clubs, nets, contests, homebrew fun projects, low-power-dedicated gear, and numerous "getting started" books (see fig. 1). You can thus take to the airwaves from any isolated or rural location and always find other QRPers sharing your interest and anxious to exchange ideas.

Recommending one particular QRP club to join is almost impossible (they are all great!), but there is absolutely nothing wrong with joining several simultaneously. Yes, then you can receive several newsletters at once—a continuous ham-fest by mail!

The largest club in the U.S. is the **QRP ARCI**, and its newsletter, "The QRP Quarterly," is always loaded with operating tips and "build 'em" circuits. The club also conducts weekly nets, holds several contests annually, and has a large awards program. Club dues (\$12) go to Mike Kilgore, KG5F, 2046 Ash Hill Road, Carrollton, Texas 75007.

Another popular group is the **Michigan QRP Club**. Membership, however, is definitely not limited to only that state. Their newsletter, "The Five Watter," is mainly oriented toward operating and experimenting with antennas, but occasionally it includes a simple homebrew project. Membership fees (\$5) go to The M-QRP Club, 654 Georgia, Marysville, Michigan 48040.

A relatively new group setting the woods on fire (no pun intended!) is the **Northwest QRP Club**. Their newsletter is always loaded with good information plus "build 'em" circuits. They also have some great homebrew kits available by mail, and recently started a neat awards pro-

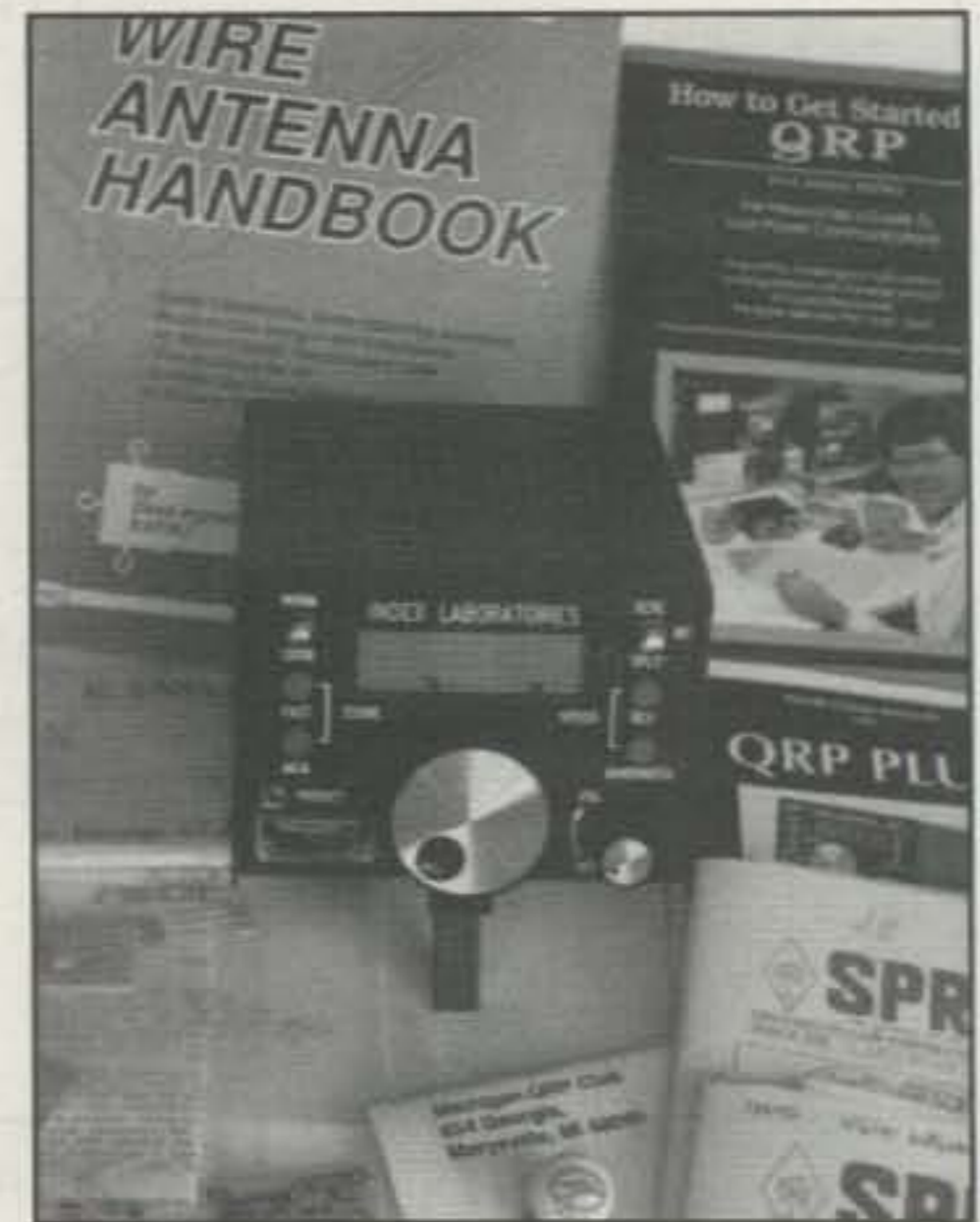


Fig. 1—A brief glimpse into the world of QRP reveals numerous "how to" books, kits galore, fancy little 5 watt rigs, clubs, newsletters, and extra goodies such as key fobs.

gram. Members are quite active on QRP, especially on 30 meters (my kind of guys!). Membership fee (anywhere in the U.S.) is \$10 a year and goes to the NW QRP Club, 4153 49th Avenue S.W., Seattle, Washington 98116.

Finally, there is the world-famous **G-QRP Club** with its various activities and Sprat mini-magazine. Rev. George Dobbs, G3RJV, heads up the club, and they are into QRP big time. The membership fee (\$16 a year) goes to David Jackson, G4HYY, Castle Lodge West, Halifax Rd., Todmorden, Lancs, England OL14 5SQ.

So where do you tune to join QRP action while waiting for your club membership(s) to arrive? Four good choices are the 80, 40, 30, and 20 meter nets shown in fig. 2. Calling in is easy: Just listen closely and call after the net control sends CQ QRP-

Frequency	Day/Time of Net	Affiliated QRP Club
3.535 MHz	Tues. 0200 GMT (Mon. 8 PM CST)	Michigan QRP Club
7.030 MHz	Wed. 0100 GMT (Tues. 7 PM CST)	QRP ARCI
10.123 MHz	Tues. 0200 GMT (Mon. 8 PM CST)	NW QRP Club
14.060 MHz	Sun. 2300 GMT	QRP ARCI

Fig. 2—Four popular and informal nets operate weekly on the 80, 40, 30, and 20 meter bands. Check into one, and you have made your first two-way QRP QSO.

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QNI. Since everyone will be running low power, you'll be making your first two-way QRP QSOs. Try it. You'll like the results!

Homebrewing

If you enjoy homebrewing gear (and who doesn't!), check out the goodies available from Kanga U.S. and 624 Kits. Kanga U.S. (the stateside affiliate of Kanga U.K.) is handled by Bill Kelsey, N8ET, 3521 Spring Lake Drive, Findlay, Ohio 45840. A large self-addressed manila envelope with two stamps will bring his catalog to your door. Some popular Kanga kits (which were originally featured in *Sprat*) include the Oner transmitter (1 watt rig on a 1 inch PC board), full Oner transceiver (four 1 inch boards), and the LCK transceiver (G3ROO's 6 by 4 inch rig with VFO).

624 Kits is handled by Pat Bunn, N4LTA, and a self-addressed business-size envelope with two stamps will get his catalog to you. Special 624 items include the Universal transmitter (the ARRL's favorite first QRP project), the Neophyte receiver (upgraded since featured in *QST*), and 624's own low-cost trans-receiver kit. That is enough mix-and-match gear to outfit home, car, campsite, bicycle, and more. Enjoy!

New QRP Dream Rig

A new super-deluxe 5 watt transceiver has been generating widespread excitement in our QRP world, and I had the privilege of checking out the little gem while writing this month's column. Saying I was impressed is an understatement. I was delighted! This is the most lavish and smooth operating QRP-only rig ever!

The transceiver is made by Index Labs of 9318 Randall Drive N.W., Gig Harbor, Washington 98332. It is called the "QRP Plus," and is shown in figs. 3 and 4. It works both CW and SSB on 160 through 10 meters including WARC's, and has general-coverage reception, 20 memories, selectable bandwidths from 2.4 kHz to 100 Hz with digital SCAF filters, built-in iambic keyer, and great QSK. I mean it has totally silent and smooth QSK. It's just like listening to your rig's sidetone while listening to another station. You cannot believe the rig is actually transmitting unless you look at the front—panel meter. Now that's real QSK!

The QRP Plus is housed in an exceptionally strong cabinet measuring 4"H x 5.5"W x 6"D and looks more like a professional medical instrument than a QRP rig. It has a large top-mounted speaker, weighted and balanced tuning knob, and half-inch tall frequency display. The rig briefly displays its serial number at turn-on, then switches to show its frequency. Press the **Memory** button and turn the

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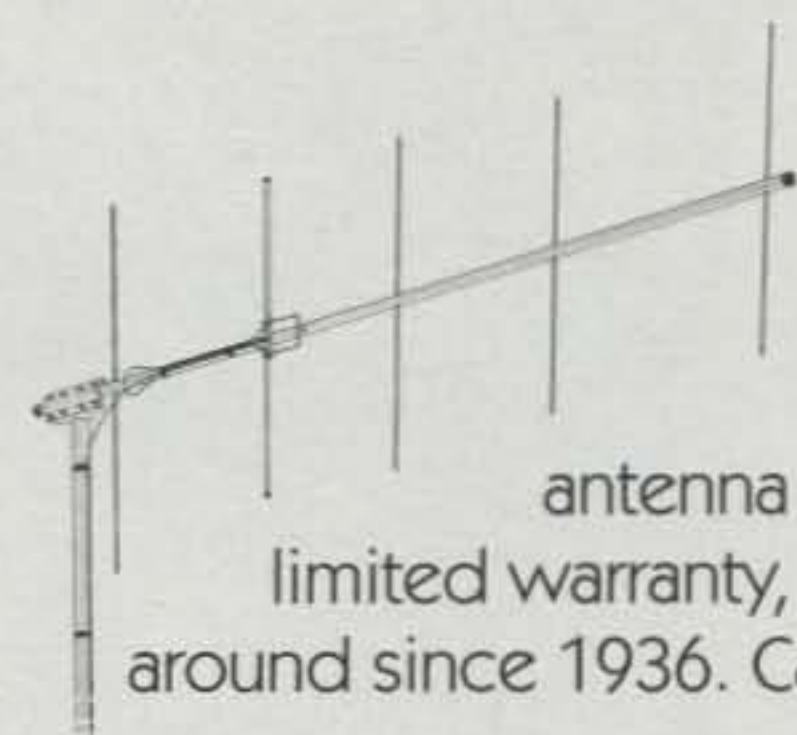
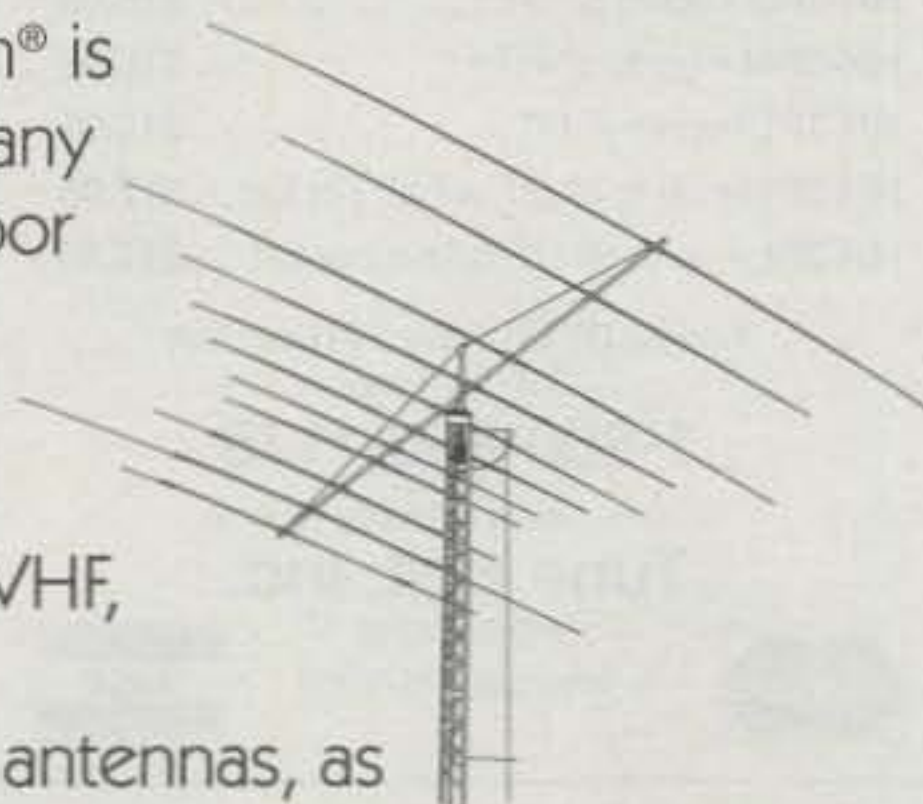
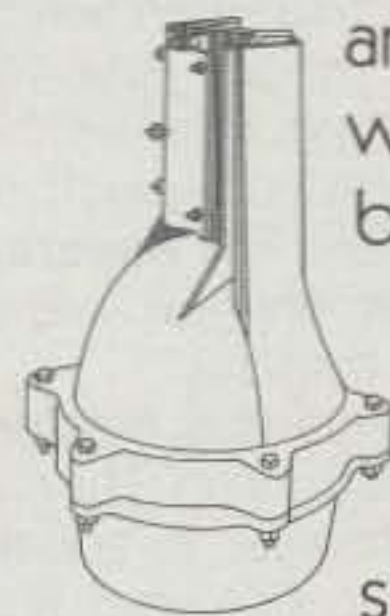
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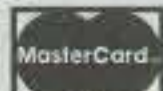
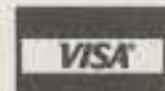
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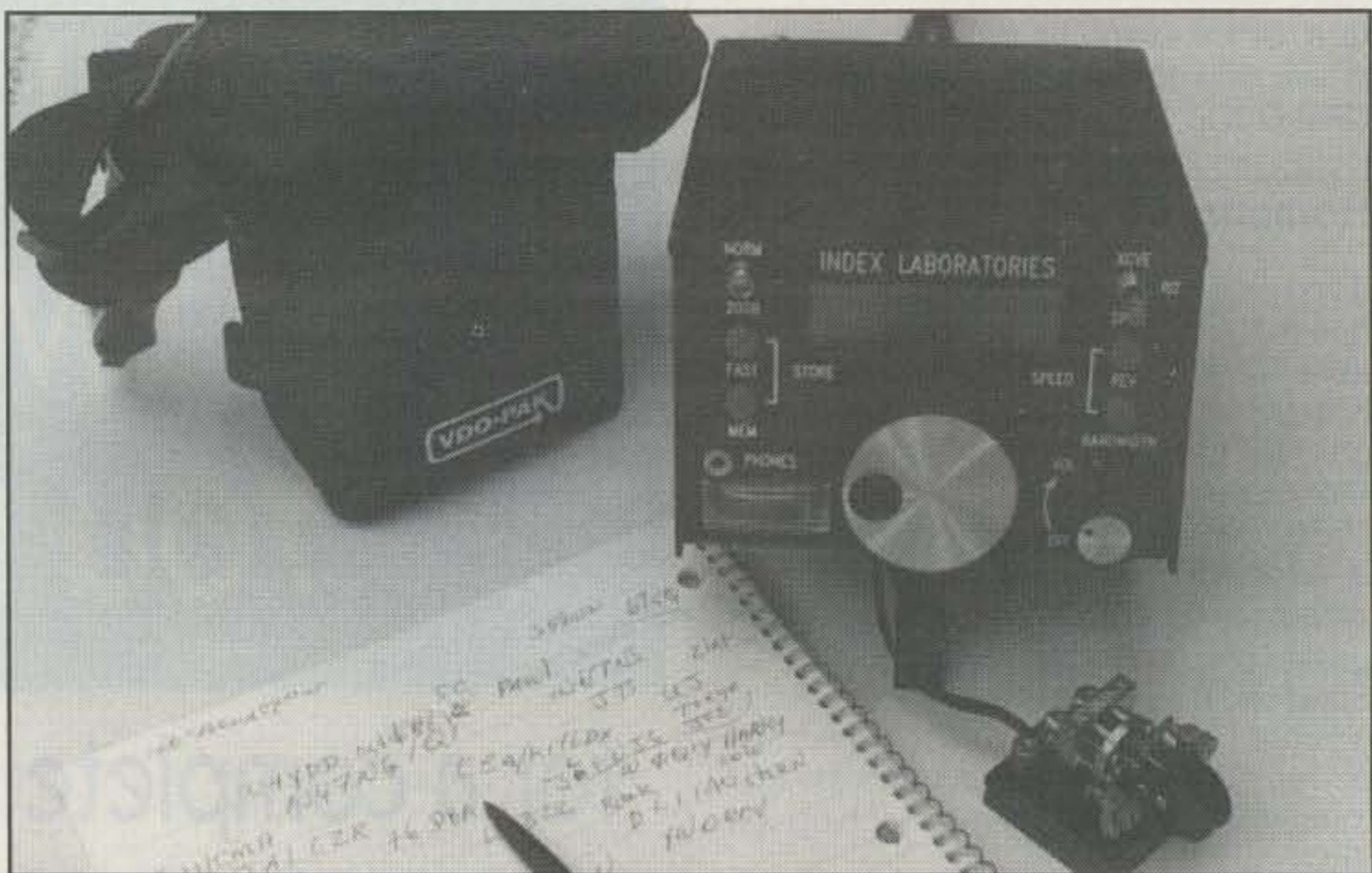


Fig. 3— Index Labs' new and totally deluxe "QRP Plus" transceiver. Unit has every operating asset imaginable, and is especially designed for long battery life.

main dial to change bands and recall favorite frequencies. Press both **Memory** and **Fast** buttons, and you can reprogram/store preferred frequencies and bands in any mixed order desired. Press the **Bandwidth** button and turn the main dial to change filter widths in 100 Hz steps from 2.4 kHz to 100 Hz. This width selection is independent of mode—neat for copying SSB DX in pile-ups. Filter widths also show on the display during selection. Press both **Bandwidth** and T/R **Reverse** buttons, and you can change keyer speed (again shown in display).

Internally, the QRP Plus is a masterpiece in design and construction. The microprocessor-driven receiver is superheterodyne with up-conversion and a first

IF of 50 MHz. Its SCAF filters are great. There is no ringing, even at 100 Hz. The transmitter runs cold at 5 watts, and output is adjustable down to a couple of milliwatts. Current drawn is 140 ma on receive and 1 amp on transmit. An internal jumper can be moved for connecting separate transmit and receive antennas. This little QRP-only rig is incredible!

My first on-the-air operation with the QRP Plus was during a weekend contest. Since the rig was quite small, I propped it by my den chair and put the CW paddle on my knee. I used it with a Cushcraft R5 vertical to synthesize a typical setup, and made 16 QSOs in 30 minutes. The following week I operated 30 meters in 20 minute stints per night and worked sta-

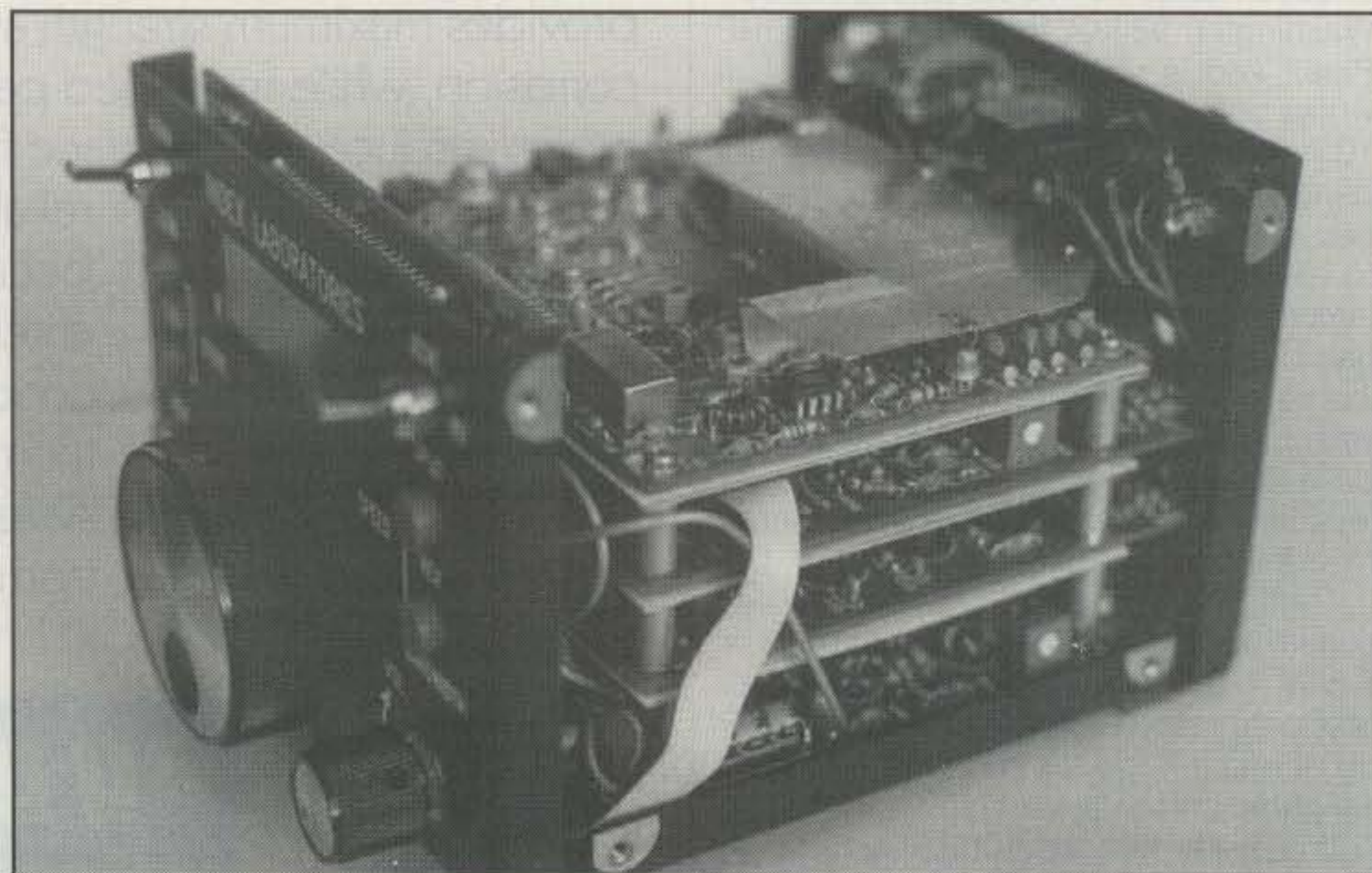


Fig. 4— Interior view of QRP Plus reveals "high rise" construction and incredible workmanship.

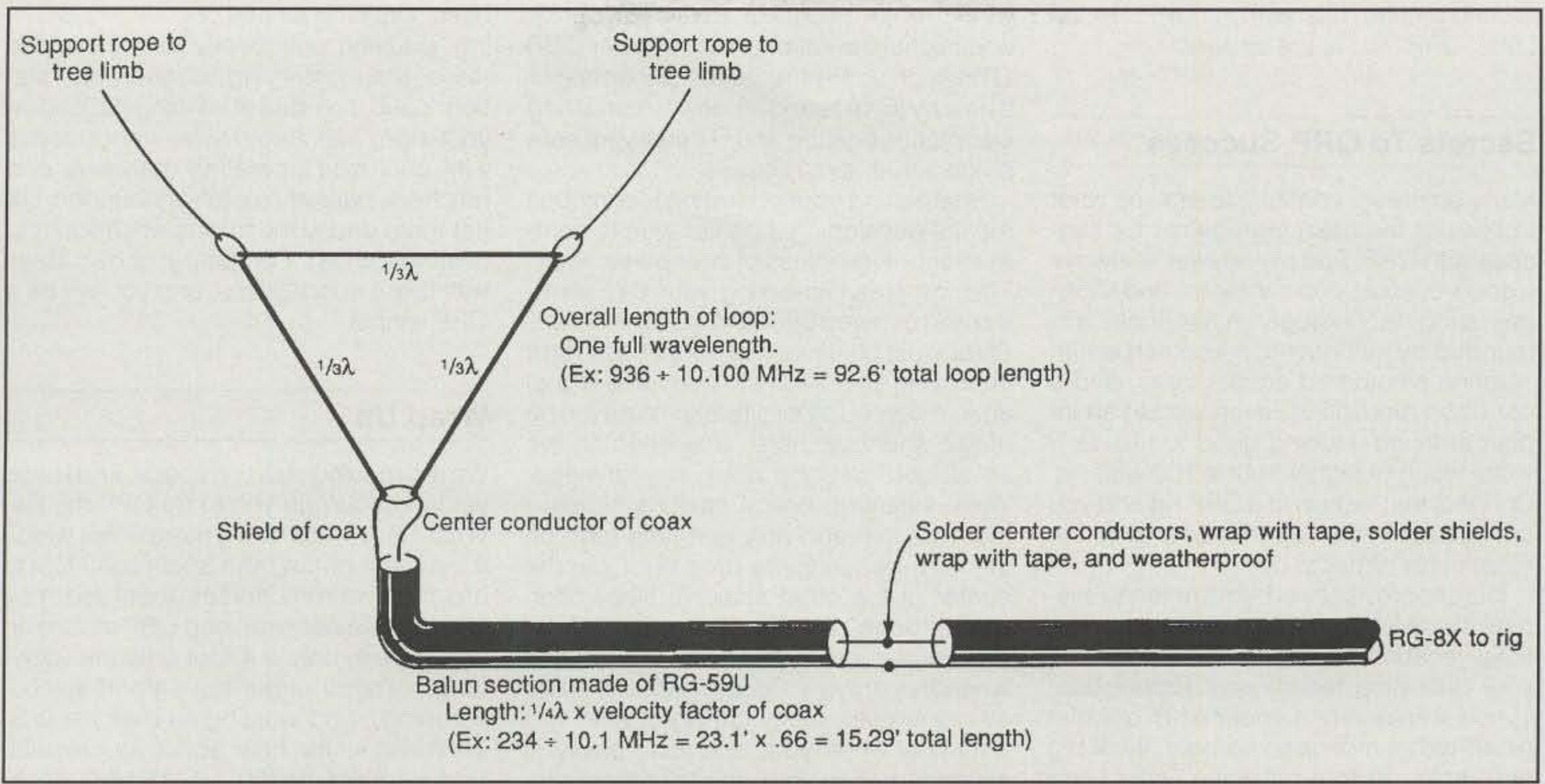


Fig. 5- Assembly outline of full-wave Delta Loop. Antenna can be made for any band from 160 to 10 meters. It's easy as a doublet to install, but radiates a much stronger signal.

tions from Europe to South America just like I was using a 100 watt rig. I even called CQ several times and usually received an answer. My antenna was a Delta Loop. The next weekend I switched to

17 meters for 15 minutes and worked two Slovenian stations without the traditional TVI experienced while using 100 watts. The only additional rig workout I could not swing due to a heavy workload was tak-

ing the QRP Plus on an IOTA expedition. Maybe that quest can also be satisfied in 1995.

In conclusion, I can only say if you want to gear-up with the fanciest 5 watt rig

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around and be "big daddy in QRP," Index Labs' QRP Plus is the answer.

Secrets To QRP Success

Many amateurs continue to ask me what I consider the main ingredients for success with QRP, and my answer is always a good location, good antenna, and sharp operating techniques. A location surrounded by mountains, a weatherbeaten antenna smothered amidst trees, and a corroded feedline or (even worse) an indoor antenna is doing good to radiate 5 watts worth of signal from a 100 watt rig. Connect that lashup to a QRP rig and you are already in the super-challenging milliwatt class. What to do?

First, improve/rework your antenna system, striving to erect it in the most beneficial location possible. Then fine-tune your operating techniques. Rather than simply replacing a multiband doublet (yuk!) with a monoband dipole, think big and move up to a full-wave Delta Loop (fig. 5). Use the same two tree-limb supports you used for the doublet so the Delta's long horizontal section is high in the air rather than near the ground. Then your 5 watt signal will "get out" like 5 watts!

Problems erecting an outdoor antenna at your QTH? Use super-thin black/gray

wire to make it invisible. Better yet, opt for occasional operations from a super QRP QTH such as Bermuda, the Bahamas, or a nearby IOTA island. Then you can string up antennas galore and DX until your ears bulge—true ham heaven!

Sharpening your operating techniques means developing a confidence to communicate regardless of your power level. This involves increasing your CW sending and copying speed to 18 wpm or faster (at least on usual info exchanges) and improving your ability to copy one signal amidst several other signals. There are no magic shortcuts here. Just listen on the air all you can and copy in your head. While listening, notice stations sending their call fast and only one time (and on the right frequency to drop right into the center of the other station's filter) often "get through" DX pile-ups regardless of their signal strength. Notice also that is when the ability to copy (a reply) while others are still slowly calling is vital. You will know when your operating savvy is improving when you can spot callers who miss their reply from a DX station due to others "covering up the DX." Get the idea?

Remember the gambler's song of knowing when to hold up, when to fold up, when to walk away, and when to run? Set up an extra rig by your easy chair, breakfast table, or bed, and check the bands

often. Develop a habit of continuous tuning, pausing only briefly to call stations rather than just trying to reach one station. Keep the odds of winning (QSOs) on your side, walk (tune) away from stations with confused operating manners, and run from packet-cluster-announced DX (let them decoy the troops while you find overlooked DX). Combine your own ideas with these suggestions, and you will be a QRP winner.

Wrap Up

We are running short on space, and I have yet to encourage you to try QRP mobile. What? Five watts and a mere 6 foot whip? It's a blast of fun, and successful QSOs are more commonplace than you may think. I have been running QRP mobile on 30 CW with only a 4 foot antenna (don't laugh; it slips under my carport without scraping), and working all over the U.S. Try it and let me hear about your results. I still frequent 10.100-10.115 MHz weeknights from 0230-0255 GMT, and 14.180 to 14.225 MHz Sundays from 2330-2355 GMT.

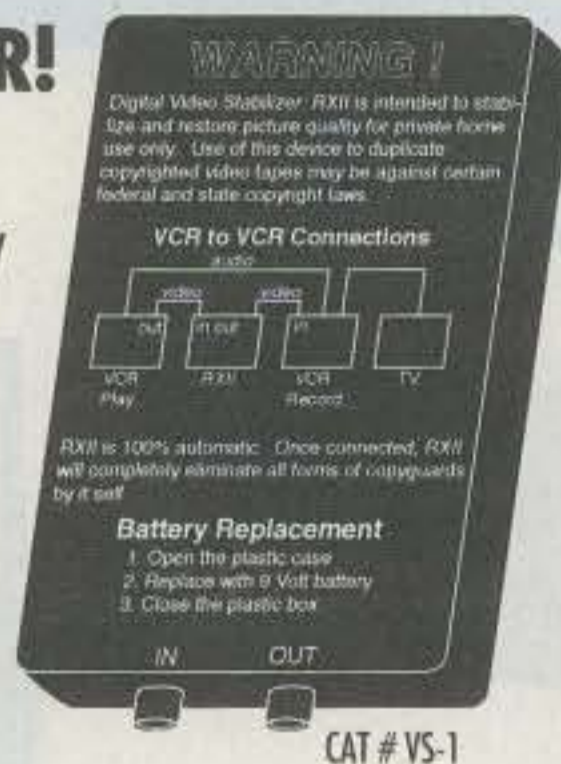
See you next month with a killer Holiday Special column.

73, Dave, K4TWJ

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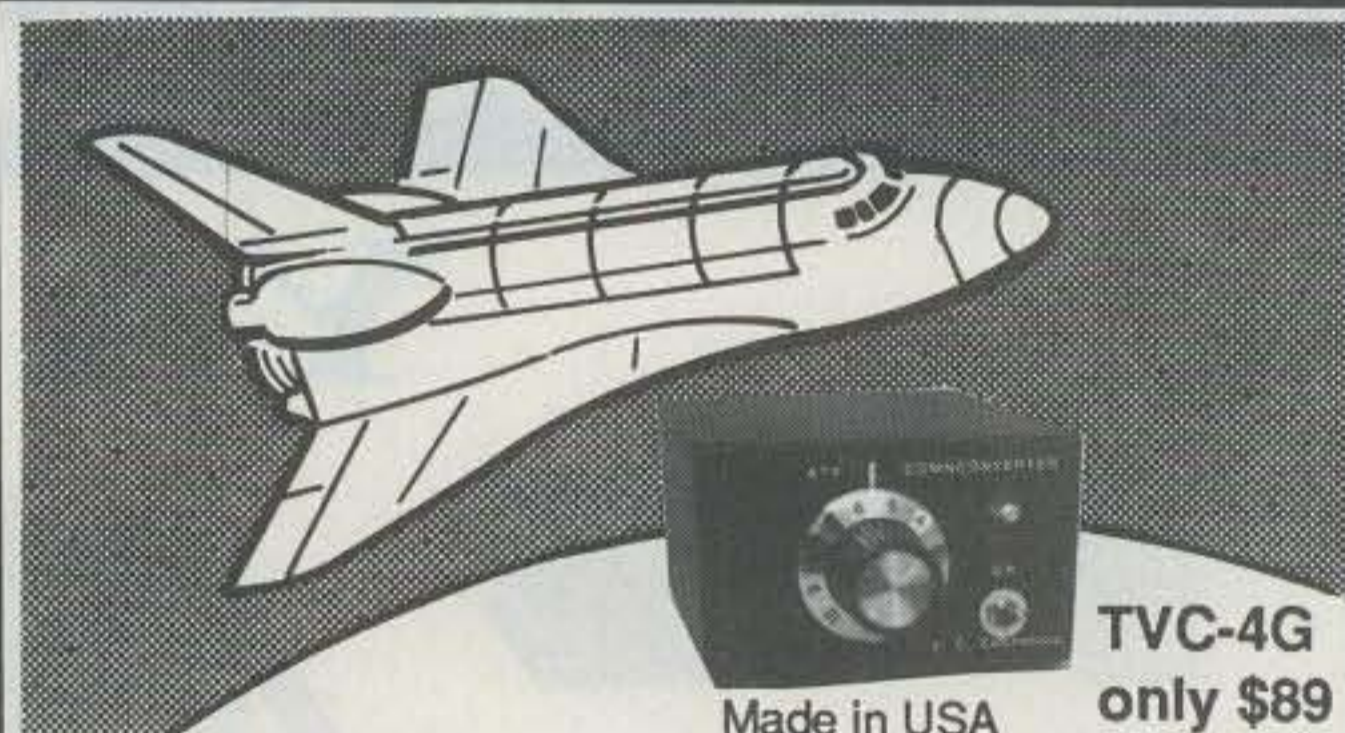
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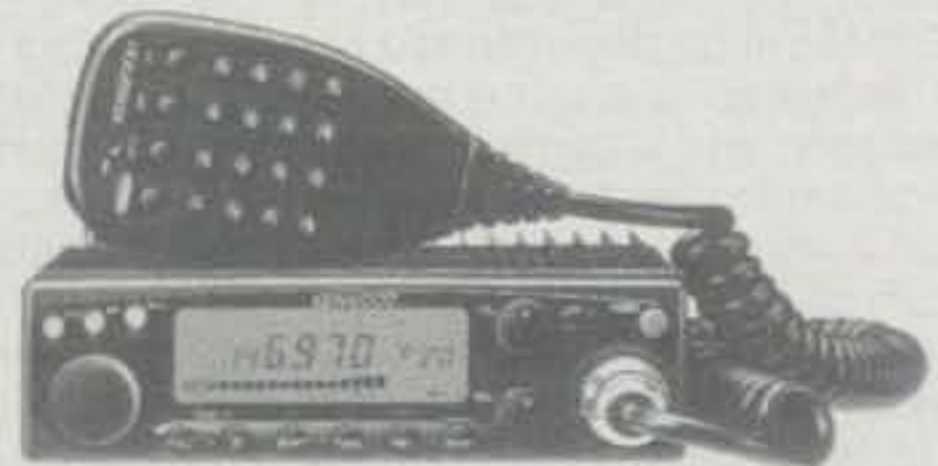
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"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Novice-Technician Licensing Course—Conclusion

This month we continue on in our amateur radio licensing course. This time we will cover antennas and feedlines.

Antennas and Feedlines

ANTENNA LENGTHS

Half-Wave Dipoles	kHz	Feet
	3725	125
	7125	66
$L \text{ (feet)} = \frac{468}{f \text{ (MHz)}}$	21,125	22
	28,150	17

Quarter-Wave Verticals	kHz	Feet
	3725	63
	7125	33
$L \text{ (feet)} = \frac{234}{f \text{ (MHz)}}$	21,125	11
	28,150	8

Longer antennas resonate at lower frequencies than shorter antennas, and vice-versa.

Five-eighths wave vertical antennas are more popular than 1/4-wave vertical antennas for VHF or UHF mobile use because they provide more gain. They emit and receive signals equally well in all azimuth directions. Their radiation is close to the horizon, which provides improved communication capability.

A 223 MHz half-wave vertical is about 25 inches high.

Directional Antennas

Except for the theoretical isotropic radiator, all antennas exhibit some degree of directivity.

- An isotropic radiator can be thought of as a ball suspended in space. It is the only completely non-directional antenna.

Although all real antennas have some amount of directivity, when amateurs refer to directional antennas they mean highly directive antennas such as Yagi-Uda (called Yagi), quad, and Delta antennas. The term *beam antenna* is usually intended to refer to a Yagi.

A directional antenna provides better signal radiation and reception in one direction than in all other directions. This signal concentration reduces reception of unwanted signals from all other directions.

Yagi: The Yagi is the most popular directional antenna because it is easy to assemble and erect, it performs well, and it seldom requires maintenance.

If the elements of a Yagi are parallel to the surface of the ground, the antenna's electrical polarization is horizontal. This configuration is standard when using large high-frequency antennas.

If the Yagi elements are perpendicular to ground, the antenna's electrical polarization is vertical.

The reflector element is electrically and physically longer than the driven element. Its

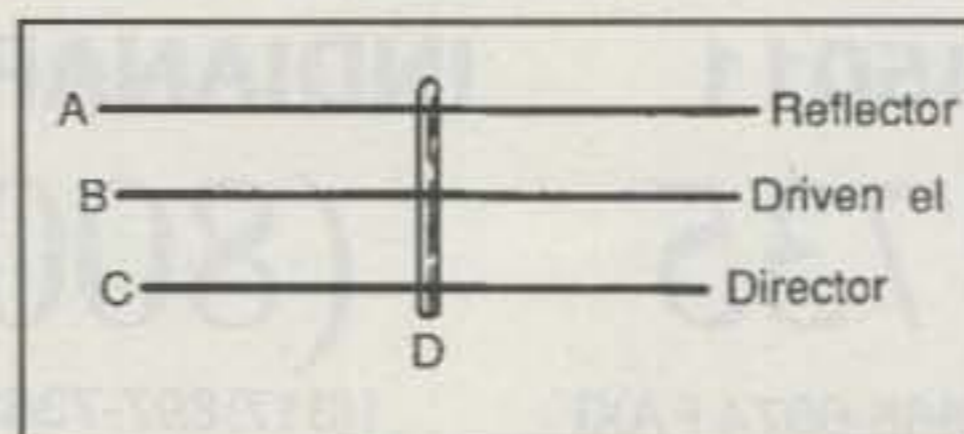


Fig. 1- Top or bottom view of a typical three-element Yagi beam antenna.

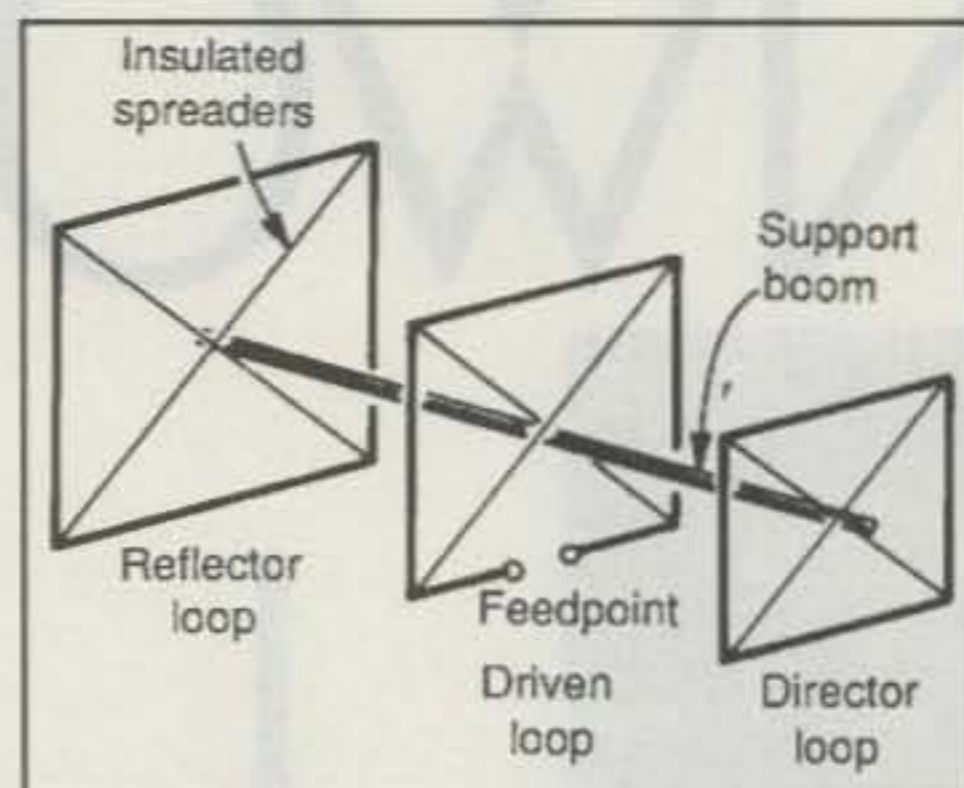


Fig. 2- Typical three-element horizontally polarized quad antenna.

resultant inductive characteristic rejects RF energy received from the driven element and reflects it back toward the driven element and the director element.

The RF transmission line is only attached to the driven element, which is electrically one-half wavelength long.

The director element is electrically and physically shorter than the driven element. Its resultant capacitive characteristic attracts RF energy from the driven and reflector elements. If additional director elements are used, each one is shorter than the previous one.

Reflector and director elements are electrically energized from the driven element; they are parasitically energized elements and they are referred to as parasitic elements.

Most Yagi antennas have just one driven element, and the feedline is attached to it.

- A minimal Yagi consists of one driven element with one reflector element.

- Reflector, driven, and director elements are physically in line with each other.

- The typical forward radiation pattern of a three-element Yagi is about 60 degrees wide to the half power points.

Quads: A Cubical Quad (quad) antenna is a four-sided wire antenna. Each side is one-quarter wave long electrically, with each complete loop about one electrical wavelength. The driven loop is electrically one wavelength. If a reflector loop is used, it is electrically longer than the driven loop. If a director loop is used, it is electrically shorter than the driven loop.

Quads require more maintenance than Yagi antennas because they are relatively frail and subject to wind damage.

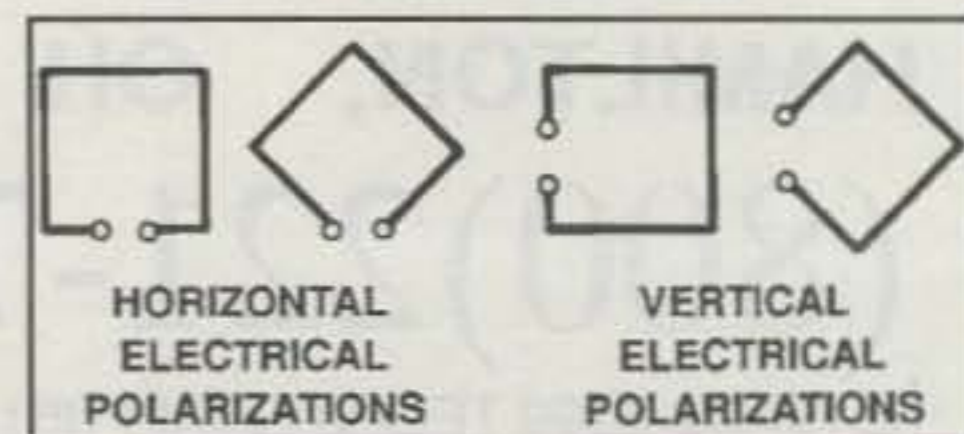


Fig. 3- Quad polarizations with only the driven loops shown.

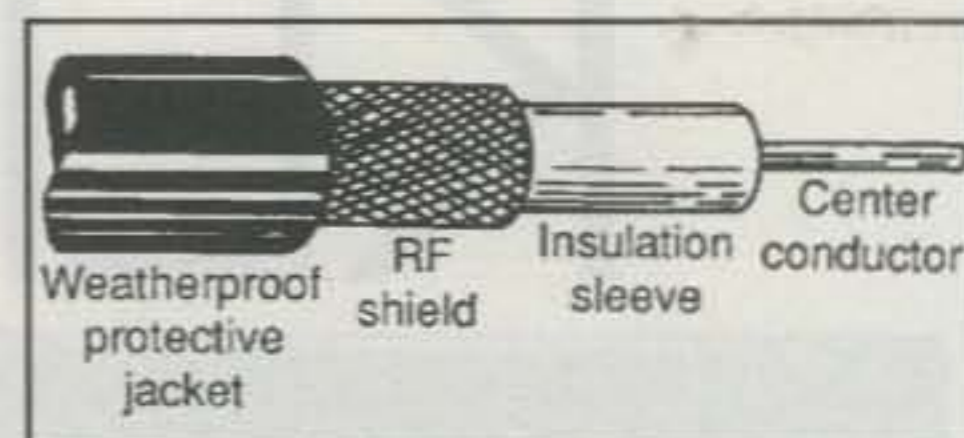


Fig. 4- Coaxial cable configuration.

Quads provide a lower fire (radiation) angle than Yagi antennas, which results in signals being refracted back to Earth farther from the transmit point. It is an excellent antenna to use to work foreign (DX) stations.

A Delta Loop is a three-sided version of the four-sided Cubical Quad. Each leg/side is about one-third of an electrical wavelength.

The driven loop is electrically one wavelength. The reflector loop is longer than the driven loop, and the director loop is shorter than the driven loop.

The Delta Loop functions well even close to the ground.

Antenna Basics

If the electrical lines of force generated by an antenna are parallel to the surface of the Earth, the antenna is horizontally polarized.

- The electrical lines of force are in the same direction as the antenna. As an example, dipole antennas are usually erected horizontally, so they are horizontally polarized.

- The magnetic lines of force are generated at right angles to the electric lines of force.

If the electric lines of force generated by an antenna are perpendicular (at a right angle) to the Earth's surface, the antenna is vertically polarized.

- Vertical antennas are vertically polarized.
- Most man-made noise is vertically polarized. This fact primarily applies to HF (3-30 MHz) and VHF (30-300 MHz) signals.

An omnidirectional antenna is a relatively nondirectional antenna. It radiates and receives signals equally well in all azimuth directions. Vertical antennas are omnidirectional antennas.

The ground plane is a vertical antenna with resonant radiators attached to its base. It is relatively omnidirectional and it functions well.

The limited directivity of a dipole antenna is broadside (front and back) to the antenna.

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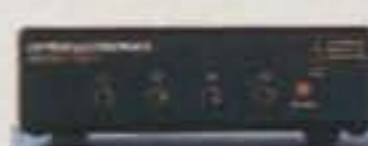
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Antennas should be mounted where they cannot be touched by people standing on the ground. Install them as high as possible where they are clear of all other wiring and metal objects.

When using a VHF or UHF hand-held transceiver, position the antenna away from your head, and away from the heads of any other nearby people.

The least hazardous antenna to use with a VHF/UHF hand-held transceiver is an antenna that is one-half wave long.

A whip antenna can be mounted at the middle of a car's roof to provide omnidirectional transmission and reception with minimum RF exposure to occupants of the car.

Feedlines

Feedlines are also called transmission lines. They are used to carry RF energy from the transmitter to the antenna, and to carry received RF signals from the antenna to the receiver.

The longer the transmission line, the higher the amount of RF signal loss. Cut off excess transmission line to avoid unnecessary loss.

Transmission lines have more loss at high frequencies than they have at low frequencies.

A lossy transmission line heats more than an efficient one that is not lossy.

Coaxial cable (coax) is a popular feedline because it is easy to install and it seldom requires maintenance.

Coaxial cable consists of a center conductor surrounded by an insulation sleeve which is covered by an electrically conductive metallic shield. An outside weatherproof jacket is used to protect the inner layers from damage.

Coax does not allow high RF voltages to be present in the shack, which can occur when using ladderline.

Coax is easy to install, it is reasonably efficient, it lasts a long time, and it usually does not require maintenance.

Coax can be buried without significantly degrading its performance. Good coax is almost immune to damage from water or oil.

Due to its built-in shielding, coax is not affected adversely by being located near metal objects.

RG-213/U coax is a low-loss transmission line. Fifty (± 2) ohm coax is popular because it matches the impedances of most transceivers and many antenna systems.

Ladderline is an open-wire transmission line that is highly efficient (low RF loss) and is the least likely to be damaged by a high standing-wave ratio (SWR). However, it is difficult to install, and it requires much more maintenance than coaxial cable.

- The parallel conductors are spaced apart the correct distance by insulators (rods) positioned at fixed intervals.

- The impedance of ladderline is determined by the spacing between the conductors.

Parallel conductor feedline is also called twinlead. It consists of two parallel wires held at a predetermined fixed separation by a solid insulating material. It can be used with excessively high SWR conditions which might damage coax. It is made to handle VHF (30–300 MHz) and UHF (300–3000 MHz) signals; consequently, it has low RF loss at HF (3–30 MHz). Twinlead must be kept away from metallic objects to avoid performance degradation.

Forward power/voltage travels from the transmitter to the antenna through the feedline. Reverse (reflected) power/voltage and received signals travel from the antenna back to the transmitter through the same feedline.

- If there is no impedance mismatch between the feedline and the antenna, no power/voltage is reflected back to the transmitter. The higher the mismatch, the higher the reflected/reverse power/voltage.

A high standing-wave ratio causes a transmission line to heat.

Ladderline and twinlead have characteristic impedances above the 50 ohm impedance common to most transceivers. Consequently, one must use an impedance matching device (balun) to attain an impedance match between these items.

Standing-wave ratio (SWR) is the ratio of high to low voltages on a transmission line when an impedance mismatch exists.

- An SWR of 3 to 1 (3:1) or less is acceptable.
- An SWR in excess of 4:1 is unacceptable.
- Excessively high SWR readings can be

caused by poor connections to the feedline and/or antenna.

- Antenna connections should be soldered, cleaned, and tightened.

RADIO FREQUENCY (RF) CONNECTORS

A PL-259 connector is commonly used on RG-213/U coaxial cable to be attached to an HF (3–30 MHz) transceiver.

A BNC connector is commonly used to attach a feedline or antenna to a VHF (30–300 MHz) transceiver.

A type N connector is a low-loss connector that is suitable for use with UHF (300–3000 MHz) equipment.

BALUNS

The term *balun* is derived from the words BALANCED and UNBALANCED, since this device is used to connect balanced loads to unbalanced loads.

A balun is an air-core radio frequency transformer. Baluns are also used as impedance matching devices, as shown in the following examples:

- Connecting a 50 ohm coaxial cable to a 35 ohm antenna.
- Connecting a 50 ohm coaxial cable to a 1000 ohm antenna.
- Connecting a 50 ohm coaxial cable to a 72 ohm dipole antenna.
- Connecting a 50 ohm coaxial cable to an antenna with an input impedance characteristic of 300 ohms.

A balun can be used to correct a balanced to unbalanced condition and/or to correct an impedance mismatch condition.

The antenna connection of a modern transceiver is unbalanced. The center connection is insulated above ground, whereas the other side of the transceiver's antenna connector is attached to chassis ground.

Summary

I hope this article has helped prepare you to pass the Novice and Technician written examinations, FCC Elements 2 and 3A. If you want material printed in prior issues of *CQ* magazine, those issues are available from *CQ* at \$3.00 each. Please do not request this material from the author.

As stated at the beginning of this article, I have a series of ten Novice and ten Technician examinations which readers are welcome to use to check their ability to pass FCC examinations. These tests are proportioned the same as the associated tests. Remember to send a large (10 by 12 inch) self-addressed envelope with double first-class postage to my address at the beginning of this column. If you want to continue on through the series of examinations, attach triple first-class postage to your envelope each time.

September Column Addition

In the September column on page 100 we reported on the "Pacific Island nations and Their Exclusive Economic Zones" map, which is an excellent map of the South Pacific. Should you wish to send for this free map, the address listed is correct, but please add the words "New Pacific Map" as follows: State of Hawaii; Department of Business, Economic Development, and Tourism; Att: New Pacific Map; P.O. Box 2359; Honolulu; Hawaii 96804.

73, Bill, W6DDB

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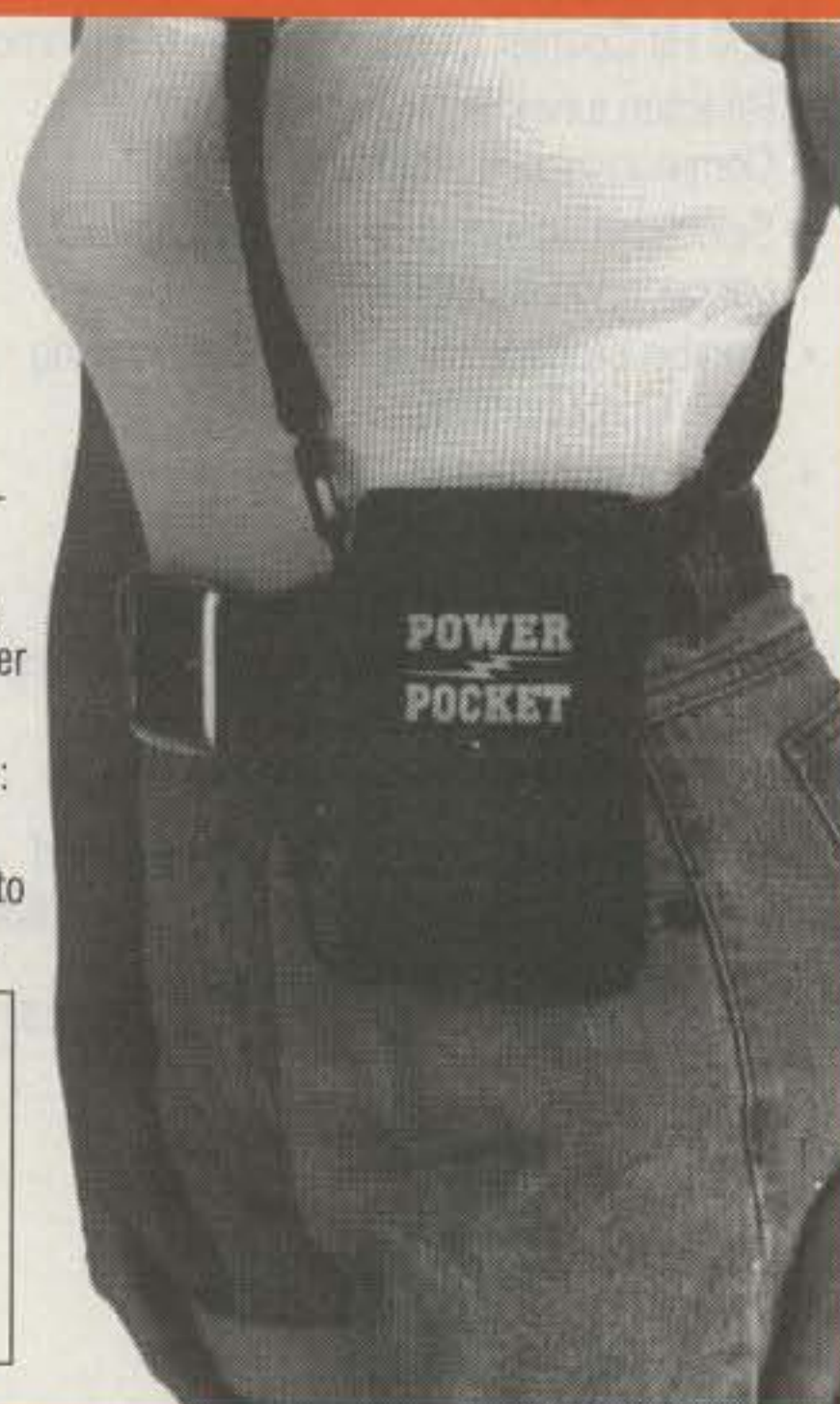
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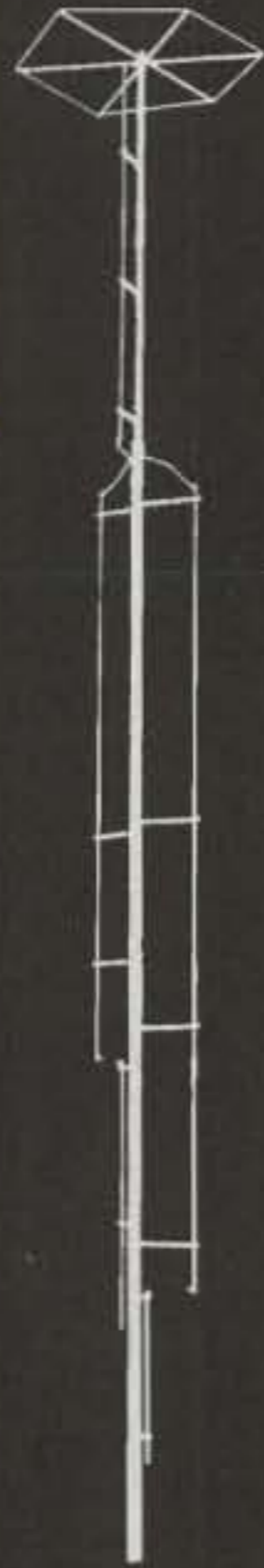
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GAP: THE PERFECT ANTENNA

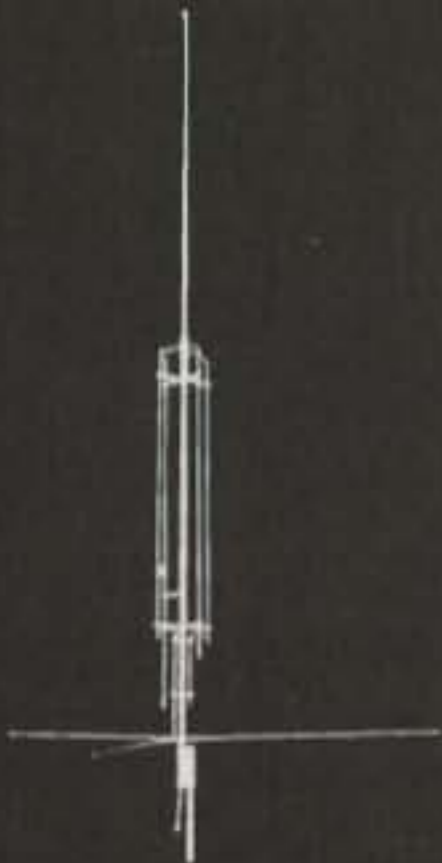
We at GAP realize there isn't a perfect antenna. No singular antenna will scream DX on 80 and be the best for local nets on 10. If anyone tells you there is, beware! The perfect antenna does not exist, but the right one for you may. If you want something to bust the pile on the low bands, then consider the Voyager. Just starting out in ham radio and need a great general coverage antenna, the Challenger is easy to assemble and for little effort will yield superior performance, especially on DX. Maybe you knowingly or unknowingly moved into one of those "restricted areas" where the Eagle's limited visibility, but unlimited ability is desired.



Voyager DX



Challenger DX



Eagle DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its **NO TUNE** feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

The secret is out and people in the know say:

CQ—"The GAP consistently outperformed base-fed antennas...and was quieter."

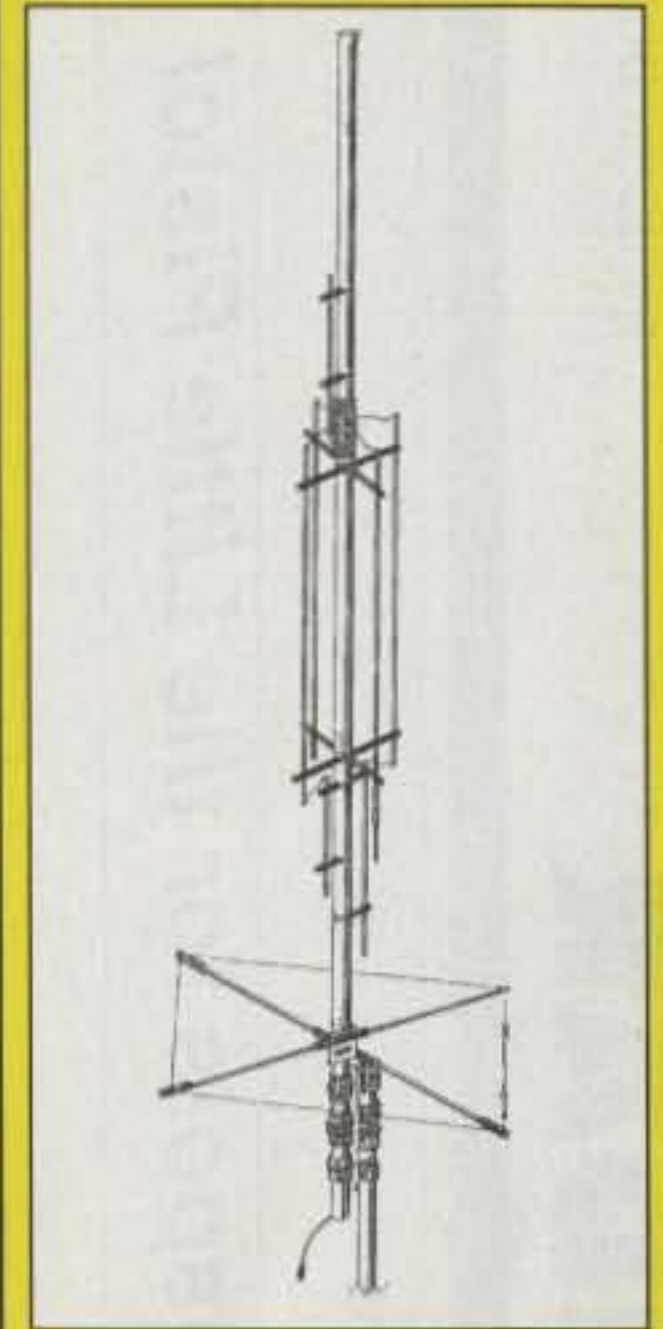
73—"This is a real DX antenna, much quieter than other verticals."

RF—"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DBs."

Worldradio—"These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if it is fed in the center."

IEEE—"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

New Release: TITAN DX



This all purpose antenna is designed to operate 10m-80m, WARC bands included. It sits on a 1-1/4" pipe and can be mounted close to the ground or up on a roof. Its bandwidth and no tune feature make it an ideal antenna for the limited space environment as well as a terrific addition to the antenna farm.

MODEL	BANDS OF OPERATION											HT	WT	MOUNT	COUNTER-POISE	COST
	2m	6m	10m	12m	15m	17m	20m	30m	40m	80m	160m					
Challenger DX	■	■	■	■	■		■		■	■		31.5'	21 lbs	Drop In Ground Mount	3 Wires @ 25'	\$259
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	\$269
Titan DX			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	\$289
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	\$399

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NEWS/VIEWS OF ON-THE-AIR COMPETITION

Contesting and Low Sunspots for the Little Pistol

November's Contest Tip

Try to vary the phonetics you use when calling in pileups. Sometimes a different word will help differentiate your call from the others. Sharp, piercing words are usually more effective. For example, GERMANY is probably better than GULF, or consider DENMARK instead of DELTA. As is so often the case in contesting, put yourself in the shoes of the operator you're calling.

If you turned on your radio lately, you may have noticed a disturbing hiss coming out of the speaker. Has lightning destroyed your receiver's front end? Maybe your tower has fallen down. Could it be that amateur radio as we know it has ended? Maybe all the DXers and contesters of the world are standing by on a big list for a *real* P5 and are getting ready to "make their call."

We all know the reality of today's conditions. For all intent and purposes, 10 meters is a thing of the past. Frankly, most of us are wondering if even 15 meters will perform this year! I, for one, am an eternal optimist. If this is your first solar downturn, please read on. If it isn't, read on anyway, as a little reminder is in order here.

What follows is an attempt to plot an operating strategy for the pending sunspot minimum that will help maximize your score and maybe even allow for a little fun. In looking over the CQ WW Contest results from the most recent sunspot minimum, I found some interesting data. In general, CQ WW scores have been steadily climbing over the past two decades. For example, W3LPL won the 1975 CQ WW SSB Contest with a score of only 1,003,055 points. As we entered the early 1980s, winning SSB scores in the low 3 million range were commonplace. Recently it has taken 6-8 million to win. Throughout the past 20 years there have indeed been significant scoring downturns at sunspot minimums, but final tallies were well above zero! Tables I through IV provide just a few examples. Experience has shown that the pain seems to last only one contest season and that recovery is quick and dramatic.

There are several predictions for the date of the impending solar minimum, but the most commonly held position is sometime in early 1996. So as we embark on this rough road, let's develop an operating strategy that will make the most of it—nothing revolutionary, just a bit of common sense.

Clearly, 20 meters is going to be the money band for the next two years. And money band it is. Even during the last minimum, multi-multi stations were making 1500 QSOs on 20 SSB

Calendar of Events

Oct.	22-23	Texas QSO Party
Oct.	26-28	YLRL SSB Anniversary Party
Oct.	29-30	CQ WW DX SSB Contest
Nov.	5-6	Ukrainian DX Contest
Nov.	5-7	ARRL CW Sweepstakes
Nov.	12-13	OK/OM DX Contest
Nov.	12-13	Worked All Europe RTTY Contest
Nov.	19-21	ARRL SSB Sweepstakes
Nov.	26-27	CQ WW DX CW Contest
Dec.	2-4	ARRL 160 Meter Contest
Dec.	10-11	ARRL 10 Meter Contest
Dec.	31	RAC Canada Winter Contest
Dec.	31	ARRL Straight Key Night

and single operators approached 1000 contacts. Now I'm already reading your mind as you think, "But I only have a tribander at 50 feet. What am I going to do?" Sunspot minimums really have little impact on operating style itself. Whether the sun is active or not, you still have to make the same operating decisions. For example, should I run stations or search and pounce? How long should I call stations in pileups? The list goes on and on.

Because of the popularity of the CQ WW, bands such as 20 meters have already become saturated. For this reason I don't think you're going to see much change in 20 meter activity in the upcoming years as we depart from extended operating on 10 and 15. For the smaller station, a little extra operating savvy will be the order of the day. Although 20 meters will still be a very usable band, conditions will even impact that band's effectiveness. Witness the conditions in this year's Worked All Europe contests. A smaller station will have a tough time running anyone except at peak propagation times (e.g., 2000Z to Europe from the East Coast USA). However, you can still be effective when searching and pouncing. Not only will there be many stations to work, but your ability to uncover interesting multipliers will be enhanced as you tune up and down the bands.

Let's not kid ourselves, running stations is always more fun than searching and pouncing, but there has been one consistent fact about the CQ WW. Activity has grown exponentially in this contest in recent years, and this will help temper the reality of reduced conditions.

Another factor about 20 meters to consider is it will continue to perform over long-haul paths. This morning, for example, with the Solar Flux Index sitting at 74 and only a dipole in my New York backyard, I worked two BVs, a DU, and a KH2. It can be done with less! Sure it wasn't a contest, but I wasn't using a Voice of America relay station either. The message here is that any sunspot minimum operating strategy must include a very active rotator. There will be plenty of times when you may have trouble working your "bread and butter" propagation paths (e.g., Europe or JA). Remember that at the same time there are many

Year	Category	Call	Winning Score
1983	Single Op	AI6V	3,576,528
1984	Single Op	K1AR	2,662,116
1985	Single Op	K1AR	4,007,648

Table I—CQ WW SSB USA winning scores at sunspot minimum.

Year	Category	Call	Winning Score
1983	Single Op	W1KM	2,699,775
1984	Single Op	N2LT	2,192,028
1985	Single Op	K1AR	3,397,905

Table II—CQ WW CW USA winning scores at sunspot minimum.

Year	Category	Call	Winning Score
1983	Multi Single	KX4S	4,191,225
1984	Multi Single	K2BU	2,791,019
1985	Multi Single	KX4S	4,603,120

Table III—CQ WW SSB USA winning scores at sunspot minimum.

Year	Category	Call	Winning Score
1983	Multi Single	K1GQ	3,712,412
1984	Multi Single	K5RC	3,221,384
1985	Multi Single	K1KI	3,477,100

Table IV—CQ WW CW USA winning scores at sunspot minimum.

other parts of the world that have band openings to your QTH. This provides an opportunity for you to increase your multiplier totals (and score) while the big stations are running, running, and running.

Now let's take a look at the low bands. One-sixty, 80, and 40 meters will continue to perform at peak levels over the next few years. If there ever was a time for you to think creatively about low-band antennas, now is the time! Remember, you don't need a 4-element 80 meter Yagi to have a great time on that band. The same is even more true on 40 meters. In fact, we are now entering a period of time when smaller stations can perform relatively well when compared to their larger brothers. We all know 20 meters will be closing early and largely become a useless band at night. This means more activity will appear on the low bands, providing a great scoring opportunity for a station

with almost any antenna in the backyard. However, just as on 20 meters, the activity level will be intense, and you will have to be realistic about your operating style. Call CQ only when it works, and take advantage of increased activity when you are forced to search and pounce. Either way, there will be worldwide propagation at your fingertips.

I may have overstated the downturn of 15 and 10 meters, so let's revisit these bands. In reality, 15 meters may still offer some good propagation opportunities, but it's not something I would count on. At the very least, 15 meters will offer predictable north-south conditions, as well as limited propagation to Europe (East Coast/Midwest USA) and JA (West Coast). Keep an eye on the band. And at the very least, make sure you work your own zone and country on 10 meters, as well as a few Caribbean and South American multipliers. Openings will be spotty, but a good operator will be able to take advantage of them (even from a smaller station) while others are banging their heads together on 20 meters.

Contest operating during solar downturns is not my idea of the best of contesting. However, I've been through two of them—one from a small station and the other from a big one. In both cases fun prevailed. It's more a case of setting realistic expectations (and maybe getting a little more sleep than usual on contest weekends). However, don't give up. The CQ WW, in particular, remains the world's most popular contest. That fact alone should remind you that even in the bottom of the sunspot cycle, there are still plenty of guys to work across all the bands. Good luck!

Final Thoughts

That's it for this month. For many of you the CQ WW Contest is just a few days away. I hope you enjoy the world's best contest as much as I will!

There's still time to reply to my 1994 Contest Survey (see September CQ). Please take a few minutes and voice your opinions. Remember that you can always send your replies to me via my E-mail addresses.

As always, please remember that the deadline for the February issue is December 1st.
73, John, K1AR

ARRL Sweepstakes

CW: Nov. 5-7 Phone: Nov. 19-21
2100Z Sat. to 0300Z Mon.

This is the 61st running of the Sweepstakes, making it the oldest domestic competition going, and it really stirs up a lot of activity.

Operation is limited to stations in ARRL sections. Operating periods are restricted to a maximum of 24 out of the 30 hour contest period. Times off may not be less than 30 minutes and must be clearly indicated in your log.

In order to minimize QRM to non-contesters it is recommended that operation be confirmed to certain portions of the bands. It is recommended that you check QST for details.

There are several other regulations, including a cross-check sheet if you make 200 or more contacts. A large SASE (45 cents in postage) will get you the "SS Package" and Operating Aid #6 with enough log and summary sheets for an average outing.

Exchange: QSO number, power class, call,

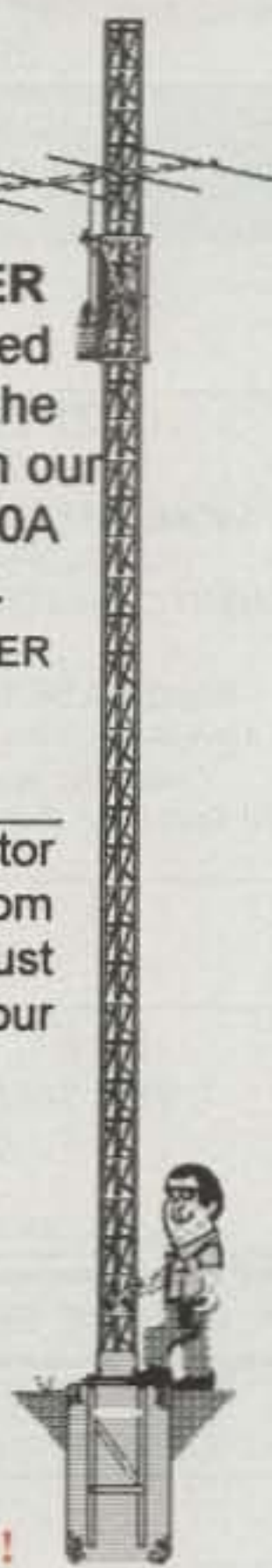
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M1840A	40' Tower Package w/ H-6 *Hazer	\$2047.64
M1850A	50' Tower Package w/ H-6 *Hazer	\$2292.64

*H-5 HAZER cranked near the top on our M1330A tower.



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last two digits of year first licensed, and your ARRL section. Stations using 150 watts or less are classed "A," over 150 watts "B," and QRP "Q." The same station may be worked only once regardless of the band.

Scoring: Each completed QSO is worth 2 points. The multiplier is derived from the number of ARRL sections.

Awards: The usual certificates in each class and mode for single operator stations in each section and multi-operator stations in each division.

Last year's trophy program has been expanded. Check October QST for details. In addition, taking off on last year's highly successful program, the ARRL will be offering SS pins to participants with 100 QSOs or more (cost is \$3 pp). SS coffee mugs will be made available to participants achieving a "clean sweep" (\$8 pp).

Logs must be postmarked no later than 30 days after the contest and go to: ARRL Communications Dept., 225 Main Street, Newington, CT 06111.

Ukrainian DX Contest

1200Z Sat. to 1200Z Sun., Nov. 5-6

This one is co-sponsored by the Ukrainian Amateur Radio League and the Ukrainian Contest Club and is open to amateurs around the world.

Classes: Single Operator, All Band and Single Band, Multi-Single, Multi-Multi, Single Operator QRP All Band/Single Band, and SWL.

Exchange: RS(T) plus serial number (599001). Ukrainian stations will add a two-letter abbreviation representing their region.

CQ WW SSB Contest Errata

W2UP's Single Operator, Assisted score was left out of the results. His line totals were: 785/115/376 for a final score of 1,061,542.

KX3Q/4 should have been listed as #1 in the USA 4th call area, not #3 in the 3rd call area.

IK1GKE was erroneously listed as K1GKE in the Top 10 QRP table.

JK2VOC should be listed correctly as an Assisted, All Band entry.

JK1GKG should be listed correctly as an Assisted, 3.7 MHz entry.

WA4CTA was really an Assisted entry.

N4KG should have been listed as a Single Band, Assisted entry.

One of the operators at W4NC's Multi-Single operation should have been listed as N4VHK, not N4YHK.

Scoring: Credit 1 point for QSOs within your country, 2 points within your own continent, 3 points outside of your continent, and 10 points for QSOs with the Ukraine. Multipliers are the sum of DXCC, WAE, and Ukrainian regions per band.

Final Score: Final score is calculated by multiplying total QSO points by the total multiplier.

Awards: First-place certificates will be awarded for each category and country.

Logs are to be postmarked no later than 30 days after the contest and should be sent to: Ukrainian Contest Club, P.O. Box 4850, Zaporozhye, 330118, Ukraine.

European RTTY Contest

1200Z Sat. to 2400Z Sun., Nov. 12-13

Rules for the WAEDC RTTY Contest are mostly the same as for the CW and Phone sections held in August and September. There is one main difference, however. To generate more activity and increase the QSO points, contacts with stations worldwide are permitted. QTC traffic, however, is not permitted within your own continent. Check the August Calendar for all detailed rules and regulations.

Exchange: RST plus a progressive QSO number.

Points: Each QSO and each QTC exchanged are worth one point. QTCs may be sent/received worldwide between continents (limit of 10).

Multiplier: Multipliers are determined from the DXCC list.

Bonus Multiplier: Multiply your multiplier on 80 meters by 4, on 40 meters by 3, and on 10/15/20 meters by 2.

Awards: Certificates will be awarded to the highest scorers in each country with a reasonable score. Continental leaders will receive a plaque. Certificates will also be awarded to stations with at least half the score of the continental leader.

It is suggested that you use the official DARC log forms. A large SASE (IRCs) to the address below will get you a supply.

Mailing deadline for all entries is December 15th to: WAEDC Contest Committee, Postbox 1328, D-8950 Kaufbeuren, Germany.

OK/OM DX Contest

0000Z Sat. to 2400Z Sun., Nov. 12-13

This popular event is sponsored by the

Czech Radio Club and is open to all amateurs worldwide on both modes. The goal is to work as many OK/OM stations as possible (non-OK/OM can only work OK/OM stations) on 160-10 meters.

Classes: Single Operator, SSB/CW/Mixed, Multi-operator/Mixed, and QRP.

Exchange: RS(T) and serial number. OK/OM stations will include their 3-letter district code.

Scoring: Credit 3 points for OK/OM QSOs (1 point from Europe). Multiply total QSO points times the total number of OK/OL/OM prefixes worked per band and mode.

There are a variety of awards available to category winners. Entries must be postmarked no later than December 15th and sent to: Karel Karmasin, OK2FD, Gen. Svobody 636, 674 01 Trebic, Czech Republic.

CQ WW DX CW Contest

0000Z Sat. to 2400Z Sun., Nov. 26-27

Just a reminder, as if you needed one, that the CW section of our WW DX Contest is coming up the last weekend of this month. The SSB section of course is past history. Complete rules were published in the September issue. The contest trophies list has been updated and well covered in the rules.

All logs, both SSB and CW, must be sent to the CQ office: CQ World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801 USA.

Deadline for logs for the SSB section is December 1st, and January 15th for the upcoming CW section. **Be sure to indicate SSB or CW on your envelope.** This will avoid your log from being entered in the wrong section.

ARRL 160 Meter CW Contest

2200Z Fri. to 1600Z Sun., Dec. 3-5

This is the 24th year for this "Top Band" activity. Exchange is between US stateside, VE, and DX stations. DX to DX not permitted for contest credit.

Classes: Single operator, high, low, and QRP; and multi-operator single transmitter.

Exchange: RST and ARRL section for W/VE. RST only for DX stations; ITU Region for maritime and aeronautical mobiles.

Scoring: Contacts between stations in ARRL sections count as 2 points, with DX stations 5 points.

Multiplier: Determined by number of ARRL sections and DX countries worked (for W/VE). DX use ARRL sections only.

Final Score: Total QSO points times the ARRL section and DX country multiplier.

Awards: Certificates to the top-scoring single operator station in each ARRL section and DXCC country. And to the top-scoring multi-operator station in each ARRL Division and continent.

Indicate the multiplier in a separate column only the first time it is worked. Entries with 200 or more QSOs are required to include a dupe sheet. Official log forms are recommended and are available from the ARRL. A large SASE and 45 cents postage or 2 IRCs will get you a supply for more than 300 contacts.

The usual grounds for disqualification (violation of established rules, excessive duplicate contacts, etc.) will prevail.

Mailing deadline for logs is January 6th to: ARRL Communications Dept., 160 Contest 225 Main Street, Newington, CT 06111.

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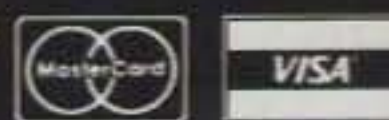
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CQ Showcase

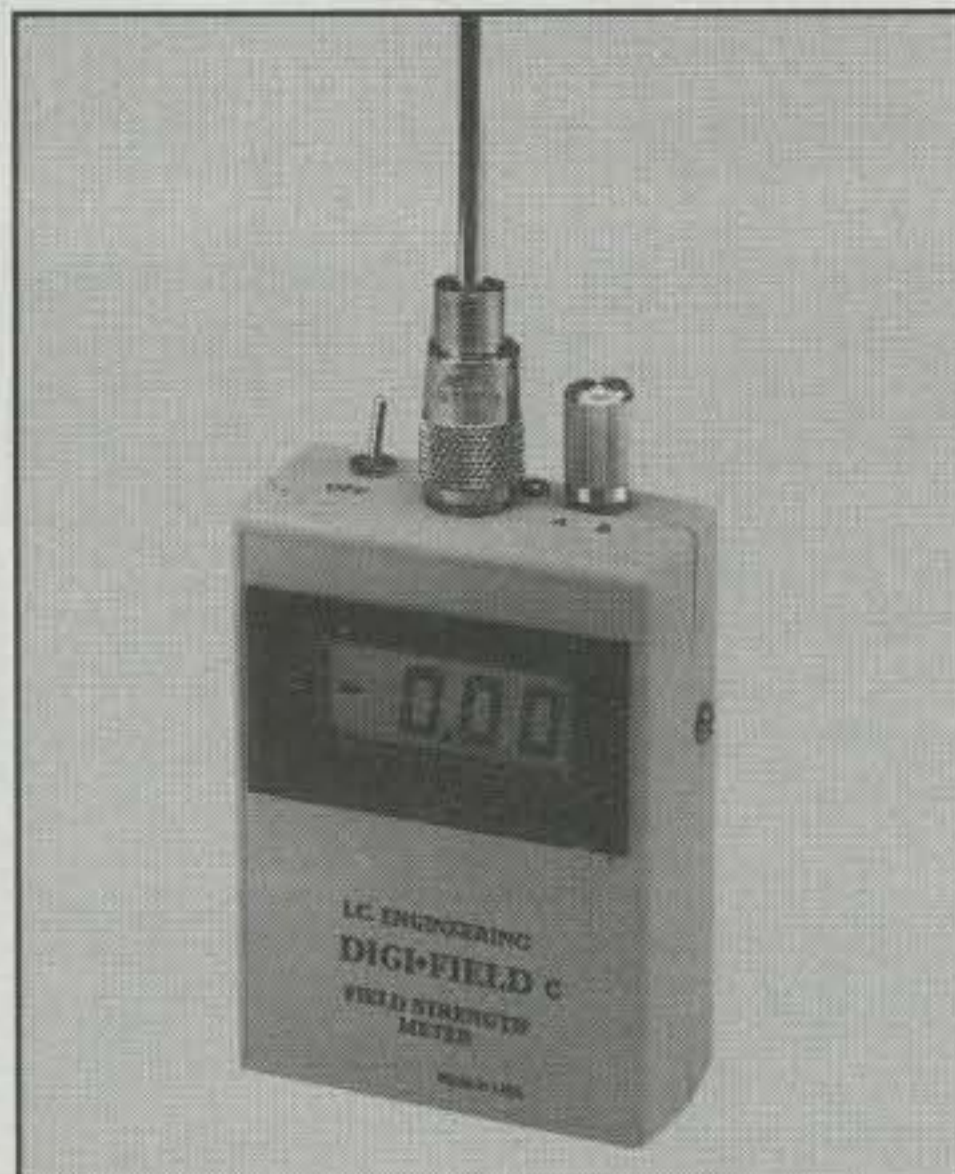


SG-500 SmartPowerCube Linear Amplifier From SGC

SGC, Inc. has announced the availability of the new SmartPowerCube microprocessor controlled linear amplifier. The unit boosts power 500 watts. It has a band of status LEDs on the front panel which function as built-in test equipment and allow the operator to determine any fault which may occur. The SmartPowerCube monitors HF SSB activities, power needs, and antenna condition, and selects the right broadband filter. The unit is protected from preprogrammed shutdown procedures and shuts down automatically in the event of a microprocessor fault. The SG-500 is designed for service in fixed, mobile, and marine applications and is compatible with most HF equipment produced. For information, call SGC, Inc. at 1-800-259-7331, or circle number 104 on the reader service card.

I.C. Engineering Digi-Field C Digital Field Strength Meter

The Digi-Field digital field strength meter from I.C. Engineering has a frequency response of DC to 12 GHz. Two existing models are the model A with a sensitivity of 150



nanowatts at 100 MHz and the model B with a sensitivity of 2 nanowatts. The new model C combines the sensitivity of models A and B. The Digi-Field has a 3 1/2 digit display and is

powered by a 9 volt battery. The model C can be used with its own movable telescoping antenna or an external one of the user's choice. It also includes a low battery indicator and detector output jack.

The Model C is priced at \$185 plus \$6.50 shipping and handling. For more information contact I.C. Engineering, 16350 Ventura Blvd., Suite 125, Encino, CA 91436 (818-345-1692; FAX 818-345-0517) or circle number 106 on the reader service card.

ICOM IC-736 Transceiver

ICOM's new IC-736 transceiver features DDS IC, and a PA circuit that employs MOS FETs for 100 watts of output power. Also included are details such as memo pads, pre-programmable quick split function, and a split lock function. All nine ham bands, transmit and receive, are included in the IC-736, plus there's a 500 kHz to 29.995 MHz general-coverage receiver and 50 MHz band for local QSOs and VHF DXing. SSB, CW, AM, and FM modes are built in.



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Monitor speaker, Rugged compact metal case and DC operation are all standard features of the TSC-100.

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- ◊ Compatible with ROBOT™ color 36, 72, Amiga AVT 90, 94 second mode.
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The IC-736 is equipped with two antenna connectors directed by an automatic antenna selector. The memory channels for each band memorize the selected antenna. For CW enthusiasts the IC-736 features full break-in function (QSK) to receive signals between transmitted keying pulses (semi break-in is also available). Two CW key jacks allow for connecting both a memory keyer and a paddle. Up to 10 electronic memo pads are available as well as 110 memory channels that include 10 split memories and two scan edges.

The IC-736 is priced at \$2250. For more information, contact ICOM America, Inc., 2380 116th Avenue N.E., Bellevue, WA 98004 (206-454-8155) or circle number 107 on the reader service card.

ICOM IC-2700H Dual-Band Mobile

ICOM has introduced the IC-2700H dual-band mobile which features a detachable front panel. The user can mount the front panel on a vehicle's dashboard and store the main body in another location. The IC-2700H provides two sets of controls for dual-band operation and safe operation while driving. Full access to all of the IC-2700H's functions is available from the supplied DTMF microphone. Another feature of the IC-2700H is the HM-90/A wireless

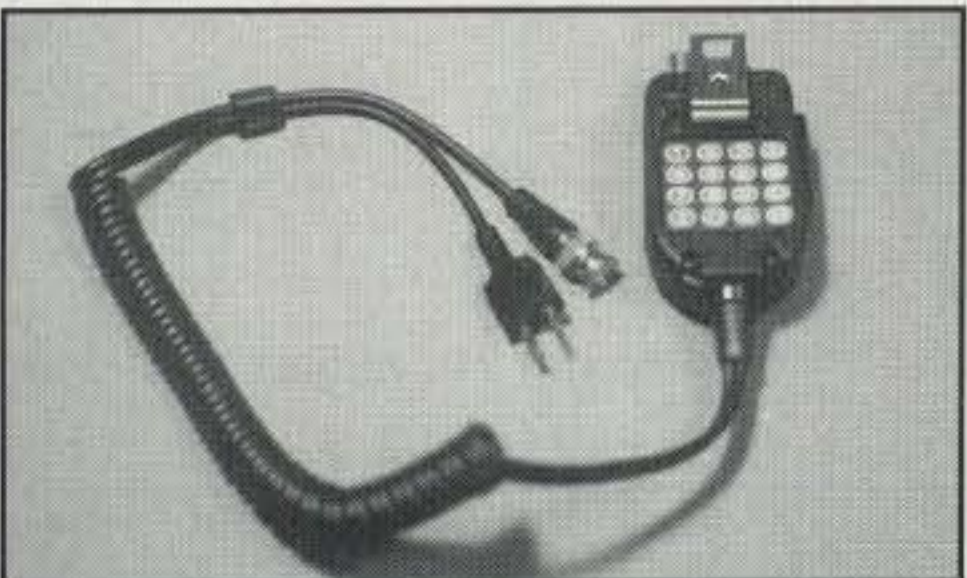


microphone which controls the IC-2700H via infrared signals. A memory allocation function allows for storage of 20 to 80 memory channels in each band, providing a total of 100 memories. Transmitted frequencies are automatically entered into "scratch pad" memories, and each band has six scratch pads to store three duplex settings for repeater use and three for simplex settings.

The IC-2700H is priced at \$959 for the 50 watt unit (35W UHF). For more information, contact ICOM America, Inc., 2380 116th Ave. N.E., Bellevue, WA 98004 (206-454-8155) or circle number 108 on the reader service card.

EUR-Am Electronics New Microphone/Speaker

EUR-Am Electronics has introduced a microphone/speaker with a BNC connector, enabling an HT antenna to be affixed to the micro-

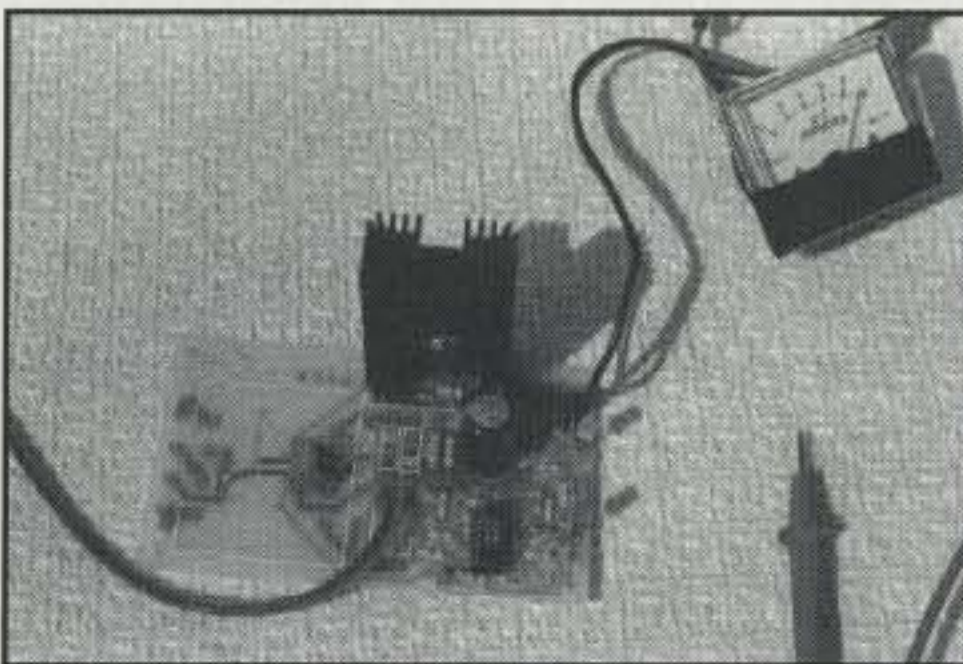


phone. Other features include earphone jack and DTMF keypad. It fits most Yaesu and ICOM hand-helds and some other units.

For more information contact EUR-Am Electronics, P.O. Box 990, Meredith, NH 03253-0990 (FAX 603-279-1394).

Jade Solar Battery Controller

Jade Products, Inc. has announced an addition to their FUN-KIT line, the Solar Battery Controller for lead-acid/gel-cell batteries. The Solar Battery Controller controls and maintains the battery continuously. This series of prod-

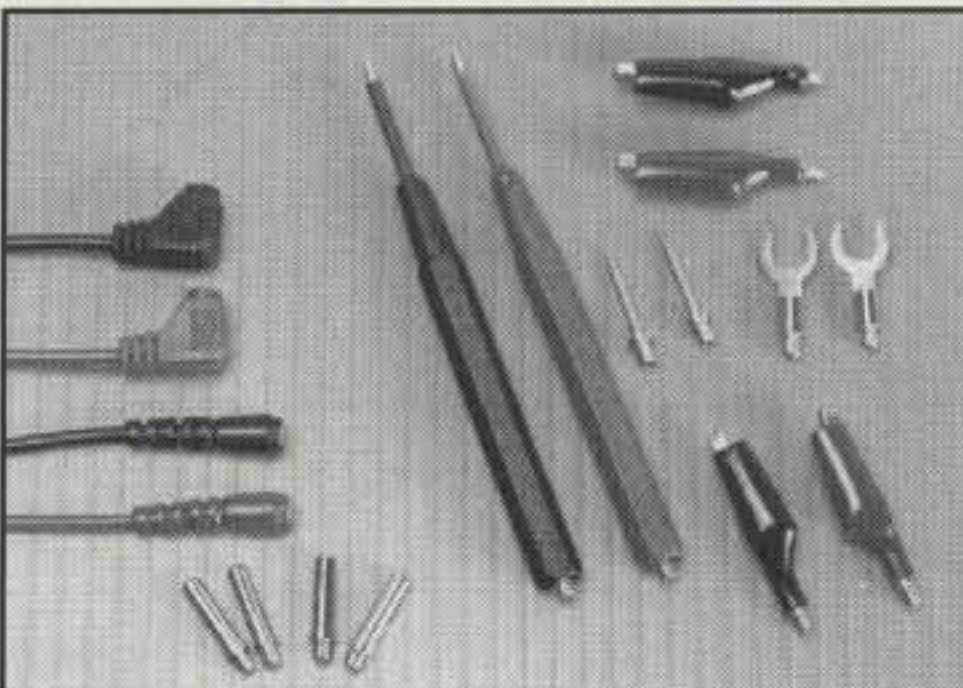


ucts is based on the Unitrode UC3906 battery charger chip. This "smart chip" is specifically designed to sense the condition of the battery and control the charging requirements accordingly. The controller can be left connected indefinitely to the battery, protecting it from overcharge-undercharge damage. The solar controller goes into a "sleep" mode when the light source is inadequate for charging. Once sufficient light is available, the controller senses the battery condition and continues its charging duties.

The Battery Controller has reverse battery protection, trickle start up, and provisions for an external current selection switch. The board can be configured as a Dual Level Float Voltage charger or as a Dual Step Current Charger. For more information, contact Jade Products, Inc., P.O. Box 368, E. Hampstead, NH 03826-0368 (603-329-6995; FAX 603-329-4499) or circle number 109 on the reader service card.

Probe Master Test Lead Set From Jensen Tools

The Probe Master Economy Modular Test Lead Set features interchangeable screw-on tips for either end of a red/black pair, making it possible to use the Probe Master with any DMM. Other applications include jumpers, powerleads, and generator output connectors.

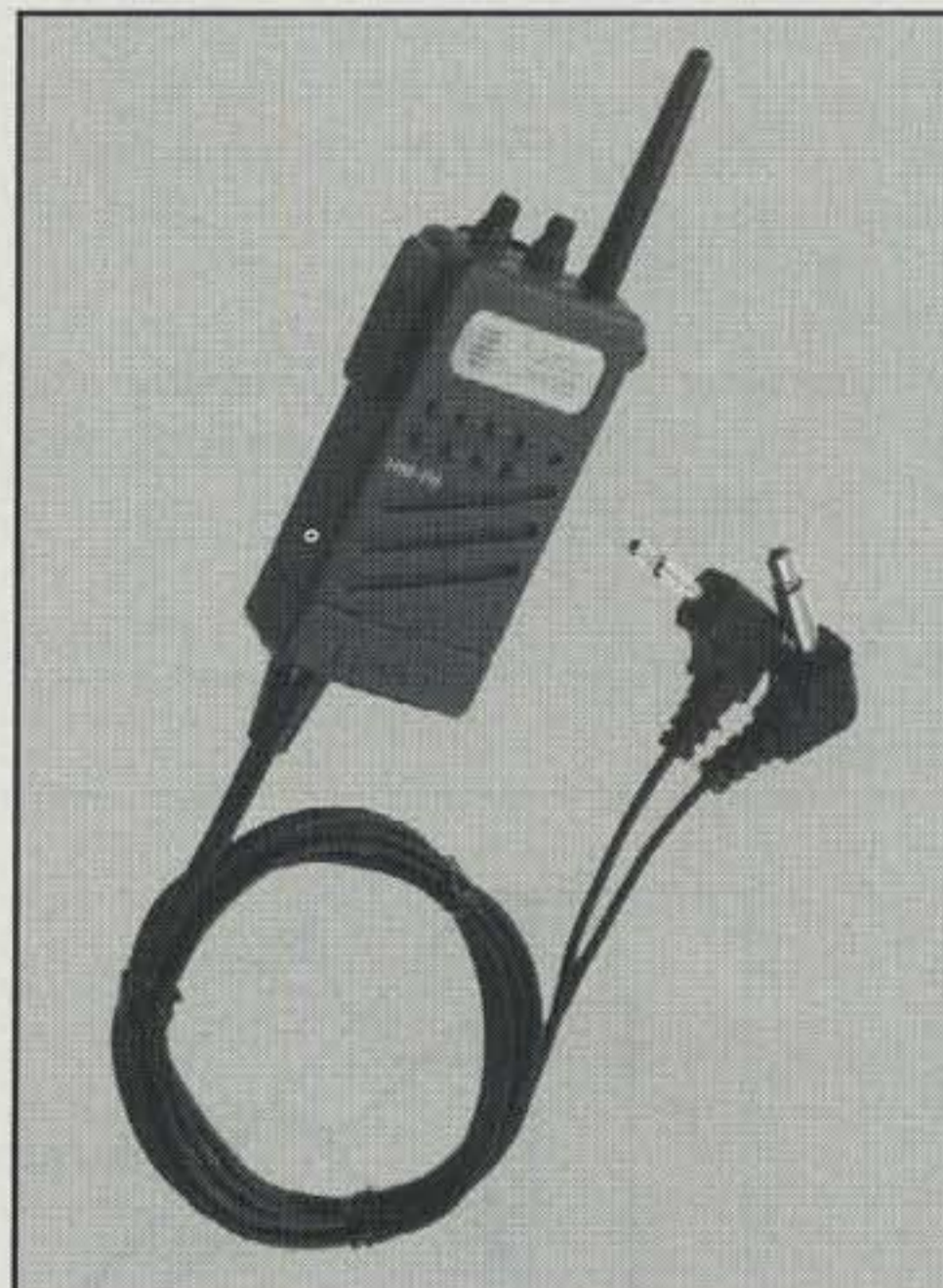


Test leads are approximately 36 inches, with PVC insulation. The kit contains red/black 4³/₈ inch test probes, two pairs red/black booted alligator clips, four standard banana plugs, two each 2 x 20 mm test pins, and spade lug terminals.

For a free copy of the Jensen Tools catalog containing the Probe Master Economy Modular Test Lead Set, write or call Jensen Tools, Inc., 7815 S. 46th Street, Phoenix, AZ 85044 (800-426-1194) or circle number 103 on the reader service card.

COMET Mini "HT" Style Speaker/Mic

The HM-P4 Mini "HT" style speaker/mic provides quality transmit and receive audio in spite of its small size—1.75 inches tall and 1 inch wide. Separate speaker and mic plugs are used at the end of a 38 inch cord. A collar/pocket clip attaches the HM-P4 to the user. Imitation



"control knobs," "antenna," and "LCD display" give the appearance of a working HT.

Three versions are available: the HM-P4K (Kenwood), HM-P4Y (Yaesu), and HM-P4F (ICOM, Alinco, Standard, etc.). They are available from NCG Company, 1275 North Grove St., Anaheim, CA 92806 (714-630-4541), or for more information circle number 101 on the reader service card.

GAP Titan DX Multiband Antenna

The Titan provides continuous coverage under 2:1 across the 10, 12, 15, 17, 20, 30, and 40 meter bands. The Titan is pretuned, needs no tuner, and requires no radials. The unit mounts on an 1¹/₄ inch pipe. It is 25 feet tall and weighs 25 pounds. The Titan has no traps or coils, but features an elevated gap feed. It utilizes 6063 aluminum tubing and stainless hardware in its construction.

For more information contact GAP Antenna Products, 6010 Bldg. B, N. Old Dixie Hwy., Vero Beach, FL 32967 (407-778-3728) or circle 105 on the reader service card.

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

The HGW Beam For 80 or 160 Meters

A beam antenna for 80 or 160 meters is a serious undertaking. I know of at least two 80 meter Yagis (there may be more), but I haven't heard of a 160 meter Yagi! Have you?

One practical approach to a beam for these bands is to use phased vertical antennas—a bad scene, as the verticals and companion ground screen take up a lot of real estate. Another idea is to use a tower guy wire, or a sloper, to simulate a beam antenna. That seems a more practical approach, as the cost is low and the ground area required for radial wires is much less.

There's plenty of data around on the phased vertical scheme, but specific information on the use of a tower guy wire as a parasitic element for a vertical radiator is hard to come by.

48 Campbell Lane, Menlo Park, CA 94025

The July 1994 issue of "BE Radio," a supplement to "Broadcast Engineering,"¹ features a "Hot Guy Wire" (HGW) beam used by broadcast station XEWB in Veracruz, Mexico. The old two-tower directional array on 900 kHz, designed to provide maximum coverage around Vera Cruz and to protect XEW in Mexico City, was at the end of its useful life and was replaced by a single quarter-wave tower using a hot guy wire as a parasitic element (fig. 1). The northwest guy wire serves as an insulated reflector element, tuned by a capacitor at ground level to adjust the electrical length of the guy wire. Twenty ground radials, each about 165 feet long, were placed at the bottom of the guy wire.

Radio XEWB runs 50 kW, so it was decided to split the guy current between two adjacent guy wires, connected together at the bottom ends. The radiation pattern of the antenna is shown in fig. 2. A power gain of 3.5 dBd is achieved, with

a front-to-back ratio of 4 to 5 dB. Not bad for a simple beam antenna!

The author of the article, Grant Bingenman, a Senior Engineer at Continental Electronics, Dallas, Texas, states that hot guy wire technology has been proven outside the United States, but the FCC has yet to accept it. The FCC at present accepts only traditional formulas used to compute radiation fields, and the method-of-moments technology (in use by amateurs and others for over a decade) is under consideration for the broadcast service. A Notice of Inquiry (Docket 93-177), under which the FCC may accept the moment-method antenna design technique in place of the old sinusoidal current distribution design, is under consideration. In the interim amateurs can make use of the several fine antenna design programs available for home computers to design HGW antennas for their own station!

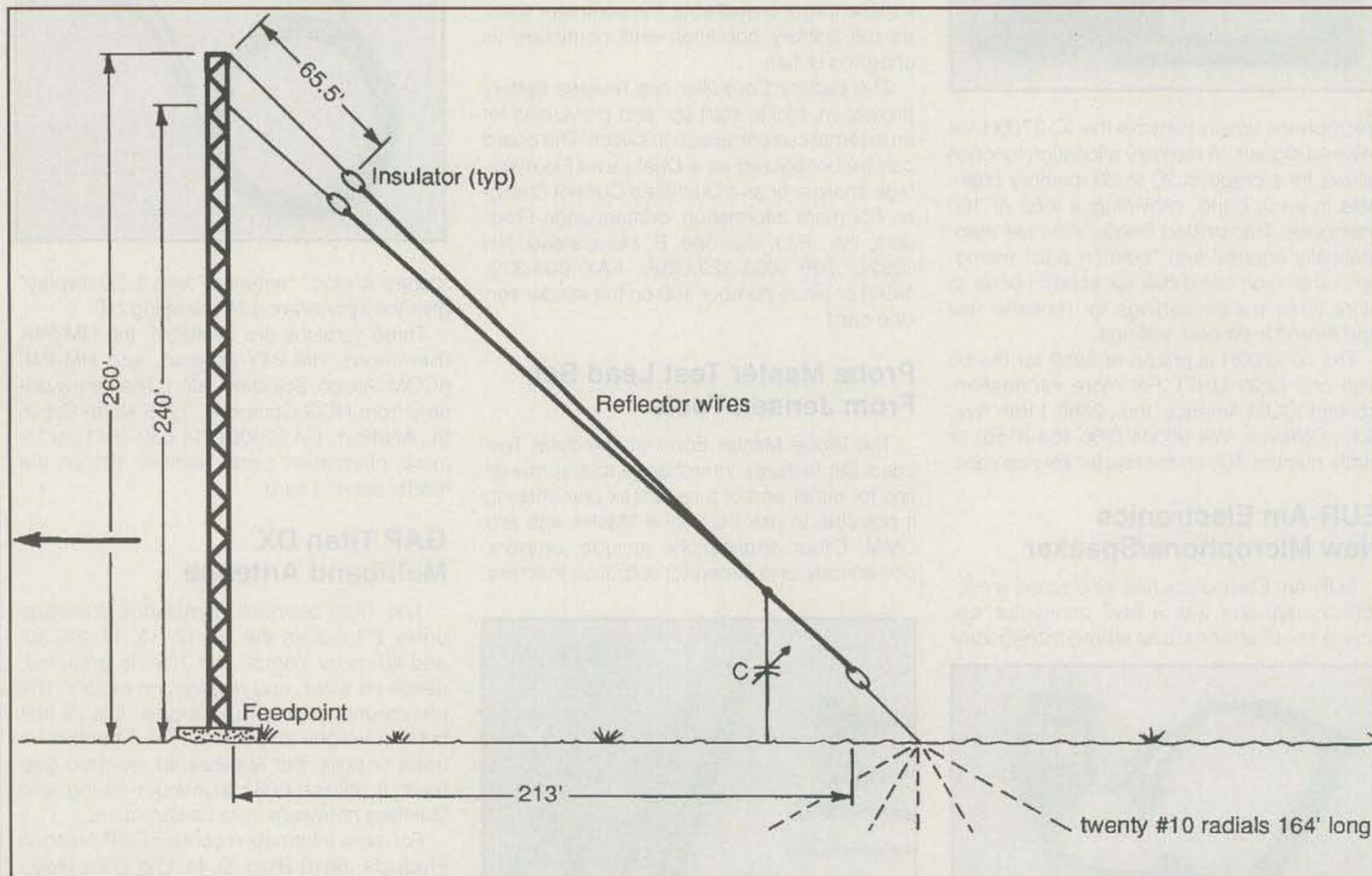


Fig. 1— "Hot Guy Wire" array at XEWB (900 kHz). Divide dimensions by two for approximately 1800 kHz.



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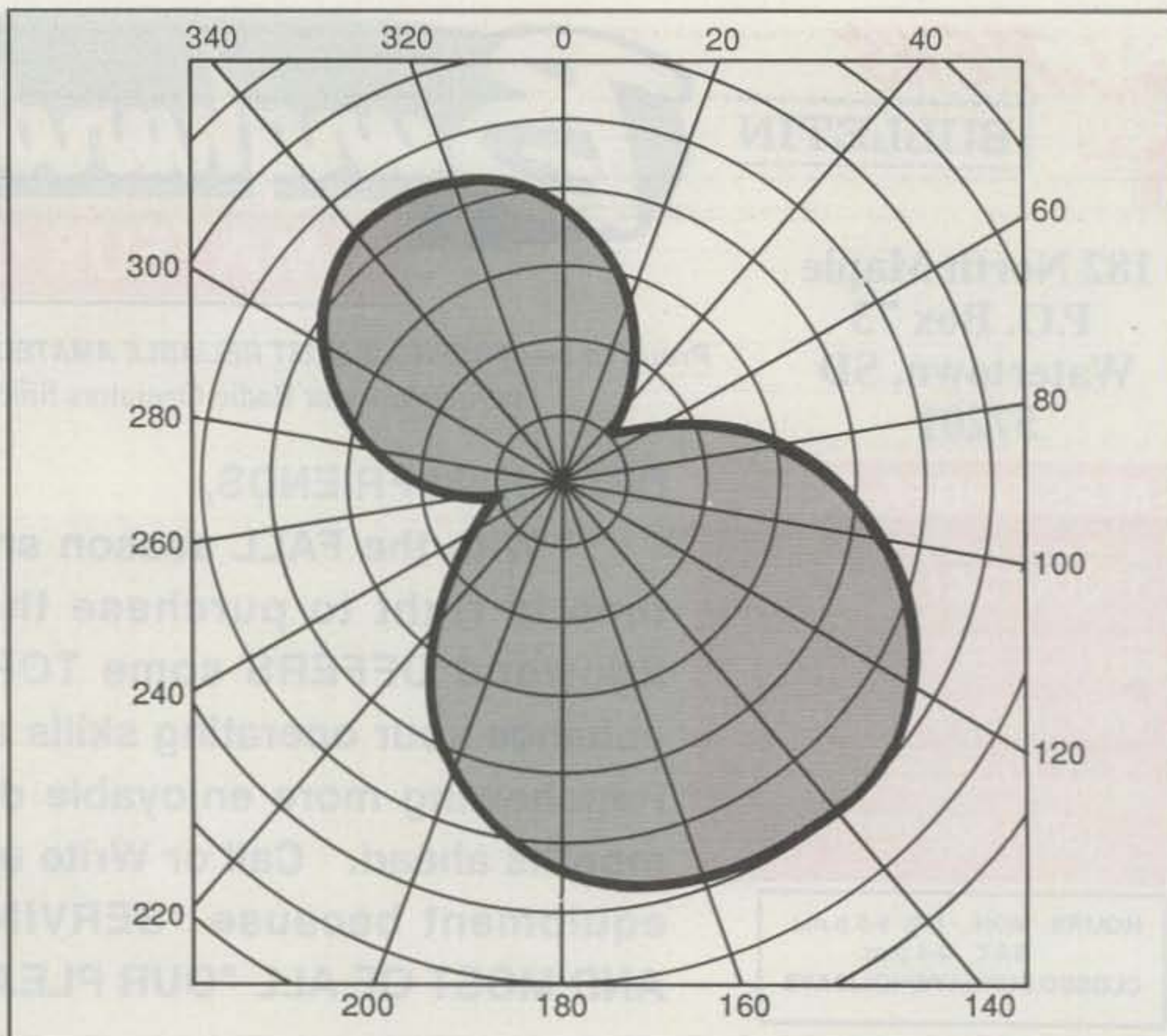


Fig. 2-- Radiation pattern of HGW beam at XEWB.

The dimensions shown in fig. 1 can easily be scaled for either 160 or 80 meter operation. Some amateurs already have towers of sufficient height (about a quarter-wavelength) to put this technique to use. While the XEWB antenna was adjusted for maximum signal rejection to the rear, there's no reason why the HGW antenna can't be adjusted for maximum forward gain. Computer analysis shows that a reflector configuration, rather than a director arrangement, is preferable, based on current/voltage stresses and bandwidth. For amateur service, however, it may be worthwhile to investigate the director case. After all, gain is the name of the game, and problems in broadcast service are somewhat different than in amateur service. Surely the director case should be examined closely. This is easy to do with a computer program, or can be done in the field by adjustment of the guy wire length or the tuning of the series capacitor.

The HGW principle could possibly be expanded to include more than one guy wire. A computer run should disclose if two guys, spaced radially 180 degrees apart, serving as reflector and director, could simulate the response of a three-element Yagi.

Computer buffs, man your machines! I would appreciate input from you concerning this interesting antenna concept! Send me your program (either 5.25 inch

or 3.5 inch disk is okay), and as your reward I will send you a genuine, prized W6SAI QSL card, which you can frame and hang on the wall of your station!

Things That Go Bump In The Night

I suppose most active amateurs have had unusual QSOs in the past, but I think I have had more than my share of them! Here are some of my most interesting ones.

Pat in China. My first unusual contact was in June 1940. My family had just moved from New York to California, and I had just gotten my 20 meter phone rig back on the air. With my brand-new W6 call I was hot to trot! I was especially anxious to QSO China, which was a very difficult shot from New York.

The coming war and the timidity of the government had banned all overseas contacts by US amateurs. (After all, amateurs could turn out to be spies, giving valuable secrets to the enemy over the air!) The only exceptions to the no-QSO rule were US Territories, Hawaii, Puerto Rico, the Canal Zone, and so on. This was a real blow to me. I had never heard a Chinese amateur from the east coast. Now, however, here I was in California with a great shot at Asia's amateurs, and I couldn't legally work any of them!

One morning, before I left for work, I called a long CQ on 20 meters, and an S-9 phone station came back on my frequency.

"Hello, Bill! I hear you S-9 plus. A beautiful signal. This is Pat."

I thought for a moment. Who is Pat? He knows me, that's for sure. "Hello, Pat," I replied. "You are a good S-9 in Los Angeles. How did you know my name? What's your QTH?"

Pat laughed. "I looked you up in the Callbook," he replied.

"A great signal here. Couldn't resist calling you. And I'll be pleased to get your QSL after you get mine."

"Okay, Pat," I replied. "But I sure wish I knew where you are. W6SAI out. 73."

There was no reply. Pat remained a mystery until a few weeks later an airmail envelope from China brought me a snorty QSL from XU1B in Canton, plus a photo of his station. So this was Pat! He was a well-known DXer over the years, but I had never heard him or heard of him.

Years later I visited Hong Kong and asked about Pat. He had lived in Hong Kong the last few years and was now VS6AE. Alas, he had passed away a few months before I arrived. Yes, the QSO with Pat was many years ago, and undoubtedly illegal, but I remember it vividly until this day. I just wish I had had the opportunity to meet Pat in person.

PX1A In Andorra. For some months during 1950 a lot of fellows worked PX1A, supposedly in Andorra, a country notably lacking in radio amateurs. Was PX1A real? He didn't QSL. A photo of his supposed station appeared in a QST DX column. But did he really reside in Andorra? That was the question.

In 1951 I made a DXpedition to St. Pierre & Miquelon and operated for several weeks as FP8AC. On more than one occasion I heard a loud signal sending coded groups of letters and numbers just outside the low edge of 20 meters. On the off-chance I could raise the station, I called "QRZ? de FP8AC." There was a pause, and then the mystery station sent "OK." And that was that. The station was on every other day sending the mysterious traffic.

I forgot about the whole affair until a few weeks later when I mentioned my unusual encounter to an amateur connected with a well-known Washington government agency. He asked for a copy of my FP8AC log covering my transcript of the mysterious messages. When I returned home, I mailed a copy of my log to him. I heard nothing for several months until I received an envelope postmarked Washington. It had no identification on it. Inside was a clipping from a Washington newspaper reporting that Mexican inspectors had raided a hidden radio station in Chihuahua city and arrested a Spanish refu-

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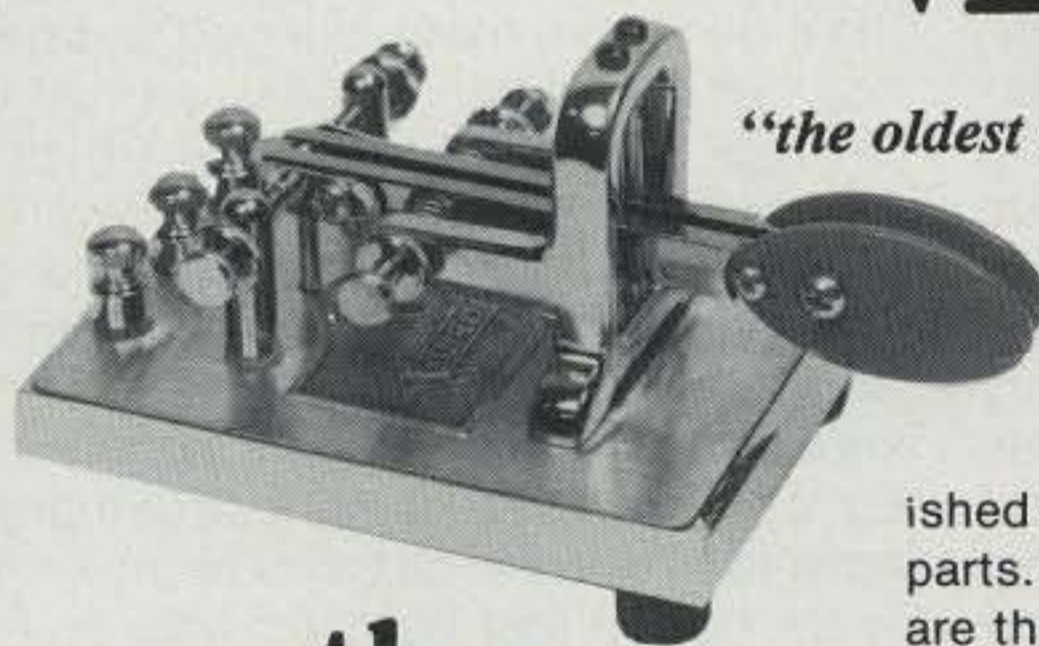
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gee who they said had broadcast coded messages to Russia. The raid revealed code books and "professional radio equipment" from the United States. According to the article the broadcasts were on 13,999 kilocycles.

There was no indication of who had sent me the newspaper article, but written on the bottom of it in pencil was "PX1A"!

Years later on a DXpedition to Andorra I asked Yves, PX1YR, if he had ever heard of PX1A. Yves was a radio serviceman and had a vast knowledge of what was going on in the tiny country. No, he had never heard of PX1A and was sure he had not operated from Andorra. So it seems as if those unsuspecting amateurs who QSOed PX1A were actually working Mexico!

Phan in Vietnam. In the mid-50s, at the height of the Cold War, QSOs with Vietnam were forbidden, unless the operator at the other end was an American citizen licensed by the American Authorities in that country. Since those authorities gave out no amateur licenses, a legitimate QSO with Vietnam was a moot point—except for 3W8AA, who showed up on 7, 14, and 21 MHz with a fine signal. He was a great CW operator and worked a lot of W stations who took a chance on an exotic DX QSO. As far as I know, no one ever got a citation for working him.

In due time I visited the International Telecommunications Union building in Geneva, Switzerland, and I met a bunch of overseas amateurs, including several from Czechoslovakia. One amateur in particular was an avid DXer. He spoke English quite well, and during a lengthy hamfest in the hotel bar, I mentioned my previous QSOs with 3W8AA. He immediately jumped out of his chair, excused himself, and ran for the hotel elevator. He reappeared shortly with a looseleaf notebook and introduced himself as an operator at 3W8AA! We looked through the log book at the many contacts he had made from the Czech embassy in Hanoi. He used a Collins 51J receiver and a hand-made 50 watt transmitter. With a flourish, he produced a handful of 3W8AA QSL cards, walked over to a typewriter in a nearby office, and after checking his log, made out a QSL for me on the spot! Now that's what I call the ultimate courtesy in a QSL card!

Finally, in 1966 (ten years later), I had a legitimate Vietnam QSO with K1YPE/XV5, Bill Porter, who had the clout to get licensed. After all, he was the American Ambassador to Vietnam!

"XX2JQ," the "City of Marseilles." Little did I know when I met John Shirley, ZL2AM, in the 1960s that he had been pre-war ZL2JQ and the operator of the mysterious XX2JQ, who was quite active on 20 meter CW in 1938. XX2JQ was very

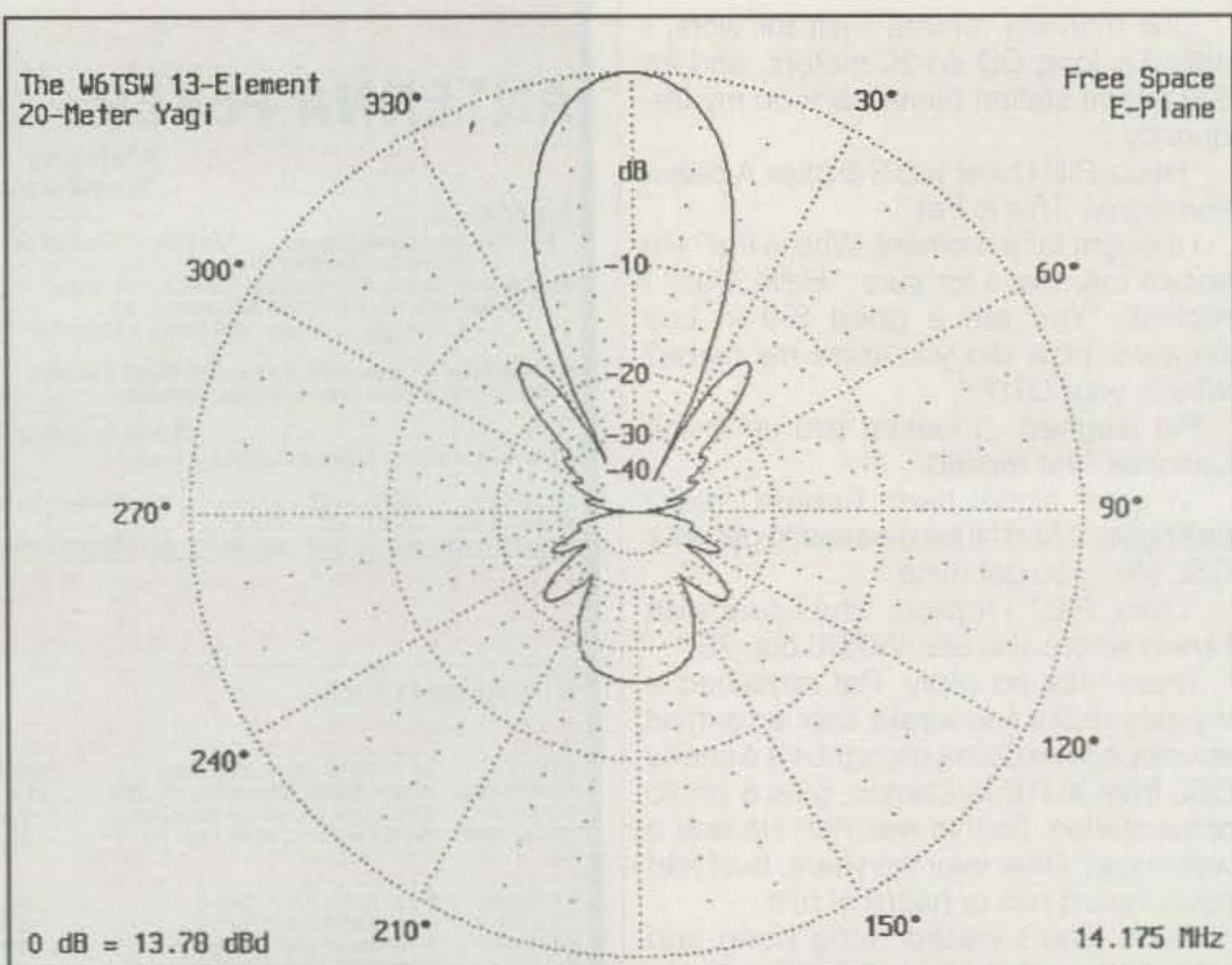


Fig. 3— Eat your heart out! The big signal of W6TSW's 13-element 20 meter Yagi.

coy about his QTH, but some fellows conjectured that he was an operator on a ship in the Atlantic.

Yes, John had been XX2JQ, and the ship was the "City of Marseilles." When I worked him he was in the Mediterranean bound for Calcutta. Shortly thereafter, in 1942, the ship sank at Ceylon. Luckily John wasn't on the ship when it went down. I received my XX2JQ QSL directly from John. It was only 40 years overdue!

4X5RE/Sinai. During the 1957 "Lightning War" with Egypt, the Israeli Army temporarily occupied the portion of the Sinai peninsula that belonged to Egypt. For four days Egon, 4X5RE, was on the air from Sharm-El-Sheikh, the Egyptian town at the tip of the peninsula. He worked 800 stations during the four day period, and as far as I know, was the only station on the air from that desolate place. I don't know whether that contact counted as Egypt or Israel, but it emphasizes that you have to be alert at all times for that exotic DX station that pops up from time to time!

D5FF in Post-war Germany. In 1947 there were plenty of German stations on the amateur bands, but they were all Allied operators. In particular, the bands were full of GIs operating under military-issued DL4 calls. As far as the German civilians went, amateur radio was verboten!

This didn't stop DX-minded German amateurs who had the temerity to skirt the law. One of the best known "pirate" stations was D5FF, who amassed over 150

countries on 14 MHz CW in a few months. Who was he? He was a top-notch operator who knew many DXers by their first names. I imagine D5FF eventually received a legitimate DL call when the Allies relaxed their ban, but as far as I know, no one ever found out who D5FF was. He remains a mystery to this day!

AC4YN, Reg Fox, Mr. DX Himself! The ultimate DX contact from the late 1930s until the late 1940s was Reg Fox, AC4YN, of Lhasa, Tibet. Reg had low power and a poor antenna and was surrounded by the high Himalayas. His antenna was aimed at England for QSOs with his friends and family—a very, very tough contact to make from the USA! And being in Zone 23 made him sought-after by a multitude of avid DX operators!

AC4YN was installed in 1936 by the British Royal Signals as the radio link between Tibet and the Foreign Office in London. The Royal Signals operators (except for Lt. E.Y. Nepean) were not amateurs, and the self-excited rig and two-tube receiver restricted the DX activities of the world's lonliest station to a handful of lucky amateurs.

Post World War II Reg Fox was the only operator left from the old days. He had been an amateur during his stint in India and was eager to get on the air. By 1946 he had a Hallicrafters receiver and a 20 watt portable military rig. He erected a long-wire antenna on tall poles, and suddenly Tibet appeared on the amateur bands on both CW and phone! It was bedlam. But Reg was a good operator

and finally established order from chaos. In a short time his assistant, Bob Ford, got on the air as AC4RF, followed by the radio operator of the Indian Embassy in Lhasa, using the call AC4NC. In fact, for a few weeks all three of them were on the air simultaneously, creating plenty of QRM in Lhasa, as Bob Ford charitably put it.

Unfortunately, Reg Fox soon passed away, AC4NC returned to India, and Bob Ford, AC4RF, was captured and imprisoned by the Chinese Communists for broadcasting "separatist propaganda," meaning he told his contacts he was in Tibet, not the People's Republic of China.

A few years after his release I met Bob Ford in Washington, and he told me something of his ordeal. He had a particularly difficult time explaining a DX contest in which he exchanged numbers with the DXer. Obviously, some sinister plot was afoot in which Bob was sending coded messages about military troop movements to the enemies of China. No doubt.

Bob wrote a book about his experience in Tibet and China. It was called *Wind Between the Worlds* and was published by David McKay Co., Inc. (New York, 1957). Long out of print, the book may possibly be found in a second-hand book store. Look for it! It's a fascinating story of adventure and adversity!

Bob eventually retired from the British foreign service, but his whereabouts are unknown. Does he have a "G" license? I would like to know.

KC4USN at the "Bottom of the World." Yes, KC4USN was literally at the bottom of the world, at the geographical South Pole in Antarctica. Nowadays, with satellite communication, you don't hear much activity from that part of the world. For a period of time, however, there were plenty of stations operating from Antarctica. KC4USN was a hot item, as it was as far south as one could get! Because of the peculiar QTH, the KC4USN signals came in at odd times of day with a peculiar echo. Once you heard the signal, you would never forget it! While KC4USN may be gone, there's still scientific activity at the Polar base. Maybe one day an amateur will show up there again, sending a thousand keys into action calling this rare station!

My First QSO. I'm sure every amateur remembers his first QSO. I am no exception. I was licensed in high school (W2HCE), and as far as I knew, I was the only active (or soon to be active) amateur in town. I built up a low-power 160 meter phone transmitter, erected a Marconi antenna, and was eager to QSO all the amateurs I heard on the band.

To my chagrin, I received no answers to my CQ calls, nor did stations come back when I called them! I was despondent. Viewing those black days from these days, it is easy to see my problem.

I had vastly overestimated my power-supply capability, and instead of a 15 watt phone carrier, my output was about 3 watts! And my Marconi antenna was badly out of tune. In effect, I was talking to myself. After painstaking effort over a two- or three-week period, I finally managed to get things in working order, and one sparkling day in June I called W2FDA (Joe, about 5 miles away) and *he heard me!* I received an R5 report. Not very good, to be sure, but I was on the air and on the way. Once I was able to make contacts, I received plenty of technical assistance from friendly amateurs and soon had a fine signal on the band. But W2FDA was the amateur who broke the ice for me, and I'll never forget him!

The YO 6.0 Yagi Optimizer

There are several nifty computer programs on the market that analyze antennas of all types. One in particular, YO 6.0 by Brian Beezley, K6STI,² is concerned with Yagi antennas. It permits the user to assign design goals and optimizes the antenna in question to approach these goals.

YO 6.0 provides a fascinating new way to experiment with element lengths and positions. Simply grab an element with

your mouse and stretch it or move it! Because of YO's great speed, the patterns, element current profile, and performance figures change instantly and continuously as you vary your antenna's geometry.

YO.6 comes with NEC/Yagis 2.0, which implements the reference-accuracy Numerical Electromagnetics Code. NEC is used to verify YO designs and to model large rectangular arrays of Yagis. You can vary stacking distance and watch the patterns change on the screen.

Unfortunately, YO.6 won't build the beam for you. You have to assemble the aluminum and do that yourself! But YO.6 tells you where to hacksaw the aluminum! You'll need a PC with 386+387 or better, VGA, and 1.44 MB disk drive. With YO 6.0 you can design a really big Yagi such as the 13-element, 20 meter Yagi at W6TSW (fig. 3).

Footnotes

1. "Broadcast Engineering" is a publication of Intertec Publishing, 9800 Metcalf Rd., Overland Park, KS 66212-2215.

2. YO 6.0 is available from Brian Beezley, K6STI, 507 1/2 Taylor St., Vista, CA 92084 (619-945-9824).

73, Bill, W6SAI



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OUR READERS SAY

Closure of Radio Room And GB2SM, Kensington, London

Editor, CQ:

I would like to draw your attention and that of your readership, if I may, to the closure of the Radio Demonstration Room and the Radio Amateur Station GB2SM in the Science Museum here in London. That will happen on November 7, 1994. No reason has been given for the impending closure.

The closure of the Radio Room will mark the end of 38 years of live demonstrations of wireless and two-way communications. Over this period the Radio Room has played host to many young children, school parties, interested parents, visiting radio amateurs from the UK and abroad, and for many others has provided answers to questions ranging from satellite broadcasting, aerial construction, addresses of local and overseas clubs, specific radio theory, and the capabilities of amateur radio.

The callsign GB2SM has achieved a significant international following, and many countries have set up similar radio demonstration rooms based on the Radio Room at the Science Museum. Many a visitor to the Radio Room has come away impressed with the aim of becoming an electronics engineer (myself among them).

As a volunteer demonstrator at the Radio Room I am particularly dismayed, as this will mean that young schoolchildren and aspiring radio amateurs and engineers will no longer have the easily accessible opportunity to witness radio principles and practices first hand. It does lead me to question if the museum authorities are aware of the possible technological loss to the UK by this action.

If any of your readers should decide to write in with their views, the Director of the Science Museum is Sir Neil Cossons, O.B.E., and the Chairman of the Trustees is Sir Austin Pearce, C.B.E. Both are directly influential in formulating policy for the museum. The address is The Science Museum, Exhibition Road, London SW7 2DD, England U.K. Thank you very much for your time and support.

Chris Nicholas, GØLZV
Bushey, Herts, England

A Few Thoughts

Editor, CQ:

I have been a subscriber to your magazine for two years now. I really enjoy the content. I wanted to drop you a short note with a few ideas.

Are you waiting for your callsign? At the beginning of our local amateur radio club meetings (Poughkeepsie ARC), we customarily go around the room to introduce all our members. At our May 1994 meeting a couple was sitting to my left who arrived after this had been done. The gentleman, Jerry, had just passed the No-code Tech



Morse Street, Edgartown, Massachusetts.

test and was waiting for his callsign from the FCC. His wife had accompanied him on the trip. He asked me what to put on the club application where it said "callsign." I said to just put down waiting. A few moments later our club president (Greg, WA2JPU) was welcoming three new members to the PARC. As he read Jerry's application, he hesitated for about 10 seconds and said "WA1TING" thinking that Jerry was from one-land and was issued a new 2x4 callsign. Naturally, we had a good laugh at his expense.

Samuel Morse found on Martha's Vineyard. While on vacation this July I was walking through Edgartown with my XYL and three children and happened upon Morse Street. Naturally, I could not resist the picture. My call is N2QMO, and I became a ham two years ago. I'm active on HF and VHF and really do enjoy the hobby. By the way, the real home of Samuel Morse is located in Poughkeepsie, New York. Each year on Morse's birthday the Poughkeepsie Amateur Radio Club operates a special events station from the Morse estate on Memorial Day weekend.

73 and "May the Code Be With You."

Timothy Sweeney, N2QMO
Pleasant Valley, NY

Makes The Heart Beat Faster

Editor, CQ:

I've been reading CQ for years and years, but this is the first time I have ever written to the editor! I just wanted to say hello and thanks for the many interesting editorials.

Ham radio is fun. I get on 40 meters phone almost every day and talk to some

old friends. One of these friends I first started talking to on CW when we were both Novices back in 1972. We are still talking today after 22 years.

What I really enjoy doing now is CW between 13 and 17 wpm, almost all on 30 and 40 meters. I often run an old Ten-Tec Century 21 made in 1978 at 20 watts output. Now that's *really* fun!

I have a Kenwood 140 to use on phone and the WARC bands. Antennas are an R5 and some inverted Vees. I don't use any baluns, traps, or tuners—real simple antennas and operation (no amplifier). I enjoy working the SS contest and Field Day both on CW, but I don't bother to send in my puny score—ha! It's just fun to use CW. Phone has become a little boring, and CW gets my old heart to ticking faster sometimes.

Well, I guess I'll close now. Keep on reminding the guys that amateur radio is supposed to be *fun*, and you can still have loads of fun with a little CW rig and a simple antenna.

Larry Brandon, KC5ND
Mesquite, TX

Crystal Clear

Editor, CQ:

I've not read CQ for a long while. Picked up a copy at a newsstand while on vacation in Yellowstone National Park. I think the article "A Coaxial Offset-Feed Method . . ." by Guler and Joy in the August 1994 issue is a model of what a well-written, technical magazine article should be—crystal clear and fact-filled!

Congratulations to you and to them!

Lloyd H. Yost, K2YJP
Shrewsbury, PA

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SL-11R	•	•	7	11	2 $\frac{5}{8}$ x 7 x 9 $\frac{3}{4}$	12
SL-11S	•	•	7	11	2 $\frac{5}{8}$ x 7 $\frac{5}{8}$ x 9 $\frac{3}{4}$	12
SL-11R-RA		•	7	11	4 $\frac{3}{4}$ x 7 x 9 $\frac{3}{4}$	13

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RS-4L	3	4	3 $\frac{1}{2}$ x 6 $\frac{1}{8}$ x 7 $\frac{1}{4}$	6
RS-5L	4	5	3 $\frac{1}{2}$ x 6 $\frac{1}{8}$ x 7 $\frac{1}{4}$	7

RM SERIES



MODEL RM-35M

• 19" RACK MOUNT POWER SUPPLIES

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RM-12A	9	12	5 $\frac{1}{4}$ x 19 x 8 $\frac{1}{4}$	16
RM-35A	25	35	5 $\frac{1}{4}$ x 19 x 12 $\frac{1}{2}$	38
RM-50A	37	50	5 $\frac{1}{4}$ x 19 x 12 $\frac{1}{2}$	50
RM-60A	50	55	7 x 19 x 12 $\frac{1}{2}$	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5 $\frac{1}{4}$ x 19 x 8 $\frac{1}{4}$	16
RM-35M	25	35	5 $\frac{1}{4}$ x 19 x 12 $\frac{1}{2}$	38
RM-50M	37	50	5 $\frac{1}{4}$ x 19 x 12 $\frac{1}{2}$	50
RM-60M	50	55	7 x 19 x 12 $\frac{1}{2}$	60

RS-A SERIES



MODEL RS-7A

MODEL	Colors		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
RS-3A		•	2.5	3	3 x 4 $\frac{3}{4}$ x 5 $\frac{3}{4}$	4
RS-4A	•	•	3	4	3 $\frac{3}{4}$ x 6 $\frac{1}{2}$ x 9	5
RS-5A		•	4	5	3 $\frac{1}{2}$ x 6 $\frac{1}{8}$ x 7 $\frac{1}{4}$	7
RS-7A	•	•	5	7	3 $\frac{3}{4}$ x 6 $\frac{1}{2}$ x 9	9
RS-7B	•	•	5	7	4 x 7 $\frac{1}{2}$ x 10 $\frac{3}{4}$	10
RS-10A	•	•	7.5	10	4 x 7 $\frac{1}{2}$ x 10 $\frac{3}{4}$	11
RS-12A	•	•	9	12	4 $\frac{1}{2}$ x 8 x 9	13
RS-12B	•	•	9	12	4 x 7 $\frac{1}{2}$ x 10 $\frac{3}{4}$	13
RS-20A	•	•	16	20	5 x 9 x 10 $\frac{1}{2}$	18
RS-35A	•	•	25	35	5 x 11 x 11	27
RS-50A	•	•	37	50	6 x 13 $\frac{3}{4}$ x 11	46
RS-70A	•	•	57	70	6 x 13 $\frac{3}{4}$ x 12 $\frac{1}{8}$	48

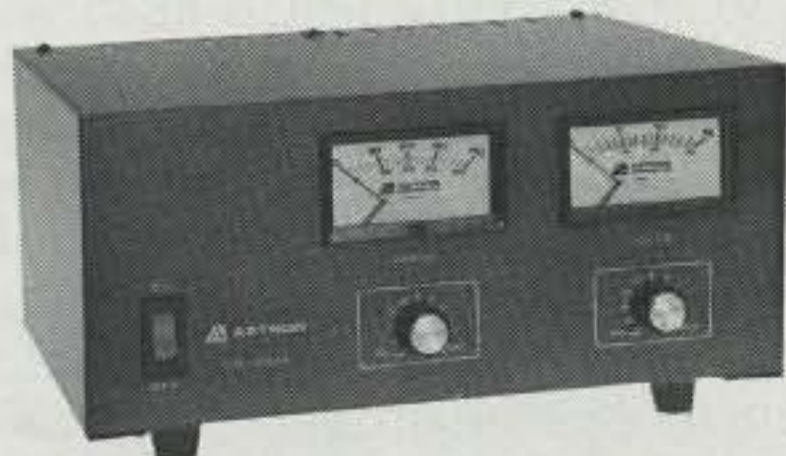
RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4 $\frac{1}{2}$ x 8 x 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 x 9 x 10 $\frac{1}{2}$	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 $\frac{3}{4}$ x 11	46
RS-70M	57	70	6 x 13 $\frac{3}{4}$ x 12 $\frac{1}{8}$	48

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	@13.8VDC	@10VDC	@5VDC			
VS-12M	9	5	2	12	4 $\frac{1}{2}$ x 8 x 9	13
VS-20M	16	9	4	20	5 x 9 x 10 $\frac{1}{2}$	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13 $\frac{3}{4}$ x 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5 $\frac{1}{4}$ x 19 x 12 $\frac{1}{2}$	38
VRM-50M	37	22	10	50	5 $\frac{1}{4}$ x 19 x 12 $\frac{1}{2}$	50

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MODEL RS-12S

• Built in speaker

MODEL	Colors		Continuous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
RS-7S	•	•	5	7	4 x 7 $\frac{1}{2}$ x 10 $\frac{3}{4}$	10
RS-10S	•	•	7.5	10	4 x 7 $\frac{1}{2}$ x 10 $\frac{3}{4}$	12
RS-12S	•	•	9	12	4 $\frac{1}{2}$ x 8 x 9	13
RS-20S	•	•	16	20	5 x 9 x 10 $\frac{1}{2}$	18
SL-11S	•	•	7	11	2 $\frac{3}{4}$ x 7 $\frac{5}{8}$ x 9 $\frac{3}{4}$	12

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we present USA-CA recipient:

**Clarence Story, KA6SWI
USA-CA #829, 1-20-94**

"I received my Novice ticket in the early 1970s using a Hallicrafters SX-1 17 and a Heath transmitter. After reading so much of DX and adventure afar, I got on the straight key and put out a call, thinking of China or some far away country. I copied the return call of an amateur down the street whom I didn't know lived there. I could have hit his house with a three iron.

"I moved on to Eureka, California in 1976 and let barn radio slide for a few years. In the early 1980s I got interested again and upgraded from Novice to General. In 1985 I upgraded to Advanced, and this last fall I upgraded to Extra Class. My XYL also upgraded to General (her call, KE6FBE), and we hope to put out some counties this summer.

"I graduated from the University of Oregon in 1973, and for the last few years I have been a project engineer in a pulp mill. I am also president of the local motorcycle club and publish a monthly newsletter. Carolyn graduated from Oregon University in 1970 and taught school for a while before becoming a homemaker and raising three daughters.

"I was looking for a particular state in January of 1984 and worked KB8KW in Wyoming. I liked the way the county hunters behaved and their camaraderie. I didn't approve of the antics in the DX portion of the band and liked the gentlemanly way business was handled on 14.336. The thought of working all the counties intrigued me, and I thought this was something that would take time to finish.

"I decided to start mobiling. The first afternoon I was really nervous. With the help of KB5FU as net control, I ran my home county of Humboldt and then Trinity county. Now 2400 mobile contacts later with 250 different counties and 19 states, and my first-time mobile out of state, QRM from Los Angeles came on 14.335 and ruined that afternoon.

"The summer of 1988 our family took a two-week vacation to Nebraska looking at historical sites and putting out counties. When I pulled up on the Kimbal/Banner line in Nebraska, three young people were very upset, as it was hot. Some people just aren't as enamored with county hunting as the rest of us.

"Back in 1986 or 1987 my brother, who lives in Ray, Montana (Fergus) went over

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		KJ5PQ	0948
1000		3000	
KM6QF	1328	KM6QF	0868
KJ5PQ	1329	KJ5PQ	0869
WA5QNH	1320		
1500			
KM6QF	1113		
KJ5PQ	1114		

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers 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 Magazine, 76 North Broadway, Hicksville, NY 11801 USA for \$2.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

to the junction of 191 and 19 to have lunch. Coming out of the restaurant, by chance he struck up a conversation with a guy who had a ham antenna on his car. The amateur happened to be Ben, W6PXE, so just on a long shot my brother asked Ben if he knew KA6SWI. Well, Ben did through the county hunters net and then on the air. Ben informed me of meeting my brother by chance. On our trip in 1988 we drove up to Fergus county with nothing but antelope and missile silos to look at. After having breakfast at the same restaurant with my brother, I heard Ben work his last county for the whole ball of wax—small world.

"Also the summer of 1988 I went to the mini in Marysville, Washington. It was my first time meeting some other county hunters, and I had a great time. I met KB7QO, WA6OCI, N7TT, and W7GVF. Speaking of N7TT (John), all these years I have been listening to the mobiles put out a call and have always heard N7TT get a 59 report. Also through the years I have worked KB7QO in 50 states.

"The summer of 1991 we took some time and ran counties through Arizona, Colorado, and New Mexico. My dad, an old-time CBer, went out with me. We left Santa Fe early one morning to run counties. After I checked in with NV6L, net control, she called for me to run. I put out a call for mobiles and DX, and my first con-

SPECIAL HONOR ROLL

Pat Reiner, KM6QF
USA-CA All Counties #845
August 5, 1994

Cheryl Mohon, KJ5PQ
USA-CA All Counties #846
August 27, 1994

tact was G4YKR. The second contact was JH8CLU. My dad almost fainted. He didn't realize a mobile could work those kinds of distances.

"One weekend back in the late 1980s we took off to run counties in eastern California. It was one of those days when propagation was just for the east coast folks. I think I made about five contacts all day. No one could hear the west coast.

"The summer of 1993 we took a two-week trip to Tennessee and made lots of contacts. I want to thank Mary, NV4Z, for saying hi every morning and for the nice phone chat when we were in Shelby county, Tennessee.

"The last few years we have operated out of an Astro Van with an ICOM 730 and a modified Hustler. The Hustler has a Bill Bell, KM4W resonator, and the length has grown with help from Tim, N9DEH, giving me some pointers years ago.

"It took exactly ten years to get my number. I want to thank WA3QNT for running Greene, Pennsylvania for the last.

"I also want to thank all of the net controls and mobiles for their efforts and all the nice folks on the county hunters net.—73, Clarence, KA6SWI."

Awards Issued

Two young ladies (YLs) are our latest recipients of CQ's USA-CA award. Pat Reimer, KM6QF, and Cheryl Mohon, KJ5PQ, both submitted complete record books to qualify for USA-CA #845 and USA-CA #846, respectively. Of special note is that our last three recipients have been YLs. I understand that the next one to submit documentation will also be a YL. Congratulations.

Three amateurs submitted records books to receive their basic USA-CA 500 certificates. They are Lloyd S. Smith, N1OAZ, USA-CA 500 #2787; Martin Bluhm, W8AKS, USA-CA 500 #2788; and Jack Wagoner, WB8FSV, USA-CA 500 #2789.

Rudy J. Duchan, WA5QNH, moved up

to USA-CA 1000 #1320 to round out our list of recipients.

Award News

Sherlock Holmes Award. The German section of the International Police Association Radio Club announced the appointment of a new award manager for their Sherlock Holmes Award. He is Horst Schonke, Markt 15 D-39261 Zerbst, Germany. Information on the award can be obtained for an SASE.

Worked All California Counties. The Worked All California Counties (WACC) award has been around for many years. It is not a new award. Until 1989 this award was sponsored by the Oakland Radio Club. In 1989 the job of administering the



Worked All Wyoming 23 Counties Award.

application. The purpose of the award is to encourage amateur radio activity within Wyoming, and between Wyoming amateurs and "the rest of the world."

The award is available by filling out an application and mailing it to P.O. Box 1721, Laramie, WY 82070, or by handing it in person to Bill, K7AP, or Wayne, NQ7Q. (The applications are also available from K7AP or NQ7Q with an SASE.) In today's world with multiple green stamps required for many DX QSLs and for various awards, you will be happy to know this one only costs a 9 x 12 SASE.

73, Norm, WA3RTY

WORKED ALL CALIFORNIA COUNTIES AWARD

The All California Counties Award.

award was assumed by the Northern California Contest Club. For the next several years this was handled by Phil Frazier, K6ZM. When Phil became a Silent Key a few years ago, Ken Anderson, K6PU (P.O. Box 853, Pine Grove, CA 95665) picked up the award and has been managing the program ever since. Information on the award is available from K6PU for an SASE.

The Worked All Wyoming Counties Award. Have you talked to amateurs in all of the counties of Wyoming? Are you a county hunter? Do you like interesting wall paper? Would you like a little challenge? If any of these apply to you, perhaps you might like to give the Worked All Wyoming Counties Award a try. No cards need to be submitted, but you must certify that you actually worked each county on the air. Expected are good on-the-air and in-the-log ethics, and the award management reserves the right to reject any

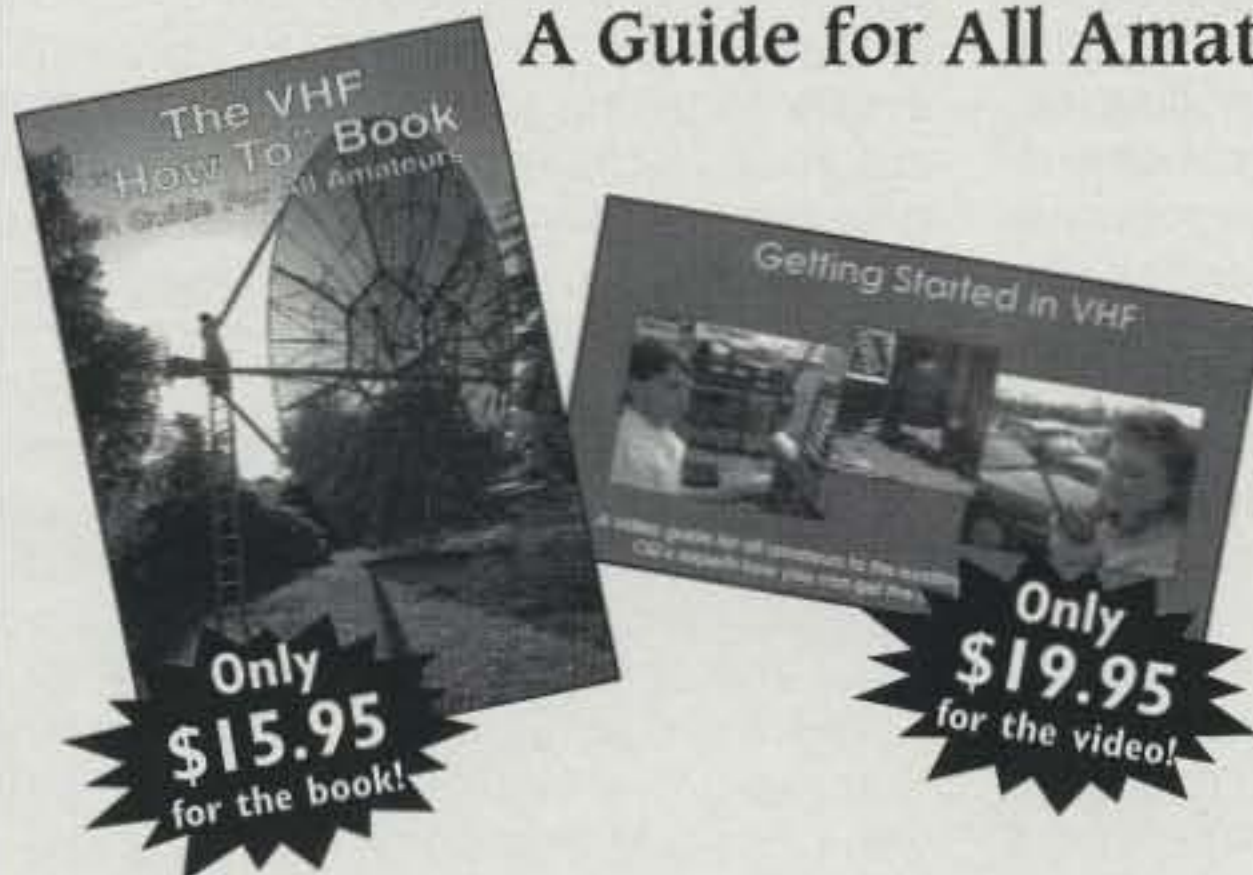
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WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

Frequently Asked Questions About Amateur Radio

The following are some of the questions about amateur radio we hear most often.

What is Amateur Radio? Ham radio, as it is often called, is a hobby. It is a non-commercial radio communication service the primary aims of which are public service, technical training, experimentation, and leisure communication between private persons. Amateurs are noted for providing communications in times of emergency or disaster. Amateur radio exists in nearly every country and on the same frequencies. This allows amateur radio operators to communicate internationally.

Who can become an amateur? Anyone can become an amateur except representatives of foreign countries. There are no age restrictions. If you can pass the written and Morse code tests, you can be a licensed amateur radio operator. Morse code proficiency is required for most of the license classes, but not for the beginning "No Code Technician" license. To become a "Technician" Class operator, you need only pass two very simple multiple-choice written tests (exam Elements 2 and 3A) to obtain your FCC license.

Where can I locate information and study material on amateur radio? Your local Radio Shack store sells some ham radios and amateur radio license preparation manuals. Books can also be obtained through the mail from amateur radio organizations such as W5YI in Dallas, Texas (toll free 1-800-669-9594) and the ARRL in Newington, Connecticut (203-666-1541). A combined Element 2 (Novice) and Element 3A (Technician) study manual costs less than \$10.00. Be sure you get the most current questions. The current question pool expires on June 30, 1997. It is also a good idea to obtain a copy of the FCC Part 97 Regulations. Study material is also available that will run on your personal computer.

How much does it cost to take a license examination or to buy a radio? There is a small examination charge (less than \$6 currently) to be administered the examinations necessary to obtain any of the five amateur radio licenses. This money goes to cover the cost of administering and processing the paperwork. Most new amateurs start with a 2 meter handheld transceiver which costs anywhere from \$150 to \$300—even less if you buy

a used one. Multiband transceivers which require separate antennas are more expensive.

Where can I take the tests? Amateur radio license testing is conducted under the supervision of Volunteer Examiner Coordinators (VECs). The examinations are given by teams of three qualified Volunteer Examiners (VEs) who volunteer their time to help the amateur service grow. There are 18 VECs, but 90% of all amateur radio testing is conducted by only two of them. The ARRL-VEC can be reached at 203-666-1541, extension 282; the W5YI-VEC at (toll free) 1-800-669-9594. Amateur radio testing is available in just about every city in the United States, and in many foreign countries as well.

What are the tests like? The written tests are based on known multiple-choice questions. There are no secret questions. In fact, passing an amateur radio test is similar to taking the written portion of an automobile driver's test. You study the questions and you pass the test. It's as simple as that! The VEs will select a few questions (about 10%) from each of nine topics for the exam. The beginning Element 2 and Element 3A test contains a total of 55 questions. Answer 75% correctly and you pass! You get a credit certificate (which is valid for a year) if you pass one of the tests but not the other.

There are actually two paths into amateur radio. The Novice route requires that you pass a Morse code receiving test in addition to written Element 2. The beginning code exam consists of transcribing recorded Morse code text at a speed of 5 words per minute. The test will last about 5 minutes. You pass if you copy 25 characters in a row correctly (1 minute) or if you answer 7 out of 10 questions about the transmission. The Morse code examination must contain all 43 different characters. These are the 26 alphabet letters, numbers 0-9, the comma (,), period (.), slant bar (/), question mark (?), double-dash prosign (BT), end-of-message prosign (AR), and the end-of-contact prosign (SK). The letters count as one character; all others count as two characters.

What can I do with an amateur radio license? There are so many things that it's a difficult question to answer. Here, however, are some ideas.

- Talk to people in foreign countries. DXing is a favorite of many amateurs!
- Talk to people (both local and far away) on your drive to work.
- Help in emergencies and natural disasters by providing communications.

- Provide communications in parades or walkathons and other public service events.

- Help other people become amateurs ("Elmering").

- Hook your computer to your radio and communicate "computer to computer."

- Collect QSL cards (cards from other amateurs) from all over the United States and foreign countries and receive awards.

- Participate in contests or Field Day events.

- Provide radio services to your local Civil Defense organization through ARES (the Amateur Radio Emergency Service) or RACES (Radio Amateur Civil Emergency Service).

- Aid members of the US military by joining MARS (Military Affiliate Radio System).

- Participate in transmitter hunt games and maybe build your own direction-finding equipment.

- Have someone to talk to on those sleepless nights at home.

- Receive weather pictures via satellites.

- Build radios and antennas, and learn some electronics and radio theory.

- Talk to astronauts in space, or use the moon to bounce signals back to people on the Earth.

- Experiment with Amateur TV (ATV) and Slow-Scan TV (SSTV), or send still-frame pictures by facsimile.

- Lash your amateur radio to the public telephone system and call your friends toll free (auto patching).

- Experiment with amateur satellite communications. (There are many in orbit that are owned and operated by the amateur community, and you can use them without any cost whatsoever!)

This is only the beginning! You are limited only by your own imagination and ingenuity.

What can't I do with an amateur radio license? Amateur radio is just that—amateur. It is a personal radio service and not a business radio service. That does not mean, however, that you cannot transact your own personal business—such as ordering a pizza or making a hotel reservation—over the amateur airwaves. You just cannot conduct profit-making business communications for yourself or your employer. Personal and public service communications with a business component are allowed, such as providing communications without compensation for a commercial event.

National Volunteer Examiner Coordinator,
P.O. Box 565101, Dallas, TX 75356-5101
(817-461-6443)

PPPPPPPPPP (3)	AAAAA (3)	RRRRRRR (3)	III (3)	SSSS (7)	
1 1 3 1 3 1 1 3	1 1 3 3	1 1 3 1 1 3	1 1 1 3	1 1 1 1 1 7 = 50	
(a)	(b)	(b)	(b)	(b)	(c)
(a) Intra-character	(b) Between character		(c) Between word		

Fig. 1—The word PARIS is the 50 count standard for CW code speed (see text).

Amateurs are also prohibited from transmitting music, communications facilitating a criminal act, obscene or indecent words, false or deceptive messages or signals, and transmissions for compensation.

As a general rule, communications which could reasonably be furnished through other radio services, notices concerning sale or trade of amateur station equipment, and retransmissions of government provided space shuttle, propagation, and weather forecast broadcasts are permitted, but not on a regular basis.

I'm interested. Who will help me?

There are amateurs who are willing to become "Elmers" (mentors, helpers). Look around and ask amateur radio operators in your neighborhood. Search out local radio clubs. There is also a lot to be said for exploring on your own. Everything you need to know to become a licensed amateur radio operator is readily available via the mail-order self-study route. It really is

not that difficult to do. You might want to listen to how amateur radio operators communicate by setting your radio scanner to the 2 meter (146 to 148 MHz) band. This is the most popular amateur band, and where most people begin their amateur radio career.

Should I build my own equipment or antenna? "Homebrewing" is a fun and educational part of amateur radio. It is a thrill to build your own transmitter and put it on the air. However, building your own equipment can be quite complicated, especially if you don't have electronics experience. Today most new amateurs purchase their first rig. Building an antenna is a much simpler project. Most beginner amateur radio books describe how to build different types of antennas. When building or even understanding antennas, it is good to know the relationship between the antenna element length and the frequency or wavelength for which it is designed.

You do not need a huge antenna or tow-

er such as ones you may see around your neighborhood. Large beam antennas and 60 foot towers are very expensive. As a beginner, a simple dipole antenna is perfectly adequate. As you gain experience (and money), you may want to invest in something bigger.

What are the different US amateur classes and what can each of them do?

Novice has CW (Morse code) privileges on four HF bands (80, 40, 15, and 10 meters), plus voice privileges on 10 meters and two VHF/UHF bands (220 MHz and 1290 MHz). You must pass a 5 wpm Morse code test and 30-question Novice test to obtain this license.

Technician has full privileges on all VHF/UHF bands above 30 MHz. You must pass the 30 question Novice (Element 2) and 25-question Technician (Element 3A) test. Technicians may access Novice HF bands by passing the 5 words-per-minute Morse code test.

General has all Technician privileges,

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plus gains access to at least a portion of every band authorized to the amateur service—including CW (Morse code) and voice on 160, 80, 40, 30, 20, 17, 15, 12, and 10 meter bands. A General Class amateur can administer Novice and Technician Class examinations. Requirements: You must pass a 13 wpm Morse code test plus the Novice (Element 2), Technician (3A), and 25-question (Element 3B) General Class written exam.

Advanced gains all General privileges, plus wider band access on the 80, 40, 20, and 15 meter phone bands. Advanced class amateurs can also administer tests to Novice and Technician applicants. Required are the 13 wpm Morse code test, Novice, Tech, General written exams plus a 50-question (Element 4A) Advanced test. The Advanced test is very technical in nature and is considered to be the most difficult of the five written tests.

Amateur Extra has full power and frequency privileges on all amateur bands. Amateur Extra Class operators may also proctor all of the amateur tests. You must pass the 20 wpm Morse code test, plus the Novice, Tech, General, Advanced, and a 40-question (Element 4B) Extra test to become an "Extra."

What is the best way to learn Morse Code? This is becoming an increasingly common question as many "no-code" Technicians realize they can add more privileges to their license if they learn Morse Code. The following list of sug-

gestions should be helpful in finding ways to approach the effort.

- Listen to code at a rate faster than you can copy.

- Develop a "copy buffer"—that is, copy behind. Listen to two or more characters before you write down the character on paper. This is not easy, but it's how the higher speeds are attained.

- Practice whenever you get a chance! Thirty minutes a day is better than 2 hours a week.

- Avoid the "deciphering" plateau that occurs around 5 wpm and the character plateau at 10 wpm by listening to the fast Farnsworth-paced "beat" of each letter and the "beat" of common words.

- Practice both with headphones and "open-air" copy, as the code test may be in either format.

- Most of all, don't give up! Recognize when you reach plateaus and keep trying until you break through them.

What is the standard for measuring Morse Code speed? The word PARIS was chosen as the standard length for a CW code word, and thus code speed. Each dit (dot) counts for one count, each dah (dash) counts for three counts, intra-character spacing is one count, between-character spacing is three counts, and between-word spacing is seven counts. The word PARIS is exactly 50 counts (see fig. 1). Every fifty counts is recognized as a word. The number of times that the word PARIS can be transmitted in one minute

equals the code speed. The "Farnsworth" method is accomplished by sending the dits and dahs and intra-character spacing at a higher speed, then increasing the between character and between word spacing to slow down the sending speed to the desired speed.

How long does it take for my license to arrive from the FCC? Right now it is taking up to three months from the date of testing, but this is about to change dramatically! The VECs are embarking on electronic filing of FCC Form 610 Amateur Radio Operator applications. This could reduce the time to less than a week! Data-entry clerks at the various VEC offices will be keying in the application information and transmitting the data over the phone lines to the FCC's licensing facility in Gettysburg, Pennsylvania. The FCC will process the application that night and issue the application as early as the next day!

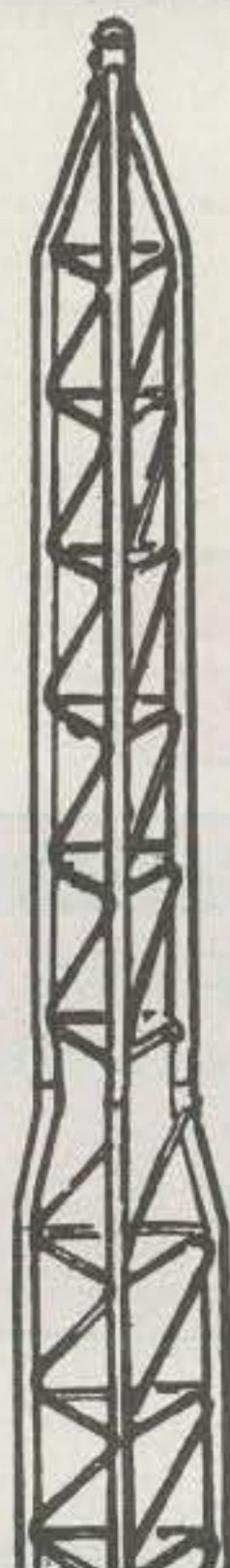
How can I become a Volunteer Examiner? You can set up your own amateur radio operator license testing sessions if

- You are at least 18 years old,
- have at least a General Class operator license,
- have a clean radio enforcement record, and;
- you are not in the amateur radio preparation or equipment business.

Contact either the ARRL-VEC or W5YI-VEC (at 1-800-669-9594) for an application form.

73, Fred, W5YI

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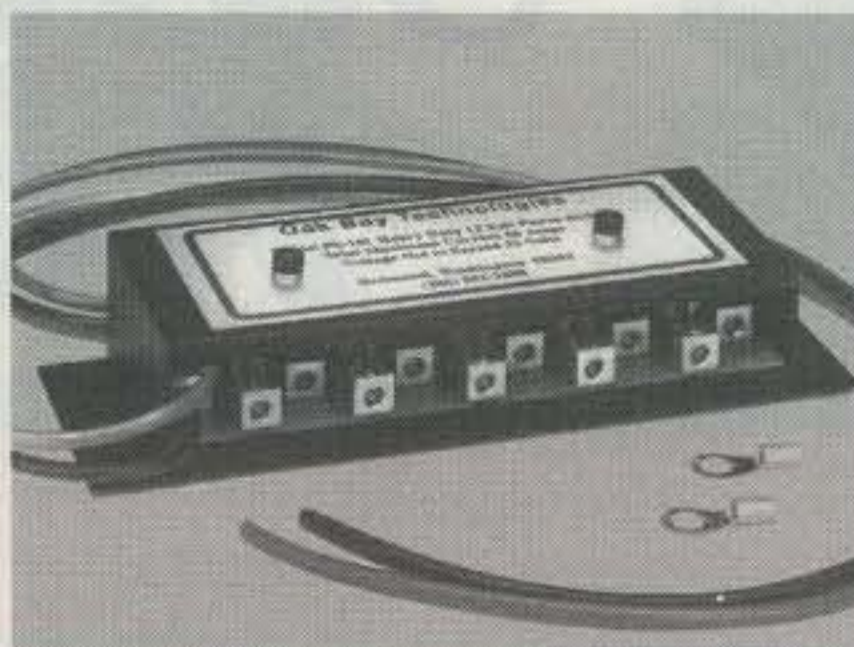
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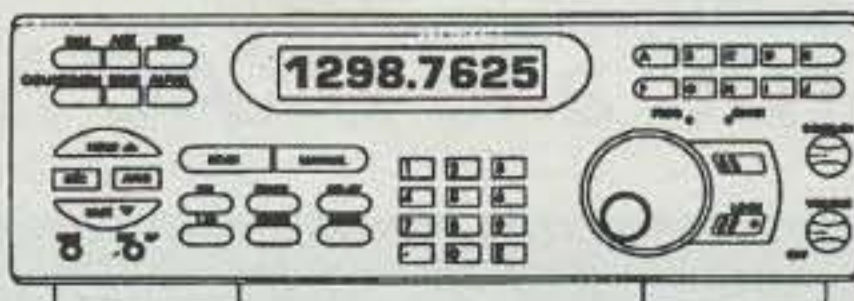
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NEWS OF COMMUNICATION AROUND THE WORLD

DXCC and DXAC News

While the bands have been relatively quiet lately, the volume of DX news hasn't declined with the sunspots. Between the DXCC desk and the ARRL DX Advisory Committee (DXAC), there are several items worthy of our attention this month. In addition, the CQ WW DX Contests are inspiring many DXpeditions, despite the low solar activity.

P5RS7

The hottest news item is the rejection by the DXCC of the **P5RS7** North Korea DXpedition. This operation by Romeo Stepanenko and friends has been under DXCC review for almost two years. The news release on this announcement reads:

"While reviewing the original [P5RS7] documentation and photographs, DXCC staff noted some apparent discrepancies. DXCC staff then requested some additional information. After more than one year, additional information was received.

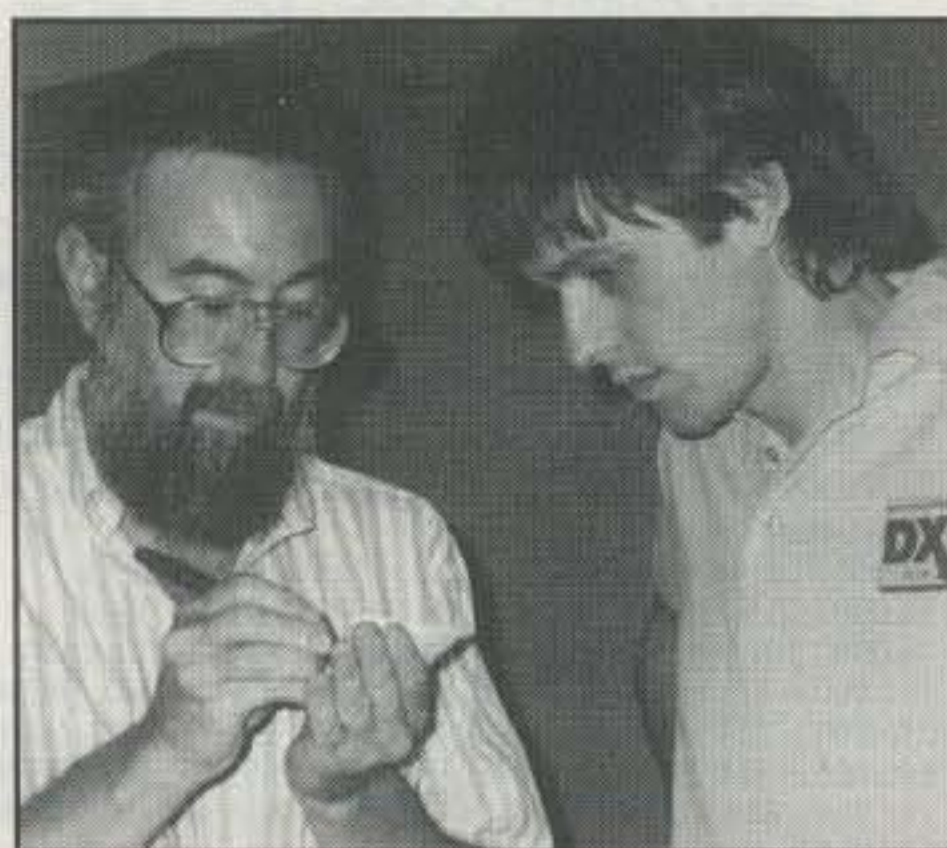
"During that year, the ongoing investigation into the paperwork and photographs suggested that the operation may have taken place from another location. Documentation in support of P5RS7 accreditation did not establish that operating permission had been granted by appropriate authorities, nor did it establish that the operation took place from the territory of North Korea.

"After reviewing all available information, there will be no DXCC credit for the P5RS7 operation, and the file has been closed. This determination is based upon Section I, 7) and 12) of the DXCC rules."

(Section I. 7 says that any amateur radio operation should take place only with the complete approval and understanding of appropriate administration officials. I. 12 concerns operations ethics, specifically documentation submitted for DXCC accreditation.)

Translating this news release into English, we find that the members of the Awards Committee at ARRL Headquarters were not convinced that Romeo actually operated from North Korea, nor did he have operating permission from the North Korea telecommunications authorities. (The Awards Committee is a quasi-secret group of active operators at ARRL Headquarters that reviews DXAC decisions and contest disqualifications, among other duties.)

P.O. Box 50, Fulton, CA 95439

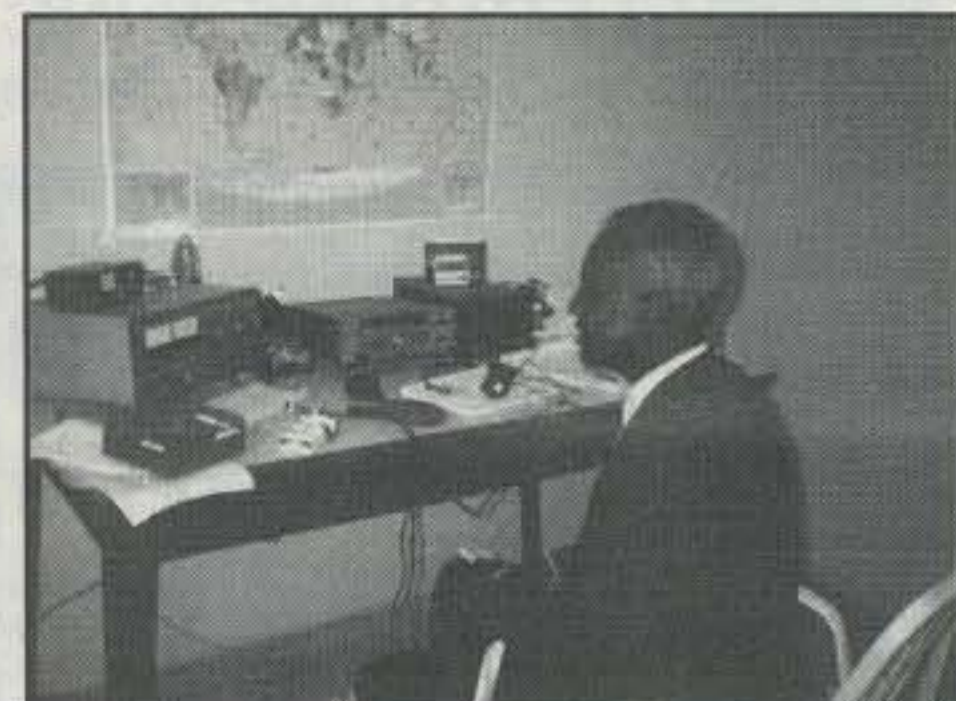


Your DX editor confers with Romeo Stepanenko, 3W3RR, about possible future DXpeditions.

Such accreditation failure has been a rare event in recent DXCC history. Since Don Search, W3AZD, left the DXCC desk, the ARRL has reversed its general attitude on accreditation. While the DXCC desk once tried to find ways to disallow a questionable operation, in recent years they have bent over backwards to find reasons to *accept* such operations. This change has been welcomed by DXpeditions and DXers alike, and has provided DXers with accredited contacts from some previously very rare countries. (While some operations are not accepted because of the complete lack of documentation, very few with reasonable proof have been rejected. The Glorioso operation of **FR/G/DJ6SI** is a rare example of a recent documented operation not accepted for DXCC credit.)

To accredit an operation, the DXCC desk looks for a piece of paper with the operator's name, dates encompassing the operation, the callsign, and the words "amateur radio," signed by an appropriate official. In most cases, the official should be a licensing person in the country's telecommunication authority, but the DXCC desk has accepted signatures from United Nations officers for **4U/** operations. Father Moran, 9N1MM, had operating permission direct from the King of Nepal. And JY1 and EA0JC can simply grant operating permission to themselves! (These are the callsigns of the kings of Jordan and Spain.)

The other "proof" needed to accredit an operation for DXCC is evidence that the operation took place from land in the appropriate country. This evidence is usually in the form of visas, passport



Tensay, ET3BT (ex-ET3PG). (Photo via DJ9ZB)

stamps, hotel receipts made out to the DXpeditioner, etc. Experienced DXpeditioners used to take "Don Search" photos, showing themselves in front of a country's airport, telecommunications building, or other identifiable landmark, to prove physical presence. In the case of islands, a certified copy of the ship's log may be required for accreditation, as many uninhabited islands look alike.

From the wording of the news release above, it appears that the Awards Committee felt that Romeo's P5RS7 documents neither provided acceptable evidence of operating permission from appropriate authorities in North Korea nor proved that the operation took place from the country.

As a consequence of this decision, the number of current DXCC countries remains at 326. Since neither the P5RS7 nor any other North Korean operation has been accredited for DXCC, North Korea remains in limbo, a potential but not current DXCC country. North Korea will be added to the current DXCC countries list after the first accredited operation from that country.

Romeo Stepanenko, 3W3RR, attended the Huntsville, Alabama Hamfest. He was at the DX Dinner and spent a lot of time chatting with DXers all weekend. He didn't issue any statements about the status of the 5A0RR or P5RS7 operations, but he did tell at least one DXer that he plans to take a couple years off from DXpeditioning. The rumors were really flying as to why he was in town, and what his plans are for the future!

DXAC News

The DXAC issued a new release covering three recent votes:

"The DXAC (DX Advisory Committee)

has voted 8 to 7 to *reject* a proposed revision to Section I.10 of the DXCC Rules to reinforce rules against the unethical action of making a contact for DXCC purposes with a callsign other than that issued to the operator. The majority felt that this could adversely affect club and other multi-operator stations—including DXpeditions. The minority felt that this rule change was necessary to prevent observed abuses."

This rule change was proposed by David Case, KA1NCN, who noted that sometimes a DXpeditioner worked his home call during the DXpedition, obviously with someone else operating. Further, multi-operator contest stations were collecting DXCC credits from contest contacts made by other than the station licensee. The current DXCC rules (I.10) state that all contacts must be made by the same station licensee. Thus, contacts made by other operators in a contest or by others using the callsign of another licensee are not valid for DXCC credit.

"The DXAC also *rejected* (by a 14 to 1 vote) a petition for new DXCC country status for the Turkish Republic of Northern Cyprus (TRNC). DXAC members stated that the TRNC did not meet DXCC Criteria Point 1, Government."

The petition for separate country status for the Turkish-occupied northern portion of Cyprus was submitted by Igor Zdorov, KU0J. Although recognized as an independent country by Turkey, the TRNC meets but very few of the specific requirements for sovereignty in the DXCC rules. Few DXers gave the TRNC much of a chance for separate DXCC status.

This decision may show how the DXAC will vote on the question of separate DXCC country status for the Marquesas and Australs islands of French Polynesia. TNRC met more of the specific criteria in the DXCC rules under sovereignty than does French Polynesia. Still there was but one member of the DXAC who voted in favor of separate DXCC status for TRNC. Since TRNC is more independent of Turkey than Tahiti is of France, the idea that French Polynesia is a sovereign, Point 1 country is likely to be voted down by the DXAC.

"In a third matter, the DXAC voted 11 to 4 to set a *minimum* size for new DXCC countries. The DXAC recommendation says: 'A DXCC country shall be a natural land mass of a size adequate to support a reasonable Amateur Radio operation. In the case of islands, the surface shall be dry at all times during high tide, and the physical characteristics may not be changed or modified. This includes the use of man-made operating structures. Each case will be judged on its own merits. Implicit in the recommendation is that operation from an island must take place from the surface of that island.' The

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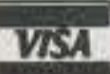
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1676.....I8QJU 1678.....AC6XW

Mixed: 450 I8QJU, I5ZJK. 500 I8QJU, I5ZJK. 550 I8QJU, I5ZJK. 600 I8QJU, I5ZJK. 650 I8QJU, I5ZJK. 700 I8QJU, I5ZJK. 750 I8QJU, KD1CJ, I5ZJK. 800 I8QJU, I5ZJK. 850 I8QJU, I5ZJK. 900 I8QJU, I5ZJK. 950 I8QJU, I5ZJK. 1000 I8QJU. 1100 EA5YJ. 1150 EA5YJ. 1200 EA5YJ. 1250 WK3Z, EA5YJ. 2200 W4UW. 2450 WB2YQH. 3000 I1EEW. 3400 W2FXA.

SSB: 350 LU2ATR. 400 LU2ATR. 450 LU2ATR. 500 LU2ATR. 550 JA2AH, LU2ATR. 600 JA2AH, LU2ATR. 650 JA2AH, LU2ATR. 700 JA2AH, LU2ATR. 750 JA2AH, LU2ATR. 800 JA2AH, LU2ATR. 850 JA2AH, LU2ATR. 900 JA2AH, LU2ATR. 950 JA2AH, LU2ATR. 1000 JA2AH, LU2ATR. 1050 LU2ATR. 1700 KF7RU. 1750 KF7RU. 2200 W4UW. 2100 I2EOW. 2150 I2EOW. 2200 WF4V. 2250 WF4V. 2300 WF4V. 2350 I2EOW. 2400 I2EOW. 2600 I1EEW.

CW: 350 HA4XR, HA7CY, F5TFS, I5ZJK. 400 HA4XR, HA7CY, I5ZJK. 450 HA4XR, HA7CY, I5ZJK, DF6SW. 500 HA4XR, HA7CY, I5ZJK, DF6SW. 550 HA4XR, HA7CY, I5ZJK, DF6SW. 600 HA4XR, HA7CY, I5ZJK, DF6SW. 650 HA4XR, HA7CY, DF6SW. 700 HA4XR, HA7CY. 750 HA4XR, HA7CY. 800 HA7CY. 850 HA7CY. 900 HA7CY. 950 HA7CY. 1000 HA7CY. 1050 HA7CY. 1100 HA7CY, KT2C. 1150 HA7CY. 1200 HA7CY. 1250 HA7CY. 1300 HA7CY. 1350 HA7CY. 1400 HA7CY. 1450 HA7CY. 2050 W8IQ.

20 Meters: DF7HX
40 Meters: SM3LGO

Asia: DF6SW
So. Amer: WK3Z
Europe: T30JH

Award of Excellence: none.

Award of Excellence with 160 Meter Bar: none.

Award of Excellence Plaque Holders: I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB0G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YB0TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VEFXR, N4MM, KC7EM, ZS6BCR, CT1YH, IV3PVD, KA5RNH, ZP5JCY, F1HWW, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2JLH, DE0DAQ, LU1DOW, N1IR, IK4GME, WX3N, KC6X, N6IBP, W5ODD, I0RIZ, I2MQP.

Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2QD, 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, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QRF, NN4Q, W4UW, NX0I, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCY, I2MQP, I0RIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB.

Complete rules and application forms may be obtained by sending a business-size self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to: "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

minimum-size recommendation now goes to the Awards Committee for action."

This minimum-size rule was an "internal DXAC agenda item" originated by DXAC Chairman Bob Beatty, W4VQ. The rule change was inspired by the application for separate DXCC country status for Scarborough Reef, a collection of small



Otto, XE1HEK; Parcival, XE1HBU; and Nellie, XE1CI confer with the ship's commander on their way to Revillagigedo to operate as XF4CI. (KD0JL photo)

rocks near the Philippines. Martti Laine, OH2BH, flew over the reef prior to the first operation from there as **BS7H** in June. The photos revealed that no above-water part of the reef was more than a few feet in any direction. To operate "from" Scarborough Reef, the DXpeditioners had to bring their own "dry land," in the form of scaffolding erected over one of the larger rocks. (See page 13 of September 1994 *QST* for a photo.)

This proposed rule change caught many DXers by surprise, because as an internal DXAC agenda item it didn't receive much attention outside the DXAC itself. To some extent this proposed rule is a backlash to one of DX's most controversial countries: Okino Tori-shima 7J1.

Nearly 20 years ago, in early 1976, the ARRL was deep into preparations for the 1979 World Administrative Radio Conference (WARC). Part of that massive effort was to win the active support of sister national amateur radio societies around the world for some new amateur bands, at 30, 17, and 12 meters. Japanese support was considered vital to this effort, as almost all the growth in numbers of amateur radio operators worldwide at that time came from Japan.

In order to win that support, then ARRL General Manager Dick Baldwin, W1RU,



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TM-742



TM-241A

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G-1000SDX Heavy Duty.	539.00	Call \$
G400RC Light/Med. Duty II sq ft	449.95	Call \$

STANDARD

HandHelds	List	Jun's
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C188A Mini 2 Meter Deluxe	489	Call \$
C288A 220MHz, HT	499	Call \$
C468A Mini 440 MHz	480	Call \$
C158A Affordable 2 Meter	339	Call \$
C178 Mini 2 Meter	459	Call \$
C228A 2M/220MHz	695	Call \$
C558A 2M/440MHz	689	Call \$
C628A 440MHz/1.2 GHz	727	Call \$
C528A 2M/440MHz Twinbander	495	Call \$
Mobile		
CCR-708A Communications Test Receiver With Spectral Display Scope	List \$750	Call \$
C5608DA 2M/440	List \$890	Call \$
C5718DA 2M/440	List \$849	Call \$

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DJ-180T	2m, HT	\$279	Call \$
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DJ-F1T	2M Handheld	List \$339	Call \$
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9913/PIN	N Male Pin for 9913, 9086, 8214 Fits UG-21 D/U & UG-21 B/U's	1.50
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UG-21B/9913	N Male for RG-8 with 9913 Pin	5.75
UG-146A/U	N Male to SO-239, Teflon USA	6.00
UG-83B/U	N Female to PL-259, Teflon USA	6.50

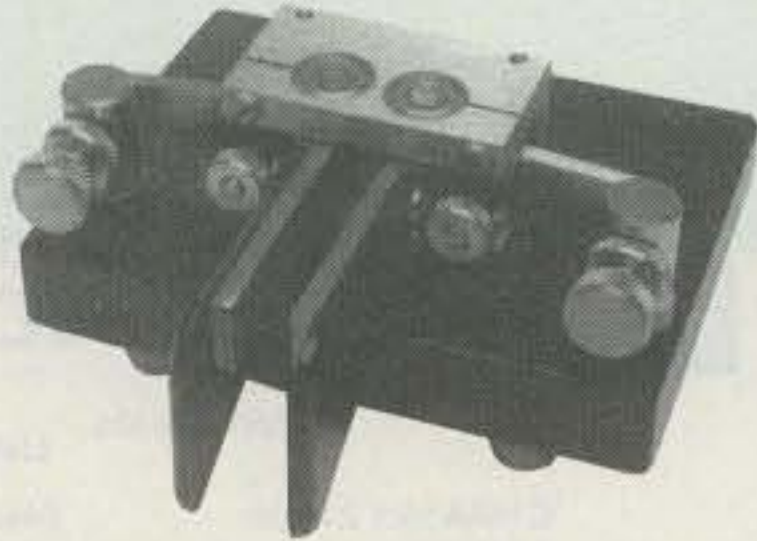
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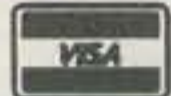
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12 Meter CW

13.....K4CIA

20 Meter CW

448.....HA5DA

30 Meter CW

10.....W9LKJ

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All CW

57.....AB6QR 58.....JH9UYZ.....

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160 Meters

75.....OM3TNU (30 Zones)

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and \$1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all CQ awards is \$4.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

overruled the objections of both the DXAC and the Awards Committee, and unilaterally proclaimed that Okino Tori-shima was a separate DXCC country from Ogasawara. He openly acknowledged that Okino Tori-shima did not quite meet the 225 mile separation from Ogasawara required for separate DXCC country status, but made an exception in this case, ostensibly in honor of the 50th anniversary of the Japan Amateur Radio League.

The JARL staged a major DXpedition to the isolated rock that summer. The Japanese erected a two-story-high scaffold to hold the operators, rigs, and generators above the so-called island. They

5 Band WAZ

As of July 31, 1994, 395 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

JA6NQT
YZ1MB

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)	KM5W, 199 (26)
K6YRA, 199 (34)	K1ST, 199 (26)
AA4KT, 199 (26)	4X6DK, 199 (4)
K7UR, 199 (34)	I1POR, 199 (1)
NA0Y, 199 (26)	AB0P, 199 (23)
VE7DX, 199 (34)	SM6AHS, 198 (12, 31)
W0PGI, 199 (26)	UA3AGW, 198 (1, 12)
W2YY, 199 (26)	KL7Y, 198 (34, 36)
W9WAQ, 199 (26)	VO1FB, 198 (19, 27)
W1JR, 199 (23)	EA5BCK, 198 (27, 39)
VE7AHA, 199 (34)	KZ4V, 198 (22, 26)
W1FZ, 199 (26)	K4PI, 198 (23, 26)
IK2GNW, 199 (1)	G3KDB, 198 (1, 12)
W9CH, 199 (26)	EA2KL, 198 (22, 26)
AC0M, 199 (34)	DK2GZ, 198 (1, 24)
IK8BQE, 199 (31)	UY5XE, 198 (24, 27)
JA2IVK, 199(34,40m)	N5FG, 198 (22,34 on 40)

The following have qualified for the basic 5 Band WAZ Award:

JA6NQT, 200 Zones	DL1SDH, 192 Zones
S57JZ, 190 Zones	KF6HI, 181 Zones
K7FL, 174 Zones	W6BCQ, 180 Zones
K5LC, 188 Zones	NC3C, 160 Zones
IV3JVJ, 172 Zones	HB9AUT, 180 Zones
WN5IJZ, 152 Zones	

Endorsements:

W2UE, 197 Zones	N5FG, 198 Zones
HB9DDZ, 192 Zones	YZ1MB, 200 Zones
SP9EES, 189 Zones	AB5C, 181 Zones
KB5EK, 180 Zones	

915 Stations have attained the 150 Zone level as of July 31, 1994.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and \$1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all CQ awards is \$4.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

didn't operate from the only part of the island that remains above the high-tide line, but chose instead to use some concrete footing left over from World War II to anchor their towers and scaffold.

Unfortunately, this 7R1RL operation took place at the dead bottom of the sunspot cycle, in the middle of the summer. Propagation to other than Japan was terrible. Few US east coast DXers even heard the DXpedition, much less worked it. Okino Tori-shima immediately vaulted into the Top Ten Most Wanted Countries list outside of Japan, and was ranked #1 Most Wanted in the US second call area.

When DXers saw the movie and photos of the 7J1RL operation, showing the operators perched high above the waves with a tiny rock in the background, the controversy over Okino Tori-shima erupted again. During the first showing of the 7J1RL movie in the US, at ARRL Headquarters, then-DXCC Desk administrator Bob White, W1CW, specifically asked the JARL representative if any part of the is-



Alex Wilhelm, DK8FD, operated as ZL7FD from the Chatham Islands.

land was above water at high tide. (Incidentally, that JARL representative was none other than Naoki Akiyama, now-NX1L, who submitted the latest petition for separate DXCC status for Australs and Marquesas; DX is a small world!)

Probably the crowning blow to Okino Tori-shima was a much-reproduced photo of fish swimming between the legs of the 7J1RL antenna tower, the base of which was several feet under water at high tide.

This combination of not quite meeting mileage requirements, lousy propagation (and thus few satisfied DXers), and minute land mass made the DXCC country of Okino Tori-shima short-lived. The DXAC voted to delete Okino Tori-shima from the DXCC country list in 1980, soon after the end of the highly successful (from the amateur radio point of view) WARC 1979. The basis of this rejection was that the country did not meet the mileage requirements, and not because it had so little dry land. However, DXers have long retained the sour taste of the entire episode, and continue, 20 years after the fact, to have negative feelings toward countries that require scaffolding to operate.

As of the deadline for this column, the ARRL Awards Committee has not voted on this proposed rule change. If this proposed rule change is accepted, yet another question is whether it will be applied retroactively to the application for separate DXCC country status for Scarborough Reef. The members of the DXAC certainly had Scarborough in mind when they voted in favor of a minimum size for a new DXCC country, and they may use this new rule, if approved, as an excuse not to add Scarborough to the DXCC countries list.

DX News

Morten Antonsen, LA9GY, will operate from Niue as **ZK2XN** Oct. 24 to Nov. 27. He'll operate on all bands, favoring CW, plus an entry in the CQ WW SSB Contest Oct. 29-30. QSL via his home call, or direct to Radioamatørklubben P35, Post-

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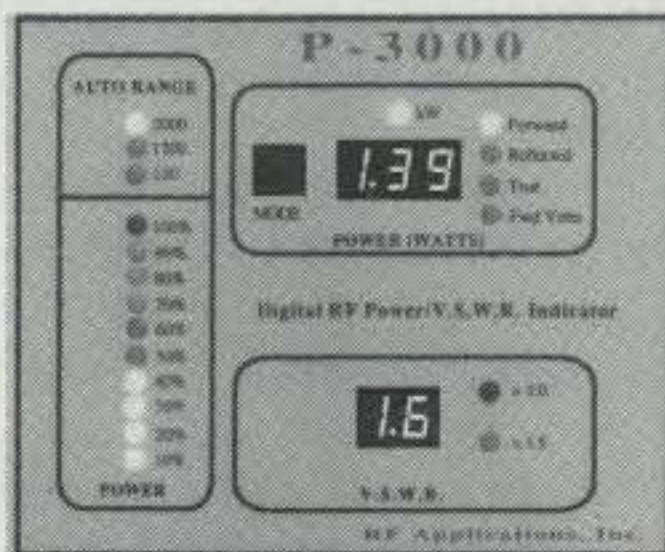
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CIRCLE 112 ON READER SERVICE CARD

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Currently there are 327 countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is \$1.00.

CW

K2TQC.....327	KD8V.....327	WA4IUM.....326	I2QMU.....324	N2KW.....319	KA5TQF.....316	K4CXY.....309	WA4DAN.....301	F6HMJ.....284
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boks 5626 Mollenberg, N-7002 Trondheim, Norway. Sunrise 1650Z; sunset 0530Z.

Paul Rubinfeld, WF5T, returns to Uganda for the full month of November. He'll operate as **5X1XT** outside of his teaching duties. He'll concentrate on CW and RTTY. Paul is taking an amplifier and will also work on 80, 40, and 30 meters. Sunrise 0343Z; sunset 1542Z. QSL via his home call, via the bureau, or direct: P.O. Box 4909, Santa Fe NM 87502.

Joe Pater, WB8GEX, will operate from several Caribbean locations over the next few months. First stop is St. Christopher Island (NA-104), known as St. Kitts, Nov. 19-27. Joe will be active as **V47NF**, and

fellow DXpeditioner John Walker, WZ8D, will operate as **V47WZ**. They'll be on 160-10 meters, on SSB and CW. QSL V47NF to WB8GEW and V47WZ to WZ8D, direct with self-addressed, stamped envelope (SASE), please. On his way home Joe will spend two days on St. Martin/St. Maarten (NA-105) operating SSB only. Finally, between Christmas and New Years Joe will operate as **WB8GEX/VP5** from Providenciales Island (NA-002) in the Turks and Caicos, 160-10 meters, SSB only. QSL home call, direct with SASE, please.

Duncan Kreamer, W1GAY, will be active from Anguila (NA-022) as **VP2EDK** Nov. 8-14. SSB only on 80-10 meters. QSL home call.

CQ WW SSB DXpeditions

Members of the Whitton (England) Amateur Radio Group will operate from Gambia as **C56DX** in the CQ WW SSB Oct. 29-30. Outside the contest the operators will sign **C56/G0MRF**. They'll concentrate on the low bands and the new bands outside the contest, and will also have amateur satellite equipment. QSL to G0MRF (G8MRF in pre-1992 *Callbooks*.)

A Central Arizona DX Association team will operate from Ghana as **9G5TL** in the CQ WW SSB test Oct. 29-30. QSL to KG7XC. They will be in Ghana Oct. 24 to Nov. 4, operating with their own call signs: **9G5WH** (KF7AY); **9G5VT** (K5VT); **9G5RM**



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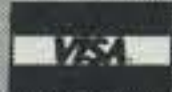
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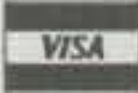
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(NZ7E); **9G5MB** (AA7NO); **9G5JR** (WA7LNW); and **9G5MT** (WY7K). QSL via home calls. Another team will operate the CW test as **9G5NN**; more details below.

Jim, KI4HN; Scott, KA9FOX; and Mike, N0BSH, will inaugurate the Residence la Chatelaine on St. Maarten in the contest, probably using a special **PJ8-** contest callsign. This new luxury rental QTH, complete with antennas and right on the beach, will be a popular spot for contests and casual DXpeditioning.

John Crovelli, W2GD, will rebuild **P40W** at a new location. Work begins the week before the CQ WW SSB in October. He'll enter the contest in the single-operator, all-band category, using Force 12 mono-banders on 40-10 meters, plus wire low-band antennas. He'll be back for the CQ WW CW, again running single/all-band, head-to-head with KR0Y, who'll operate as **P40L** from P40V's QTH. QSL P40W via N2MM.

V29Y will be a single-op, all-band entry in the contest, by Yoichi Sakurada, JP1NWZ. He'll be on Antigua Oct. 26 to Nov. 3. QSL via his home address: 2-9-7-101 Namiki Kanazawa-ku, 236 Yokohama-City, Japan. A US group plans a multi-operator entry from Antigua as **V26B**; more details are in "The DX Bulletin" or "The Long Island DX Bulletin."

K2TD, N2VW, and WB2YOF will be multi-single in the CQ WW SSB Contest from 0000Z Oct. 29 to 2400Z Nov. 30 using the contest call VP5R from the QTH of Jody, VP5JM, on Provo in the Turks & Caicos Islands. From Oct. 25 to Nov. 1, before and after the contest, they will be operating VP5/home call with emphasis on CW and the WARC bands. QSL VP5R to N2VW, for the 1994 CQ WW DX SSB Contest period only, via the *Callbook* address. QSL VP5/home calls to operators' home calls. Bureau okay, or to N2VW with SASE or SAE and postage.

KC6SS and **KC6OK** will be active from Belau Oct. 25 to Nov. 2, with Jim Hood, WV5S, and Coy Day, N5OK, respectively, operating. Outside the test they will concentrate on CW, the new bands, and the low bands, with some RTTY. QSL via home calls. After the contest they'll operate from Micronesia. Jim, WV5S, and Coy, N5OK, will use **V63SH** and **V63OH**, respectively, from Yap (OC-012) Nov. 2-7.

CQ WW CW DXpeditions

Members of the Central Arizona DX Association and from the UK will operate multi-multi as **9G5NN** in the CQ WW CW DX Contest Nov. 26-27. The operators will be in Ghana Nov. 20-30, and will operate with their own callsigns outside the contest, concentrating on CW. Operators, Ghana callsigns, and home calls are: Roger Western **9G5RW** G3SXW; Chris Henderson **9G5CH** G4FAM; Rob Ferguson **9G5RF** GM3YTS; Jim Larsen **9G5JR** K7GE; Tony Rogozinski **9G5TR** N7BG; and Mike

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 ZZ7DX to PP5LL

Fulcher **9G5MF** KC7V. QSL individual calls to operators' home calls, and 9G5NN to Roger Western, G3SXW.

W9VNE, W0CG, K8MFO, WD8AUB, WD8LLD, and possibly others will operate multi-multi as **VP5VW** in the CW contest from the QTH of VP5JM. They'll be on Provo (NA-002) Nov. 19-29, operating with their home callsigns **VP5/** outside the test. QSL VP5VW via W8TPS and others by their home calls. Bureau cards are welcomed!

Finally, Mike Manafo, K3UOC, returns

to Sint Eustatius (NA-145) as **PJ8H**, with a multi-single operation with WM2C, K0PP, KE7X, WS4E, and N4XO. Outside the test Mike will be active as **PJ5/K3UOC**. QSL both calls via the Harvard Wireless Club W1AF, 6 Linden St., Cambridge, MA 02138.

DX Gathering

The 42nd New England DX Dinner is Sunday, Nov. 13, at VFW Post 2017, 84 East-

ern Ave., Dedham, Massachusetts. Special guest speaker is Bob Schmieder, KK6EK, 3Y0PI DXpeditioner and author of the book on the trip. The day starts with early-bird coffee and Danish at 10:30 AM, followed by morning speakers. The all-you-can-eat buffet is at 1:30 PM. Card checking for both DXCC and WAZ programs. Cost, including buffet, is \$15. Send checks to Tony Penta, WA1MWN, 66 Pleasant Ave., Lynnfield, MA 01940.

New DX Publications

Videos available: Roger Western, G3SXW, operated from Tristan da Cunha Island as **ZD9SXW** in Oct. 1993, making 23,300 CW contacts on a one-man DXpedition. His professionally produced 12 minute video shows the journey, the island, and operating the pile-ups from the DX end. It is now available in the USA, at cost. Please send a check for \$14.95 to Jack Reed, WA7LNW, 16423 North 54th Ave., Glendale, AZ 85306.

Sam Brown, WA4IUM, has prepared an excellent VHS videotape of the **3Y0PI** Peter 1 Island DXpedition. The professionally edited tape truly captures the sights and sounds of this extraordinary operation. The tape, entitled *Journey to Peter 1 Island: Close to the Edge*, is available for a donation of \$25 or more to Jerry Branson, AA6BB, 93787 Dorsey Lane, Junction City, OR 97448.

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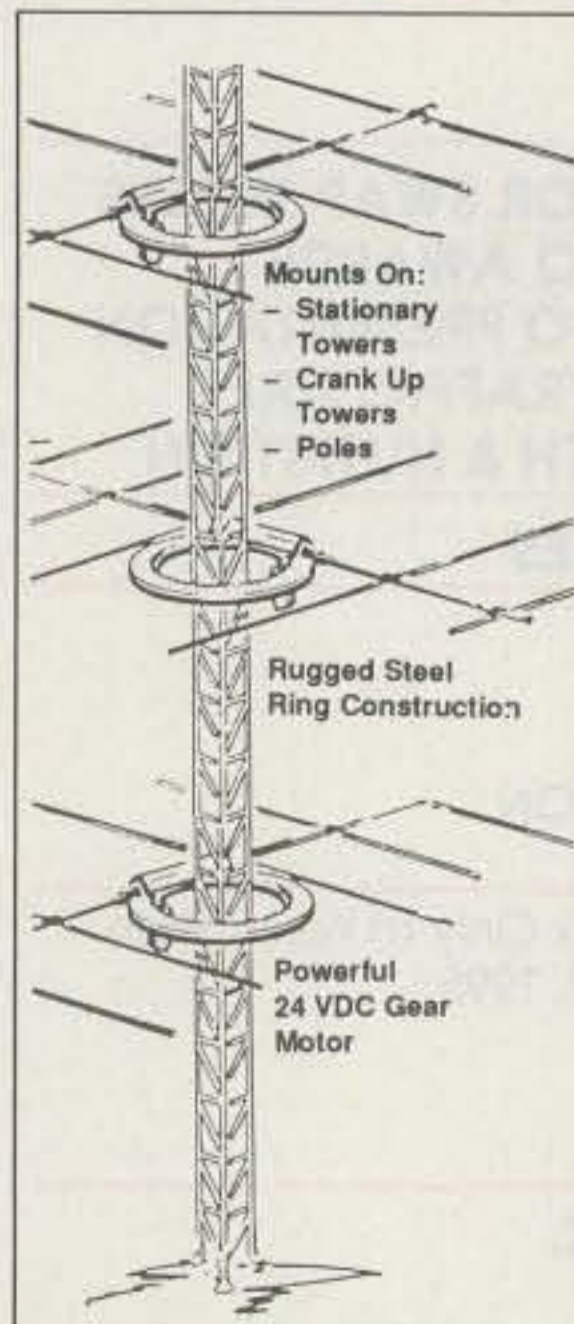
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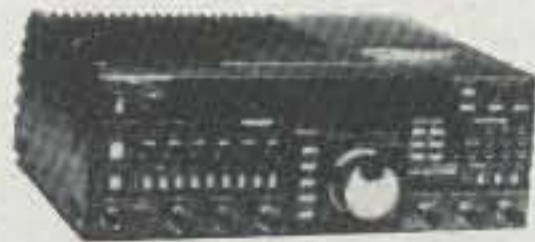
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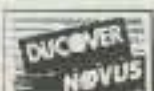
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320	KC4MJ/327	310	KF8VW/318
320	WB4UBD/326	310	KA4RAW/315
320	IT9TGO/326	275	VE3CKP/299
320	IT9TQH/325	275	K2EEK/291
320	I4LCK/325	275	EA5GKE/289
320	I0ZV/323	275	CT1BWW/284
320	N5FG/322	275	EA3CWT/278
320	WE2L/320	200	IK4MSV/208
310	OE7SEL/319	OSCAR	IK4MSV
310	WD0BNC/319		

CW Endorsements

320	IT9TQH/325	300	WB4UBD/305
320	W1WAI/320	150	EA6AA/195
310	KB4HU/316	150	KF8VW/159
300	N5FG/307		

RTTY Endorsements

275	WB4UBD/291	200	W4EEU/249
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Total number of active countries is 327. 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 airmail reply. Please make all checks payable to the awards manager.

Also, a video is now available of the October 1992 Malyj Vysotskij Island operation. The film was shot by Ed Kritsky, NT2X, and edited by Jack Reed, WA7LNW. This may be the first DXpedition film with original music, composed by Alexander Kritsky, a professional Russian musician. The tape is available for loan from the Northern California DX Foundation, P.O. Box 2368, Stanford, CA 94305.

While not a new publication, there have been some changes in the highly respected "W6GO/K6HHD QSL Manager List." This list has long been recognized as the most accurate of all QSL manager listings, with entries carefully cross-checked before publication. The major change is that the "W6GO/K6HHD List" is no longer printed as a separate publication. It is now included as the middle pages of *The DX Magazine*. Jay and Jan O'Brien continue to edit the list, and provide it in electronic form on computer disk or via their DX BBS. The printed version, however, is now available only through a subscription to *The DX Magazine*, P.O. Box 50, Fulton, CA 95439.

New DX Services

Les Bannon, WF5E, has taken over the DX QSL Service from N7RO. Dick retired from the QSL forwarding business in August,



Timothy Hulick, W9QQ, recently made a two-week trip to China, and on his way out had the opportunity and permission to operate BY4AA in Shanghai. BY4AA custodian Xuru is on the left, with W9QQ on the right.

after forwarding more than 1,000,000 QSL cards in 13 years. The DX QSL Service bundles cards from various DXers and forwards them directly to the appropriate QSL manager, DX station, or foreign bureau. Returned cards are then placed into the ARRL incoming QSL bureau system, to eventually arrive at your QTH. While the service lacks something in speed, it makes up for the delays with an economical price (six cards per \$1) and great simplicity. A DXer need only sort cards into alphabetical order by prefix, and send them with payment to Les at 3400 Bedford, Midland, TX 79703. Les handles all the work of determining the correct QSL route, foreign envelopes and postage, and return postage. (Note that a few DXpeditioners and QSL managers refuse to cooperate with such a service; cards for such stations will be returned to the sender.)

Another new service of interest to the DXer is an Amateur Radio Equipment Insurance plan. This insurance program does not require that you be a member of any organization to qualify for coverage, and can include mechanical breakdown coverage and tower-antenna-rotor coverage at additional cost. For more information on this insurance program, contact Ham Radio Insurance Associates, Inc., P.O. Box 201, Canonsburg, PA 15317-0201.

QSL Notes

Randy Martin, KØEU, operator and QSL route for **9G1XA**, has moved. His new address is: 8985 West Jefferson Ave., Denver, CO 80235.

QSL Hugh Paul, **TA2ZI**, via WB6EQX, and not via the Turkish bureau, which handles cards for its members only.

QSL **UK7R** and **UK8AX** via Gene Schumat, UA9AB, P.O. Box 17, 457100 Troitsk, Chelyabinskoy Oblast, Russia. Note that one IRC is not sufficient for airmail return postage from the USSR at this time;

UA9AB requests 2 IRCs or US\$1. [US\$1 are not recommended to Russia.—ed.]

The Tonga **A3** is no longer working. Try sending your A5 QSLs to A35CT, via the 1994 *Callbook* address.

QSL **SM7/T94BO** (ex-YU4BO, 4N4BO, SM7/4N4BO) via the Swedish bureau, or direct to Samir Popaja, V. Sandviksg. 22, 252 28 Helsingborg, Sweden.

QSL **XR1X** and **3G1X** via Nicolas Herrera G. (CE1IDM), P.O. Box 345, Antofagasta, Chile.

WA2NHA says that it is not his policy to keep US\$1 from QSL requests that he cannot answer due to lack of logs. Those cases in which he failed to return the US\$1 were accidental, not on purpose.

Not Managers

W1RAN is *not* the manager for **DU6BG**.

AHØW (ex-AA7FM) does not have cards or logs for **3W4DK** any longer. Frank has requested the USA/VE logs and/or cards, and will announce if they do arrive.

F6EXQ is not the manager for **5NØGC** (ex-TU5DX).

VK2DFL is no longer the QSL manager for **S21ZW**. QSL direct to Craig Maxey, KH8AL, 9820 SW Dapplegrey Loop, Beaverton, OR 97005.

N4EOF is not the manager for **P29DX**; N4EOF is manager for P29DK.

QSL **ET3VZ** and **4S7/OH2VZ** via OH2VZ, not via OH3VZ.

73, Chod, VP2ML

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CW DX Contest Special

The CW weekend of the 1994 CQ World-Wide DX Contest will take place on November 26–27. Special DX Propagation Charts for use during both the SSB and CW weekends appeared in last month's column, along with valuable tips and suggestions for increasing scores. Be sure to refer to last month's column if you plan to participate in the CW contest weekend. Additional tips are discussed in this month's column.

Sunspot Cycle Progress

The 1994 CW contest period will be held during steadily declining sunspot numbers, and in the low phase of solar activity.

The Royal Observatory of Belgium reports a monthly mean sunspot number of 35 for July 1994. This results in a 12-month running smoothed sunspot number, upon which the cycle is based, of 37 centered on January 1994. This is a drop of 2 points from the previous month's level. If the cycle continues its present rate of decline, a smoothed sunspot number in the low 20s can be expected for November 1994.

Solar activity during November 1994 is expected to be on the order of 20 points less than the 41 level observed last November. A level in the low 20s is considered to be an indication of relatively low solar activity. The last CQ World-Wide DX Contests held under similar sunspot conditions took place in 1984.

It is unlikely that any DX records will be broken during the 1994 WW DX Contest periods, but even during the low period of a solar cycle interesting and exciting DX possibilities exist.

A corresponding 10.7 cm mean solar flux level of 82 was reported for July by the Dominion Radio Astrophysical Observatory at Penticton, B.C. This results in a smoothed solar flux value of 93 centered on January 1994. A smoothed level of approximately 83 is expected during this November.

Exceptional August Conditions

Considering the prolonged periods of geomagnetic instability and accompanying radio storms that took place during the first four months of 1994, it is nice to report about the exceptionally stable geo-

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for November 1994

Propagation Index.....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 8, 13, 20, 23	A	A	B	C
High Normal: 6-7, 9, 12, 19, 21-22, 24-25	A	B	C	C-D
Low Normal: 1, 4-5, 10-11, 14-16, 18, 26-28	B	C	D	D-E
Below Normal: 2, 17, 29	C	C-D	D-E	E
Disturbed: 3, 30	C-D	D	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be fair (C) on Nov. 1st, fair-to-poor (C-D) on the 2nd, poor (D) on the 3rd, fair (C) on the 4th and 5th, good (B) on the 6th and 7th, etc. During the CQ WW CW weekend conditions are expected to be fair (C) on both Nov. 26th and 27th.

magnetic and ionospheric conditions that took place during August. While I have not yet had time to check years and years of records, August 1994 was certainly one of the "quietest" months in my memory, which spans more than 50 years on the HF bands!

The geomagnetic A_p , or *planetary*, index takes into account the daily readings taken at dozens of observatories throughout the world. This index stayed below 10 (very quiet) on 24 days during August, and below 5 (exceptionally quiet) on 14 days. It rose above 25 (stormy) on a single day, in comparison to the large number of days each month that were stormy earlier this year. The exceptionally stable conditions observed during August compensated somewhat for the continued decline in sunspot counts.

"Salting" The Ionosphere

Carrying out what has now become a tradition with this column, this year the ionosphere received special "salting" atten-

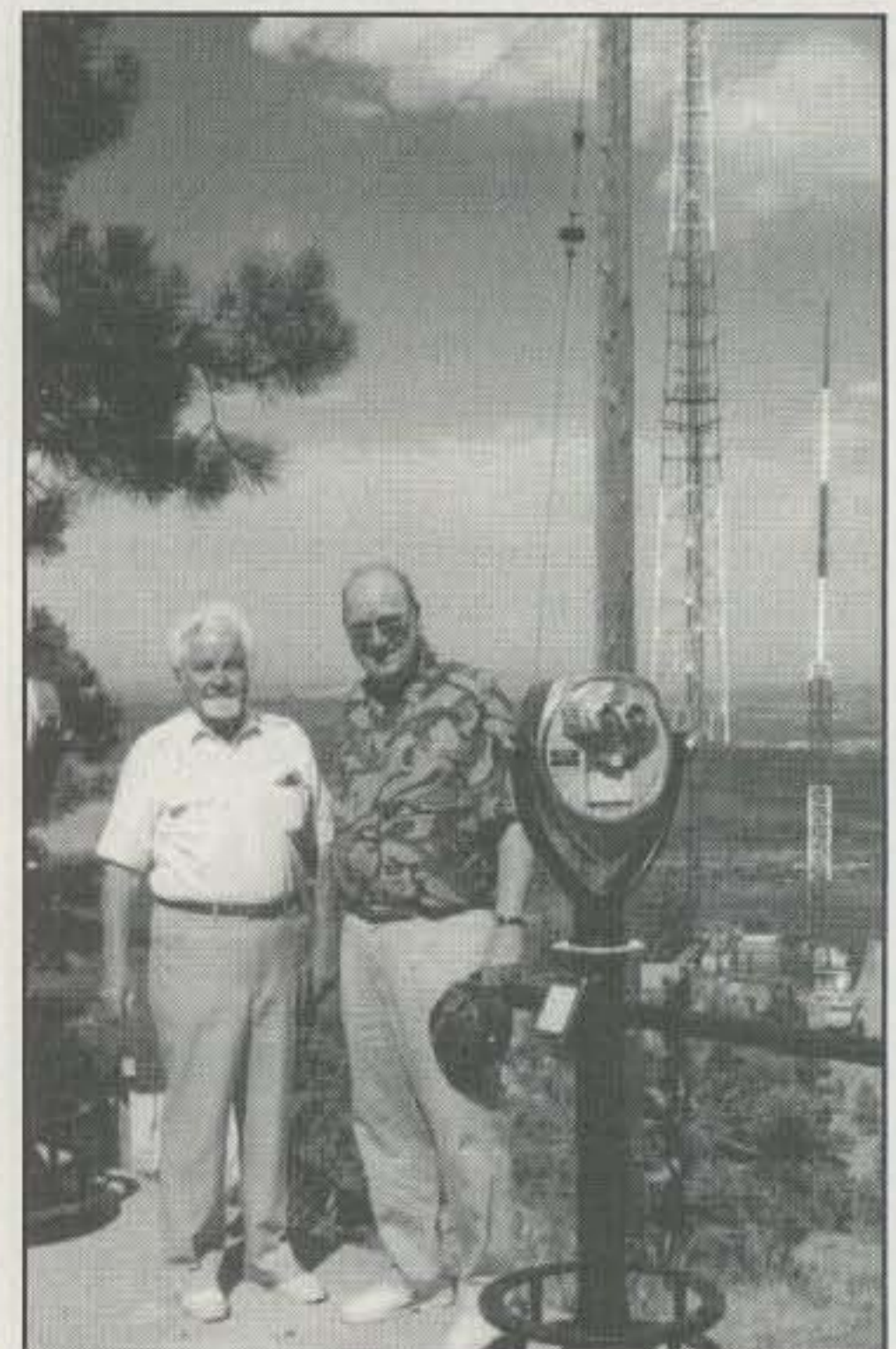
Bulletin

Since this issue of CQ should reach most subscribers prior to the start of the CQ World-Wide DX SSB Contest weekend of October 29–30, here is an updated forecast made at press time for the general propagation conditions expected during the SSB weekend.

The exceptionally stable geomagnetic and ionospheric conditions observed during August may bode good news. Based on the 27- and 54-day recurrence tendency for HF propagation conditions, there is a high probability for at least Low Normal conditions during the weekend of October 29–30, with a fairly good chance that conditions may even improve to High Normal during parts of the weekend. Check on-the-air conditions on October 2 and 3, which would be just one 27-day cycle prior to the contest weekend, for a more probable recurrence pattern.

During the contest be sure to check with the forecast sources discussed in last month's column for up-to-the-minute reports on ionospheric conditions.

The initial forecast for the CW contest weekend of November 26–27 looks fairly good at this time. At least Low Normal conditions are expected for the entire weekend. A fine-tuned press-time update for the CW contest weekend will appear as a bulletin in next month's column.



John Gayer, ex-HB9AEQ (left), and George Jacobs, W3ASK, at the 1994 "salting" the ionosphere site high in the Rocky Mountains overlooking Denver. (Photo by Bea)

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CQ Short-Skip Propagation Chart November & December 1994 Local Standard Time At Path Midpoint (24-Hour Time)

Band (Meters)	Distance between stations (Miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	Nil	08-11 (0-1) 11-17 (0-2) 15-17 (0-1)	08-09 (1) 09-11 (1-2) 11-15 (2) 15-17 (1) 17-19 (0-1)
15	Nil	09-11 (0-1) 11-15 (0-2) 15-18 (0-1)	07-08 (0-1) 08-09 (0-2) 09-11 (1-3) 11-15 (2-4) 15-16 (1-3) 16-18 (1-2) 18-19 (0-1)	07-08 (1) 08-09 (2) 09-11 (3) 11-15 (4) 15-16 (3) 16-18 (2-3) 18-19 (1-2) 19-21 (0-1)
20	10-12 (0-1) 12-14 (0-2) 14-16 (0-1)	06-07 (0-1) 07-10 (0-2) 10-12 (1-3) 12-14 (2-4) 14-16 (1-4) 16-17 (0-3) 17-19 (0-2) 19-22 (0-1)	06-07 (1) 07-09 (2-3) 09-10 (2-4) 10-12 (3-4) 12-16 (4) 16-17 (3-4) 17-19 (2-3) 19-22 (1-2) 22-00 (0-1)	06-07 (1-2) 07-09 (3) 09-15 (4-3) 15-17 (4) 17-19 (3-4) 19-21 (2-3) 21-22 (2) 22-23 (1-2) 23-00 (1) 00-06 (0-1)
40	07-08 (0-2) 08-09 (1-3) 09-17 (3-4) 17-19 (2-3) 19-21 (1) 21-00 (0-1)	06-07 (0-2) 07-08 (2-3) 08-09 (3) 09-15 (4-3) 15-17 (4) 17-19 (3-4) 19-21 (1-3) 21-00 (1-2) 00-03 (0-2) 03-06 (0-1)	06-07 (2-3) 07-08 (3) 08-09 (3-2) 09-15 (3-1) 15-17 (4-2) 17-19 (4) 19-21 (3-4) 21-03 (2-4) 03-06 (1-3)	06-08 (3-2) 08-09 (2-1) 09-15 (1-0) 15-17 (2-0) 17-19 (4-3) 19-03 (4) 03-06 (3)
80	08-21 (4) 21-01 (3-4) 01-04 (2-3) 04-07 (1-2) 07-08 (3)	08-09 (4-2) 09-16 (4-1) 16-18 (4-3) 18-01 (4) 01-04 (3-4) 04-07 (2-3) 07-08 (3)	08-09 (2-1) 09-16 (1-0) 16-18 (3-1) 18-20 (4-3) 20-04 (4) 04-06 (3-4) 06-07 (3) 07-08 (3-1)	08-09 (1-0) 09-16 (0) 16-18 (1-0) 18-20 (3-2) 20-04 (4) 04-06 (4-2) 06-07 (3-1) 07-08 (1)
160	07-09 (3-2) 09-11 (2-0) 11-17 (1-0) 17-19 (3-2) 19-07 (4)	07-09 (2-1) 09-17 (0) 17-19 (2-1) 19-04 (4) 04-07 (4-2)	07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-21 (4-2) 21-04 (4) 04-06 (2) 06-07 (2-1)	07-19 (0) 19-21 (2-1) 21-04 (4-2) 04-06 (2-1) 06-07 (1-0)

HAWAII November & December 1994 Openings Given in Hawaiian Standard Time

To:	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern USA	08-10 (1) 10-12 (2) 12-14 (1)	07-08 (1) 08-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	06-08 (2) 08-13 (1) 13-14 (2) 14-17 (3) 17-20 (2) 20-00 (1)	16-18 (1) 18-02 (3) 02-04 (1) 18-20 (1)* 20-01 (2) 01-03 (1)*
Central USA	08-10 (1) 10-14 (2) 14-16 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (2) 07-08 (3) 08-13 (2) 13-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-00 (1)	17-19 (1) 19-20 (2) 20-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-02 (2)* 02-04 (1)*
Western USA	08-10 (1) 10-14 (2) 14-17 (1)	06-07 (1) 07-08 (2) 08-12 (3) 12-14 (4) 14-16 (3) 16-17 (2) 17-19 (1)	06-07 (2) 07-09 (4) 09-14 (3) 14-16 (4) 16-18 (3) 18-22 (2) 22-02 (1)	17-18 (1) 18-20 (2) 20-01 (4) 01-04 (3) 04-06 (2) 06-07 (1) 18-19 (1)* 19-21 (2)* 21-04 (3)* 04-05 (2)* 05-06 (1)*

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in () after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

- (4) Opening should occur on more than 22 days
- (3) Opening should occur between 14 and 22 days
- (2) Opening should occur between 7 and 13 days
- (1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate daylight time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between New York and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PDT zone; 3 hours in the MDT zone; 4 hours in the CDT zone; and 5 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to daylight time in other areas of the USA subtract 8 hours in the PDT zone; 7 hours in the MDT zone; 6 hours in the CDT zone; and 5 hours in the EDT zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 kw PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the propagation index will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

ALASKA Openings Given in GMT

To:	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern USA	19-22 (1)	16-18 (1) 18-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	18-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-04 (1)	06-12 (1) 07-11 (1)*
Central USA	19-23 (1)	17-18 (1) 18-21 (2) 21-00 (3) 00-01 (2) 01-02 (1)	17-20 (1) 20-23 (2) 23-02 (3) 02-03 (2) 03-05 (1)	06-14 (1) 07-12 (1)*
Western USA	19-21 (1) 21-23 (2) 23-00 (1)	17-20 (1) 20-21 (2) 21-22 (3) 22-00 (4) 00-01 (3) 01-02 (2) 02-03 (1)	14-17 (1) 17-20 (2) 20-22 (3) 22-00 (4) 00-02 (3) 02-04 (2) 04-06 (1)	02-03 (1) 03-05 (2) 05-14 (3) 14-15 (2) 15-16 (1)

*Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

Time EST	Time UTC	Meter Band	Areas To Which Openings Are Expected
7-10 PM	00-03	20	Southern Africa, Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Central & South America, Antarctica
10 PM-1 AM	02-06	40, 80, 160	Europe, Africa, Central & South America
1-4 AM	06-10	40, 80	Europe, Central & South America, South Pacific, New Zealand, Australasia
4-7 AM	10-12	40, 80, 160	Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Antarctica, Central America
7-10 AM	12-15	20	Europe, Africa, Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Antarctica, Central & South America
10 AM-2 PM	15-19	10, 15, 20	Europe, Africa, Central & South America
2-4 PM	19-21	15	Africa, Central & South America, South Pacific, New Zealand, Australasia, Antarctica
4-7 PM	21-00	15	Central & South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Central & South America

Table 1- Sample all-band operating schedule for Eastern QTH derived from DX Propagation Charts appearing in last month's column. Similar schedules can be derived for individual bands and time spans.

tion because of the steady decline in solar activity.

My thanks go to a very good friend and professional colleague of many years, John Gayer, ex-HB9AEQ, who directed me to a Rocky Mountain peak overlooking Denver, Colorado, which had been selected by previous ionosphere salters for a Denver radio and TV antenna farm. By all counts this is "sacred" land for radio transmission and propagation!

Thanks also to Charlie Young, N8RR, who sent me a box of the biggest rock-salt crystals I have ever seen. They came from 1200 feet below ground at the Morton Salt's Louisiana Rock Salt Mine. It is claimed that these rock-salt crystals have curative power, and Charlie sent them to me for this year's salting the ionosphere expedition with the hopes that they may help "cure" the ionosphere for the 1994 CQ World-Wide DX Contest.

John Gayer and I duly distributed the salt rocks at the over 8000 foot altitude with our usual ceremony. We hope that it will help provide a nice, stable ionosphere for this year's contest.

Contest Tips

Last month's column contained special DX Propagation Charts for use during the CW section of the contest. If you plan to participate in the contest, be sure to check last month's column for propagation data that should be helpful in piling up contacts and points. For a day-to-day forecast of general propagation conditions

expected during the month, including the contest weekend, see the Last Minute Forecast.

Here are some propagation rules of thumb that should be useful for working DX during November, and especially during the CW Contest weekend.

1. During and shortly after sunrise good DX conditions to most areas of the world are forecast for 20 meters. Also check for openings on 40, 80, and 160 meters towards southerly and westerly directions.

2. From a few hours *after sunrise* until *late afternoon* it should be a toss-up between 15 and 20 meters for the optimum DX band, with openings possible to many areas of the world during this period. A few openings may also be possible on 10 meters, but considerably below last year's level. Openings on these three bands should favor signals from an easterly direction before noon, from the north and south shortly after noon, and from southerly and westerly directions during the late afternoon hours.

3. During the *late afternoon* and *early evening* hours check 15 meters for signals arriving from the south and west, and 20 meters for signals from just about every direction. Fairly good DX openings towards the east and the south should also be possible on 40 meters beginning an hour or so before sundown.

4. During the *late evening* and *early morning* hours 20 meters should open for DX towards the south, west, and northwest, often with strong signals. Good openings to most areas of the world

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should also be possible on 40 meters during the hours of darkness. Some fairly good 80 meter and some 160 meter DX openings are also possible during this period.

Signal levels on most DX openings should be noticeably stronger during November as a result of a seasonal decrease in static levels and solar absorption.

CW Contest Work Plan

Table I is a sample work chart for the CW Contest section. It was devised from the DX Propagation Charts which appeared in last month's column. This particular example is for multi-band operation in the EST zone. Similar work charts can be devised for other bands, for other operating conditions, and for other time zones.

VHF Ionospheric Openings

Two significant meteor showers are expected during November, which should make possible some meteor-scatter-type openings on the VHF bands. The *Taurids* shower is scheduled to occur between November 2 and 4, peaking during the early morning hours of the 3rd with a rate of about 15 meteors per hour. Later in the month the *Leonids* shower should take place. This shower will peak on the 15th, but its effect should be noticeable from the 14th through the 16th. During the peak of the *Leonids* shower about 15 meteors should enter the earth's atmosphere each hour.

Auroral-type VHF ionospheric openings are likely to occur during the month, especially when ionospheric conditions on the HF bands are Below Normal or Disturbed. Check the Last Minute Forecast at the beginning of this column for the days that are most likely to be in these categories during November.

Solar activity is too low to expect any regular 6 meter F-2 ionospheric openings. There is a possibility, however, although very slim, for an occasional 6 meter Trans-Equatorial (TE) scatter-type opening during November, mainly between the southern tier states and deep South America. If a TE opening is to occur at all, the most likely hours are between 8 and 11 PM local standard time.

This month's column contains short-skip propagation data for use between distances of approximately 50 and 2300 miles, and between the states of Hawaii and Alaska and the continental areas of the United States.

Good luck on the WW DX CW Contest weekend. Be sure to let me know how these special contest propagation forecasts work out. For the past 44 years the contest forecasts have held up with an accuracy better than 90%.

73, George, W3ASK

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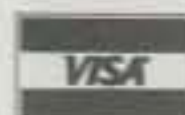
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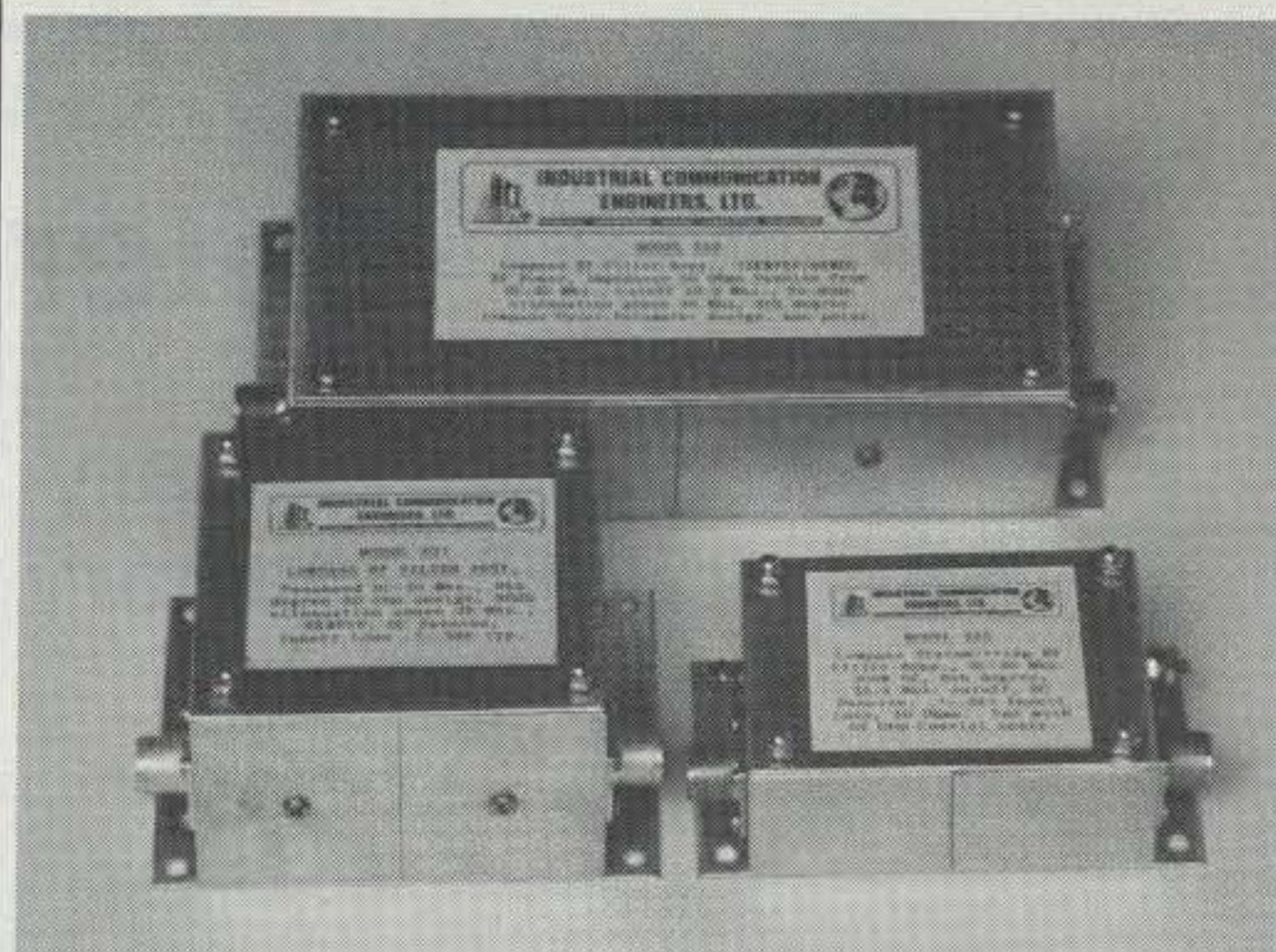
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Announcing:

The 1995 CQ World-Wide 160 Meter DX Contest

CW: 2200Z January 27 to 1600Z January 29
SSB: 2200Z February 24 to 1600Z February 26

The objective of these contests is for amateurs around the world to contact other amateurs in as many U.S. states, Canadian provinces, and countries as possible on the 160 meter band.

Classes: Single and multi-operator only. Use of packet, a spotting net, or logging assistance makes an entry multi-operator. Multi-operators must show the actual operator for each QSO. Under single operator there will be a designation of power level: H = power over 150 watts, L = power under 150 watts, and Q = 5 watts or less. There will continue to be only listings per state or country, but if there is sufficient activity or if a high enough score is made, then a separate certificate will be issued. Minimum score for the separate certificate is 5,000 points! Multi-operators will all be considered high power.

Exchange: RS(T) and state for USA, province for Canada, and either prefix or country abbreviation for DX. Contacts without some location indicator will be ruled invalid.

Scoring: Contacts with stations in own country, 2 points. Contacts with other countries on same continent, 5 points. Contacts with other continents, 10 points. *Maritime mobile contacts count 5 points. There is no longer any multiplier value for a maritime mobile contact.*

Multiplier: Each continental U.S. State (48), Canadian area (13), and DX Country. KL7 and KH6 are considered DX and not states for this contest. DX countries are DXCC plus WAE (IT, GM Shetland Islands, et al). Canadian areas include VO1, VO2, NB, NS, PEI, VE2, VE3, VE4, VE5, VE6, VE7, NWT, and Yukon. Do not count States and Canada as separate countries. Remember that maritime mobiles no longer count as a multiplier.

Final Score: Total QSO points times the sum of all multipliers (states, VE, DX countries).

Penalties: Three additional contacts may be deleted for each unacknowledged duplicate or unverified contact removed from the log.

Disqualification: A log may be disqualified for violation of amateur radio regulations, unsportsmanlike conduct, or claiming excessive duplicate/unverified contacts or false multipliers. If the corrected score without penalties shrinks more than 3%, disqualification will be considered. A warning may be issued if an entry borders on disqualification, and the calls of those warned or disqualified will be printed with the results!

Awards: Certificates will be awarded to the top scorers in each class by state, Canadian area, and DX country. Runners-up with high

scores over 100,000 may also receive certificates. Low power or QRP entries may also receive certificates if there is sufficient activity or the score is outstanding. The following plaques, with donating sponsors as indicated, will be awarded for exceptional efforts.

1995 PLAQUES SINGLE OPERATOR

	CW	SSB
World (N5JJ Memorial)	K5AAD	K5AAD
USA	K4TEA	K4JRB
Canada	W8BLA	K5NA
Zone 3 USA	KM4MG	N4ONI
Zone 4 USA	KI4XO	KC4MJ
Zone 5 USA	WA4CUG	K4ODL
Europe	N4TMW	N4NX
Africa	K4MZW	WB4ZNH
Oceania	KM4FV	K4DLI & KB4SSS
Asia	NE4S	W8BLA
Japan*	W0ZV	—
S. America	K4JAG†	AE6E
N. America**	CQ	CQ

MULTI-OPERATOR

World	N4RJ	Southeastern DX Club
USA	WS9V	WB9Z

*There is no SSB operation allowed in Japan at present.

†Roy V. Brewer, W4UUH Memorial plaque.

**N4IN Memorial plaque. North America outside USA and Canada.

The procedure for the plaques is that the top scorer in the indicated area wins the plaque. However, a station can only win one plaque per contest section. The plaque is then awarded to the next highest scoring station. For example, WX8ZZZ wins top World multi-operator. Then the next station in the U.S. wins the U.S. plaque.

Volunteer DX Window: 1830 to 1835 kHz should be left clear for DX stations for intercontinental QSOs in both contests. Note this is voluntary but essential if the contest is to continue to attract rare DX as entries. USA, Canadian, and European stations should refrain from using the window for local contacts. Let's all make this work and increase our scores! This is a gentleman's contest and band, so let's help make intercontinental contacts happen.

Computer Logging: Please send us your computer disk. IBM, MS-DOS compatible disks are encouraged. The format we prefer is your CT.Bin or NA.Bin file. If you use a program different from the one mentioned above, the generic format should contain a vertical single column of calls in chronological order. The

committee will require, on request, a disk for any possible high score, provided that the paper log or dupe checking material as originally submitted was a computer printout. The outside of the disk should be clearly labeled with the call of the entrant, the files included, the mode (SSB or CW), and the category. Disks **must** be accompanied by a paper log satisfying all logging instructions.

Manual Logs: Sample log and summary sheets may be obtained from CQ by sending a large SASE with sufficient postage to cover your request. You can make your own with 40 contacts per page with columns for GMT, exchanges, multiplier, and points.

Dupe/Check Sheets: All logs over 200 contacts must provide a check sheet or dupe list. A check sheet or dupe list is a list of all calls in alpha sorted order.

For All Logs: Show the multiplier only the first time it is worked. Each page must have sub-totals for multipliers, contacts, and points. A running total below the sub-total on each page is recommended. Dupe or check sheets with every entry are requested and are required with over 200 QSOs. Include a summary sheet with your entry showing the scoring and other essential information. Include a printed name/mailling address and a signed declaration that all rules have been observed. Please put the summary sheet at the front of the log. All logs should clearly indicate total multiplier, W/VE multiplier, and DX multiplier.

Club Competition: Any club that submits at least three logs can enter the Club Competition. The name of the club must be clearly identified under club competition on the summary sheet. Club competition is a "for fun" competition to foster more activity. There is a separate listing for the club scores.

Log Submissions: Mailing deadline for CW entries is February 28, 1994, and March 31, 1994 for the SSB section. *Exception:* You may send both logs in one package as long as the CW log is received by March 31, 1994. Try to mail early to assure receipt. For a return receipt enclose an SASE or SAE with postage or 1 IRC. Avoid the registered postal route, as this delays getting the log until someone can sign the receipt! Finally, proof read your log before submission. Each year many errors are corrected that you should catch! Logs or sections of a log that are unreadable will be disqualified.

Send all logs to 160 Meter Contest Director David L. Thompson, K4JRB, 4166 Mill Stone Court, Norcross, GA 30092 USA. **Please indicate CW or SSB on the envelope.**

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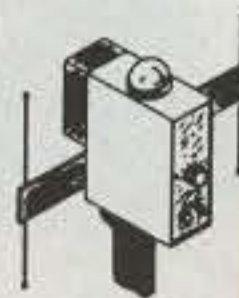
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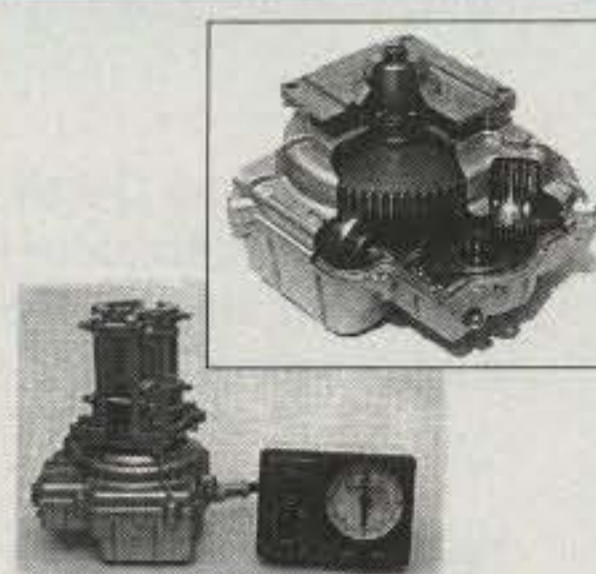
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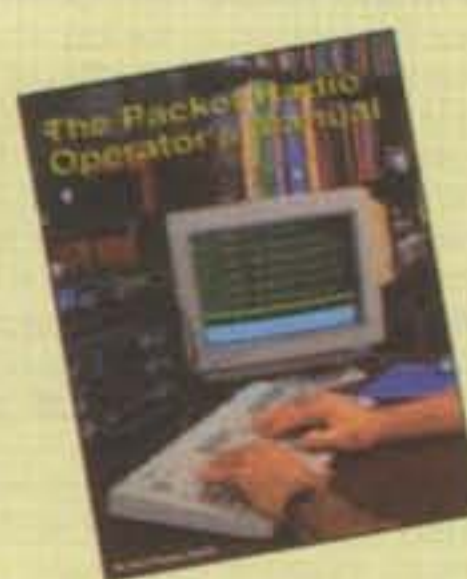
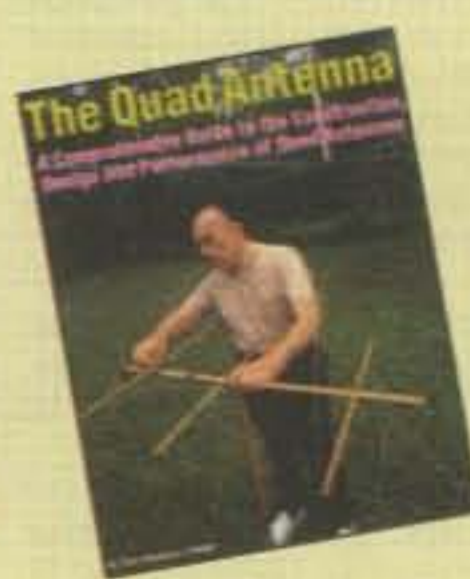
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If you're like most hams, you'll be fascinated by the thousands of facts, tables, graphs, maps, and other information to be uncovered in the CQ 1994 Amateur Radio Almanac. Compiled by Doug Grant, K1DG, CQ's Almanac puts it all right at your fingertips, providing a resource that you'll refer to over and over again. If you're looking for it, it's in the Almanac! **Order No. BALM\$19.95**

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This book is the perfect operating guide for both the new and experienced VHF enthusiast. Developed by CQ VHF Columnist, Joe Lynch, N6CL, this book is the ideal reference tool for all phases of VHF operating. Learn more about packet, EME, satellite, ATV, and repeater operation. You'll also find a complete tutorial on exotic propagation modes as well as pages of data and sources for additional information. **Order No. BVHF\$15.95**

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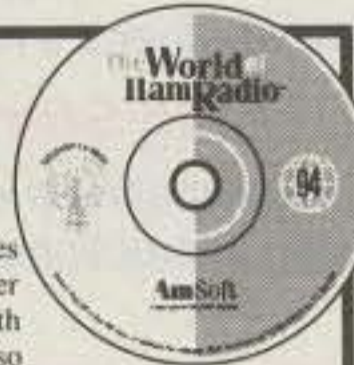
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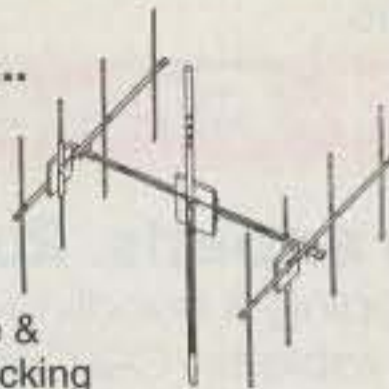
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FOR SALE: ICOM AT-500 automatic all band antenna tuner. It was set up but not used. \$350 plus shipping. W3BVM, phone 813-283-7672.

FOR SALE: QST/HR/73 and misc. publications. SASE, Ernie Guimares, KA1VY, P.O. Box 1262, Lakeville, MA 02347-7262.

WANTED: Millen Mu-Metal shield with/without graticle for 3 inch round oscilloscope tube. Call 613-729-1184.

WANTED: Swan 117XC power supply. Richard, WA0KKC, 7139 Hardy, Overland Park, KS 66204 (913-432-5136).

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FOR SALE: President, HR-2600 10 Meter All Mode Transceiver, \$100. Ask for Gary, N6BJF, 503-474-6466. WANTED: HANDBOOK, CIRCUIT, DETAILS, etc., of Texscan Spectrum Analyzer AL-51A. Any information greatly appreciated and all cost refunded. Send details to Ben Nock, G4BXD at 62 Cobden Street, Kidderminster, Worcs. DY11 6RP, England, or via packet to G4BXD@GB7BBS.#28.GBR.EU.

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CRYSTALS: SASE for my list. K8LJQ, 2023 Lannen Road, Howell, MI 48843.

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ANNOUNCEMENTS

(from p. 6)

Nov. 5, **6.91 Friendly Fest**, Waukesha County Expo Center Arena "Round Building," Milwaukee, Wisconsin. Contact Milwaukee Repeater Club, P.O. Box 2123, Milwaukee, WI 53201. (Exams.)

Nov. 5, **Northeast Texas Fall Hamfest**, Hopkins County Regional Civic Center, Sulphur Spring, Texas. Contact Hopkins County ARC, c/o Nathan Bailey, 1510 San Jacinto, Sulphur Springs, TX 75482 (903-885-3555 after 7:30 PM Central). (Exams.)

Nov. 5-6, **Eleventh Annual Odessa Hamfest Convention**, Holiday Inn Convention Center, Odessa, Texas. Contact N5RKN, Robert Jordan, at 915-335-7980 (evenings).

Nov. 6, **The Carthage ARS 1994 Hamfest**, Memorial Hall, Carthage, Missouri. Call Jim Dixon, WX0J, at 417-358-4126. (Exams.)

Nov. 6, **Fox Cities ARC Hamfest**, Starlite Club, Kaukauna, Wisconsin. Contact FCARC, Dan Vanevenhoven, N9LVS, 2410 E. Newberry, Appleton, WI 54915, or call 414-739-5101. (Exams.)

Nov. 11, **Fairlawn ARC Ham Radio/ Computer Auction**, Fairlawn, New Jersey. Contact Gary, KB2LCA, at 201-791-3841 (Friday eves. only).

Nov. 12, **Mayflower ARC 4th Annual Flea Market**, Plymouth Memorial Hall Building, Plymouth, Massachusetts. Contact Jon, WS1K (508-746-0162); or Jim, NM1F (508-747-2224 eves.).

Nov. 12, **BeachFest '94 Hamfest and Computer Show**, Myrtle Beach High School, Myrtle Beach, South Carolina. Contact Robert Battle, 803-236-2887, or Gordon Mooneyhan, 803-293-3839, or write to GSARC, P.O. Box 2135, Myrtle Beach, SC 29578-2315. (Exams.)

Nov. 12, **17th Annual Montgomery Hamfest and Computer Show**, Garrett Coliseum, S. Alabama State Fairgrounds, Montgomery, Alabama. Contact Hamfest Committee, c/o 1111 Diane Drive, Prattville, AL 36066; or phone Jiggs at 205-365-0380 or Fax 205-264-1150. (Exams.)

Nov. 13, **Southcentral Connecticut ARA 15th Annual Flea Market**, Branford Intermediate School, Branford, Connecticut. SASE to SCARA, P.O. Box 705, Branford, CT 06405-0705; or call Brad, 203-265-9983 (24 hrs.). (Exams; handicapped accessible.)

Nov. 19, **Westshore Hamfest and Computer Expo**, Holland Christian High School, Holland, Michigan. Contact Joe Campbell, N8TGX, 616-772-4928 after 6 PM, or Westshore Hamfest, c/o Joe Campbell, 10413 Northfield Drive, Holland, MI 49424. (Exams.)

Nov. 19, **Amateur Radio and Electronics Auction**, Bull HN, 300 Concord Road, Billerica, Massachusetts. Contact Eliot Mayer, W1MJ, 508-851-0183; E-mail: 73210.3104@compuserve.com.

Nov. 19, **Socorro Hamfest**, Finley Gym, Socorro, New Mexico. Contact Dave, N1IRZ, 505-835-1218; for information regarding exams contact Kalman, AJ5B, 505-835-5225. (Exams.)

Nov. 19-20, **Fort Wayne Hamfest and Computer Expo**, Allen County Memorial Coliseum, Fort Wayne, Indiana. Call John Rufner, KB9BNI, 219-483-6305 (tables); Don Gagnon, WB8HQS, 219-484-3317 (general questions); or write ACARTS, P.O. Box 10342, Fort Wayne, IN 46851. (Exams.)

Nov. 19-20, **Ham Expo Weekend '94**, SUNY Stony Brook, Long Island, New York. For information, contact John Mark, KB2QQ, 516-689-6343; or Emil Tillona, KD1F, 516-696-0610. (Exams.)

Nov. 19-20, **19th Annual Suncoast Amateur Radio & Computer Convention**, Expo Hall, Florida Expo Park (formerly Florida State Fair Grounds), Tampa, Florida. Contact Bill Smith, WD4HHA, 813-837-4533; or write Bill Smith, 4402 Henderson Blvd., Tampa, FL 33629. (Exams.)

Nov. 20, **JARFEST '94**, American Legion Complex, Benson, North Carolina. Contact Bill Lambert, AK4H, 8917 NC 50 N., Benson, NC 27504 (919-894-3352, evenings 7-9 PM).

Nov. 26, **Evansville Hamfest**, Vanderburgh County 4-H Center, Vanderburgh County Fairgrounds, about 5 miles north of Evansville, Indiana. Contact Bev, KA9PDG, 812-479-5741; or write EARS, 1506 S. Parker Dr., Evansville, IN 47714.

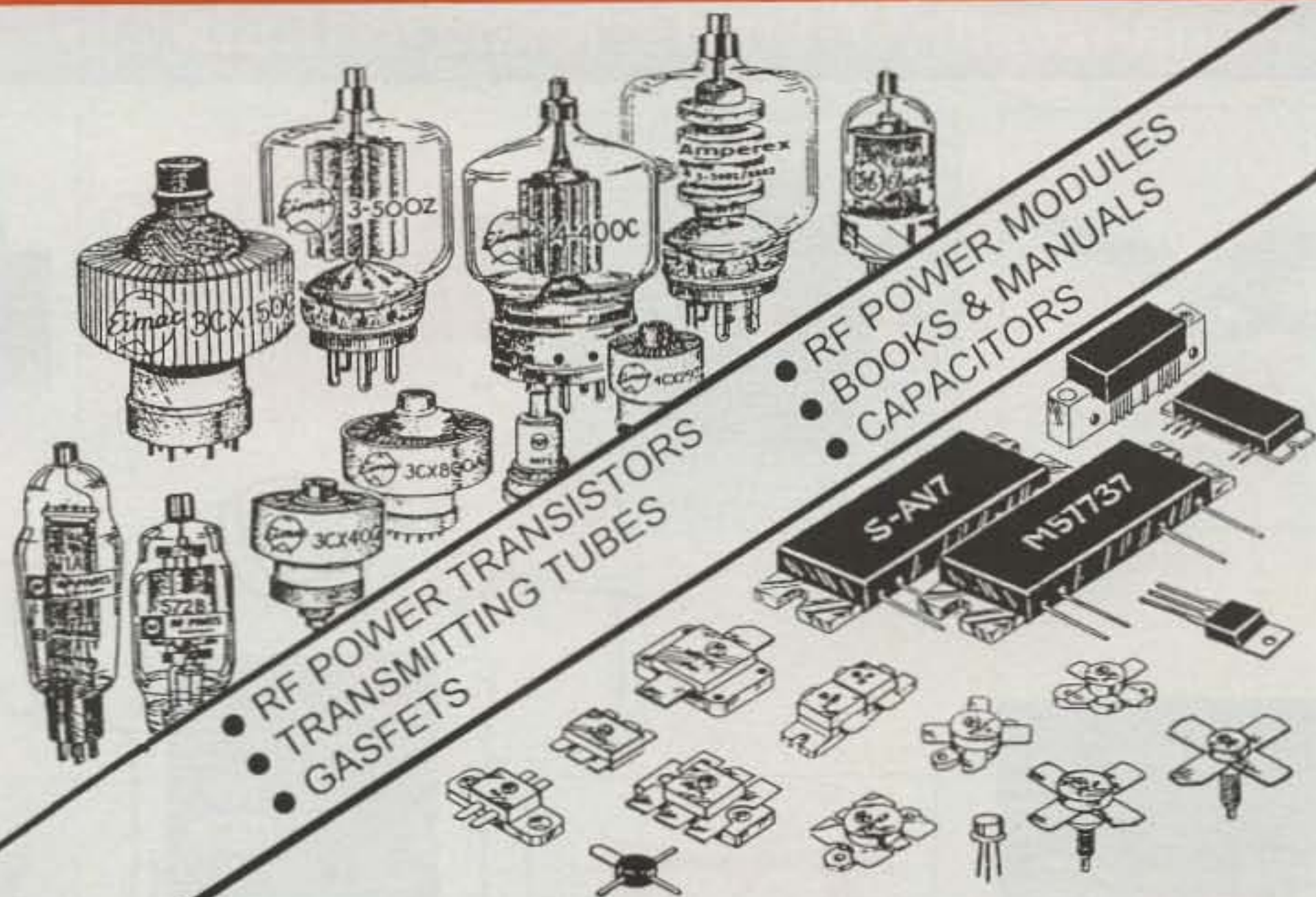
Nov. 27, **Wheaton, Illinois Winterfest**, DuPage County Fairgrounds, Wheaton, Illinois. Call 708-690-1492, or write to GMRS, 2077 W. Roosevelt Rd., Wheaton, IL 60187.

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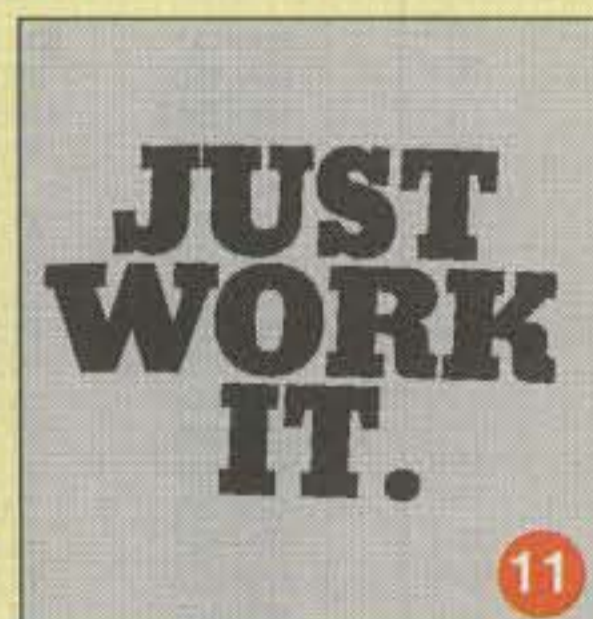
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FT-5100.....50	FT-11R.....30



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2 Meter/70cm Mobile
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IC-2700H
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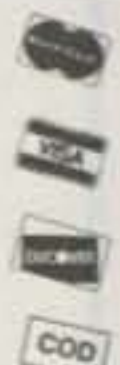
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 - FT-530
 - G-2700SDX
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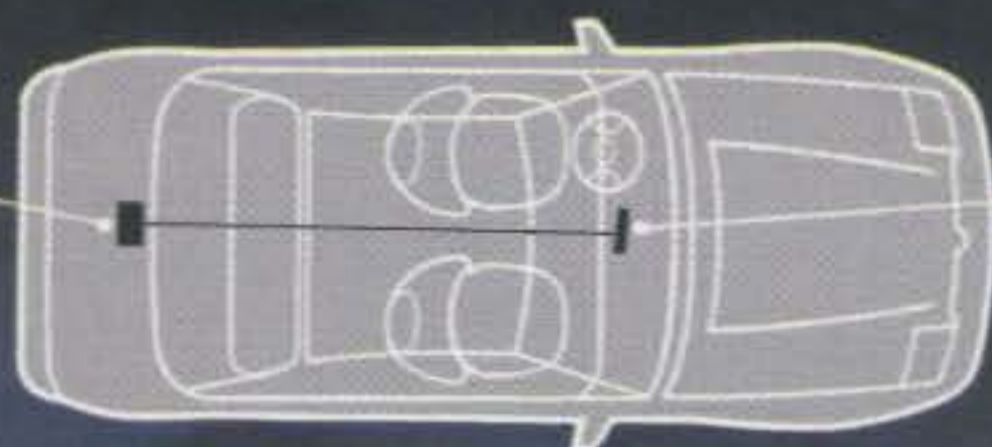
The Yaesu Holiday Sale is on! Cash off, at the register! From October 1, 1994 through January 8, 1995! Don't miss these great savings on 15 super Yaesu products from the exciting FT-1000D to the popular FT-11R! See your Yaesu dealer for details and fill those holiday wish lists now!

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YAESU

Choice of the World's top DX'ers

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- Large, Bright Omni-Glow™ LCD Display
- 100W on SSB, CW, FM modes; 25W on AM
- IF Shift and 30db Notch Filter
- Digital S/R, SWR & ALC Meters
- Programmable CTCSS Encode w/Repeater Offset
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- SP-6 Base Station External Spkr.
- DVS-2 Digital Voice Recorder
- FP-800 20A HD Power Supply
- YH-77ST Headphone



NEW HF

Introducing an HF

"With the small snap-off remote front panel design, it's an HF mobile."

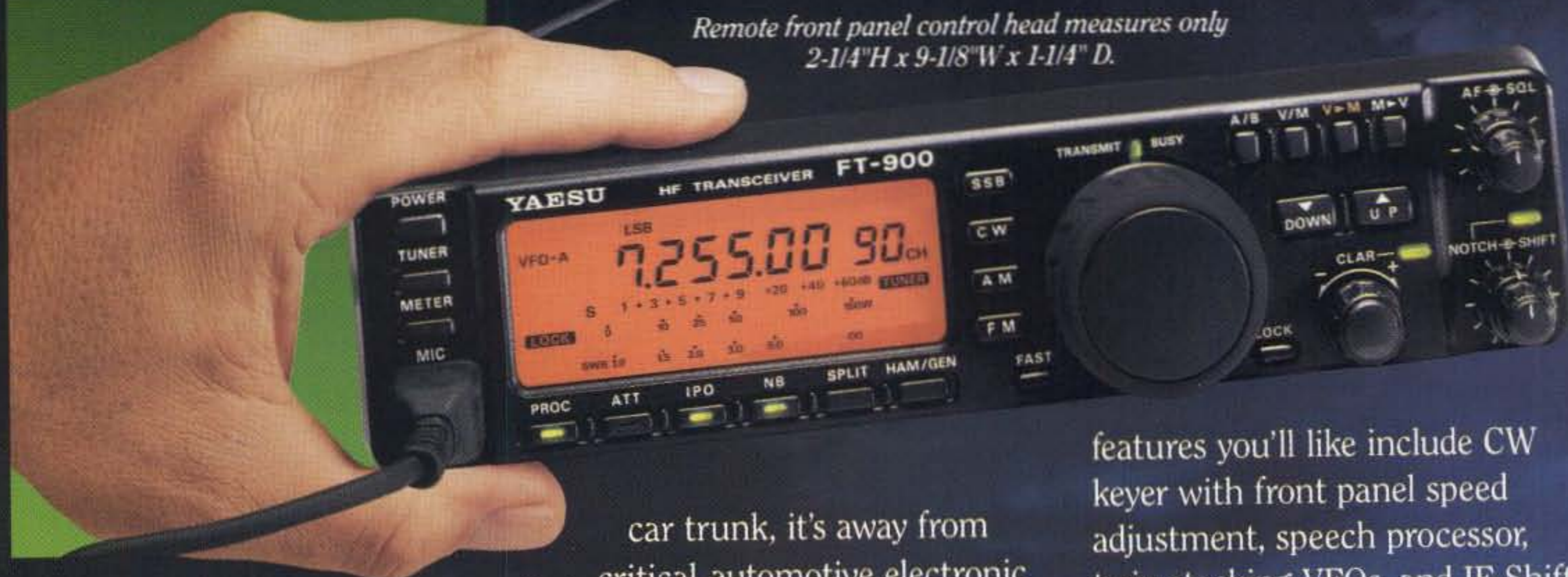


"It's a great base, too. Direct keypad entry, built-in antenna tuner, CW keyer with adjustable speed, 100 Watts, Omni-Glow display... Wow!"

"Yaesu did it again!"



Remote front panel control head measures only 2-1/4"H x 9-1/8"W x 1-1/4" D.



Uncompromising HF quality that will change your lifestyle. It's the first transceiver with true HF technology to go mobile in any vehicle or stay at home as a compact base station.

With its revolutionary, small, snap-off remote panel, the controls of the FT-900AT can install almost anywhere in your car, truck or camper. Since the 100 Watt RF deck can be installed under a seat or in your

car trunk, it's away from critical automotive electronic wizardry. And, for ultimate convenience, the built-in antenna tuner simplifies in-car operation.

As a base station, the compact full function FT-900AT includes direct keypad entry for pinpoint accuracy during quick band/frequency changes. Other

features you'll like include CW keyer with front panel speed adjustment, speech processor, twin stacking VFOs, and IF Shift and Notch. No competitor offers this! Bonuses, such as signal strength, power output, SWR and ALC digital meters, add value to the FT-900AT, and the proven duct-flow cooling system provides excellent long-term transmit power output reliability and frequency stability.



The FT-900AT controls mount almost anywhere in your car, truck or camper.

The Choice is Yours...

The new IC-2700H or IC-2340H give you a choice of features and budget. Choose the one that best fits your needs. Either way you win... it's an ICOM!



IC-2700H with supplied HM-92 DTMF Microphone.

IC-2700H

- Covers 2 M (144-148 MHz) and UHF (440-450 MHz)
- 50 W VHF, 35 W UHF (selectable)
- Detachable Front Panel
- 3 Channel Scratch Pad Memory
- Separate Tuning Dial, Volume and Squelch Control for Each Band
- FULL Remote Control Microphone
- INFRARED Wireless Microphone (opt.)
- 3 Repeater Quick Memories
- 118 Total Memory Locations
- Remoteable DTMF Control
- Auto Repeater Duplex Direction
- V/V or U/U - Simultaneous Receive of 2 Signals on the Same Band
- Built-in Pager and Code Squelch
- 24 Squelch Levels
- One-touch PTT with Time-out Timer
- Tone Scan (w/optional UT-84)



Wireless IC-2700H HM-90 infrared mic (optional).

IC-2700H

The IC-2700H features a **Detachable Front Panel**. With the optional mounting kit you can mount the faceplate in an easy-to-see location while keeping the main body in a secure place, such as the trunk of your car. With its **Easy to Read Display**, all indications are visible and separate for each band providing safe operation while driving.

The IC-2700H has **Independent Controls and Switches** for each band. Often-used

dials and switches for each band are duplicated, providing true dual band operation in V/V, U/U or V/U modes.

The supplied **DTMF Microphone** provides **full remote control of all transceiver functions**. The optional **Wireless Infrared Microphone** also provides full control. The IC-2700H can even be controlled by a passenger in the back seat of a vehicle! Talk about back seat driving!

Transmitted frequencies are automatically entered into **Scratch Pad Memories** for easy recall. Each band has 6 scratch pads, 3 for duplex settings (repeater

use) and 3 for simplex settings. The **Memory Allocation Function** allows you to divide the memory channels between bands to suit your preferences - 20 to 80 memories can be allocated to a band for a 2 band total of 100.

The **Auto Repeater Function** automatically selects the proper duplex offset direction, allowing you to work repeaters with ease.

The optional **Tone Scan Function** scans for and sets the subaudible tone frequency being transmitted by another station for you. This is especially helpful when travelling in unfamiliar territory.

IC-2340H

- Covers 2 M (144-148 MHz) and UHF (440-450 MHz)
- 45 W VHF, 35 W UHF (selectable)
- Independent Controls
- 110 Total Memory Locations
- Auto Repeater Offset Function
- Remote DTMF Mic (opt. UT-55)
- 14 Autodialing Memories
- Direct Frequency Input
- One-push Action Buttons
- Built-in Duplexer
- 2.4 W Audio
- Large, Easy to Read Display
- Tone Scan (opt. UT-89)
- Voice Synthesizer (opt. UT-66)
- Optional Pager and Code Squelch
- Optional Tone Squelch and Pocket Beep

NEW LOWER PRICE!



IC-2340H

The IC-2340H offers **Independent Controls and Switches** for each band (VFO/MHz, Memory/Call, Volume/Squelch and main tuning dial) for **True Dual Band Operation**. Both frequencies are "stacked" for quick visual reference and greater driving safety.

Easy to read in ambient light or direct sunlight, the IC-2340H's **Large**

OR...True Dual-Band Operation

IC-2340H with supplied HM-77 DTMF Microphone.

Display is easy to view and operate, even while driving.

The IC-2340H features **110 Memory Channels** (each band

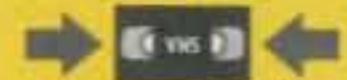
has 50 regular memories, 2 scratch pad memories, 1 call channel and 2 scan edges).

One Push Button Controls allow you to adjust functions on your IC-2340H with a single push of a button. This offers increased operating convenience and safety while driving.

The IC-2340H also offers both an **Auto Repeater Function** and optional **Tone**

Scan Function. Just as with the IC-2700H, the IC-2340H will automatically select the proper duplex and offset direction for repeater operations. It will also scan for and set the subaudible tone frequency being transmitted by other stations.

View a video demonstration of this radio



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