

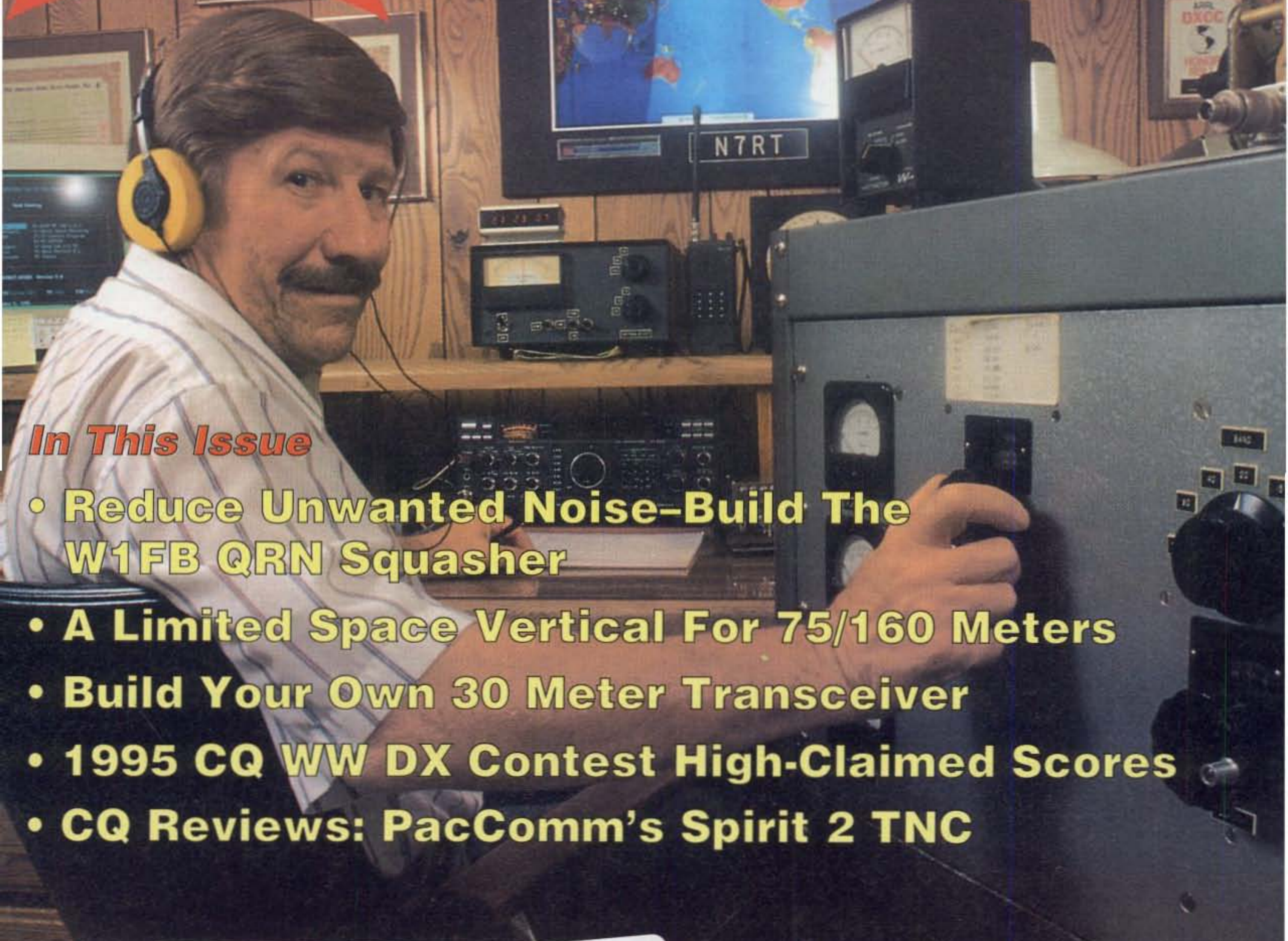
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# Amateur Radio

SERVING AMATEUR RADIO SINCE 1945

JUNE 1996

# CQ



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- **Reduce Unwanted Noise—Build The W1FB QRN Squasher**
- **A Limited Space Vertical For 75/160 Meters**
- **Build Your Own 30 Meter Transceiver**
- **1995 CQ WW DX Contest High-Claimed Scores**
- **CQ Reviews: PacComm's Spirit 2 TNC**

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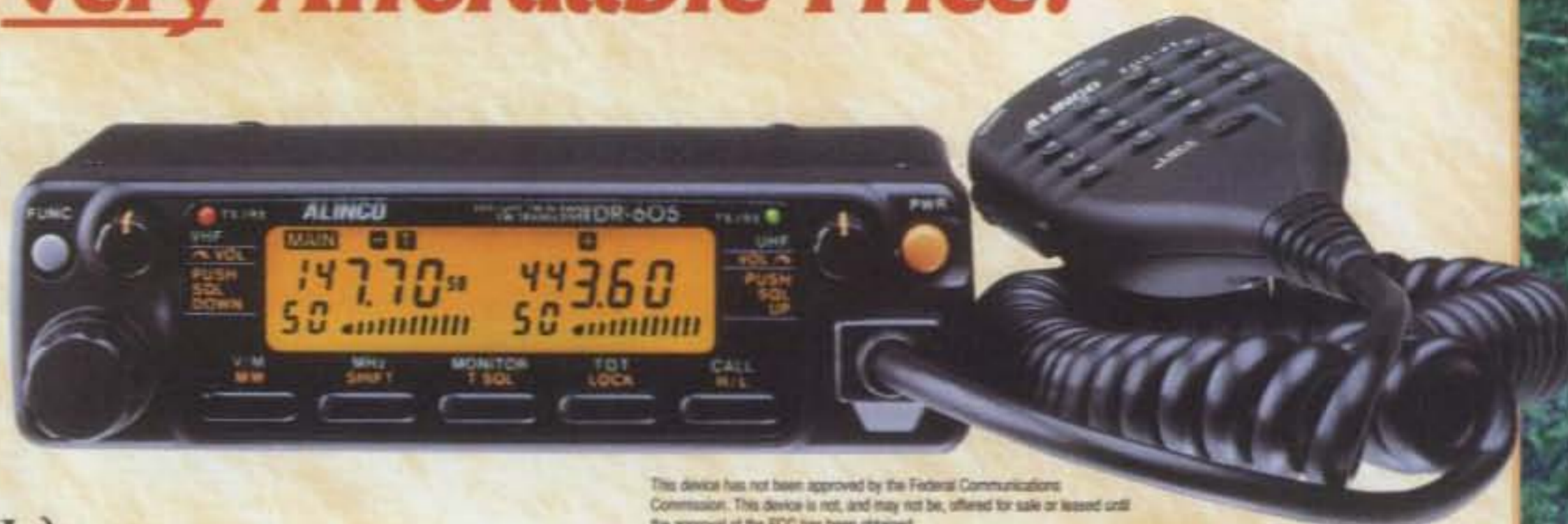
Editor: Hardy Landskov, N7RT, Phoenix, AZ

THE RADIO AMATEUR'S JOURNAL

# THE NEW DR-605T DUAL BAND MOBILE/BASE

**Full 2 Meter/440 Performance  
at a Very Affordable Price!**

- 100 memory channels, each capable of cross-band or "odd-split" storage PLUS a "call" channel for each band
- CTCSS encode PLUS European tone bursts (1450, 1750 and 2100 Hz) Ready to travel the world!
- Cross-band repeat and full duplex capability
- 9600 bps packet ready with dedicated terminals
- Internal duplexer — one easy antenna connection
- RX-VHF 136-173.995 MHz, UHF 420-470 MHz
- TX-VHF 144-147.995 MHz, UHF 430-449.994 MHz



This device has not been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or leased until the approval of the FCC has been obtained.

- MARS/CAP modifiable (permits required)
- OUTPUT H/L — 50/5 watts VHF, 35/5 watts UHF
- Time-out timer (ideal for repeater and packet operation)
- Large controls, easy to operate, easy to program
- With the optional EJ-24U CTCSS Tone Decoder, unit can operate in "tone squelch" receive AND search (tone scan) for a specific CTCSS tone in a received signal

Alinco breaks the 2 meter/440 mobile radio "price barrier" with the full-performance DR-605T. But a low price doesn't mean "bare bones" or that you need to purchase costly extras. The DR-605T is loaded with popular features! In addition, it's easy to operate, has large control buttons and a large, easy-to-read display.

Alinco engineers listen to what today's Amateur Radio operators are saying. The DR-605T is the answer for those who want a full-featured dual-band radio that's easy to operate at an affordable price.

**Simple ■ Clean ■ Dependable**



**THE NEW VALUE LEADER IN AMATEUR RADIO™**

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Specifications are subject to change without notice or obligation. Performance specifications only apply to amateur bands. Permits required for MARS/CAP use.

# Free Accessories

## THIS IS HOW IT'S DONE.

When you purchase a new radio, part of the fun is getting a few extra accessories. It's even more fun when they're FREE. That's why when you purchase any of the Alinco Radios listed here **before June 30, 1996**, you can get a free accessory bonus! This is how it's done.

Buy the **DJ-G5T Two Meter + 440 Hand-held** and get:

the **EMS-9 speaker-microphone**  
**AND your choice of a soft case**  
**(A \$54 value)**

Specify ESC-28 for EBP-33N battery; ESC-29 for EBP-37N battery; or ESC-30 for EBP-34N, EBP-35N and EBP-36N batteries.

Buy the **DR-130T Mobile/Base Two Meter Radio** and get:

a **packet radio TNC interface cable** PLUS  
your choice of EITHER the **EJ-19U 100 memory expansion module**  
**(A \$43 value)** OR the **EJ-20U CTCSS tone decoder unit** **(A \$56 value)**

Buy the **DR-150T Mobile/Base Two Meter Radio**  
and get:  
the **EJ-20U CTCSS tone decoder unit**  
**(A \$41 value)**

Buy the **DJ-191T Two Meter Hand-held Radio**  
and get:  
the **EDC-36 filtered DC cigar lighter power cord**  
**(A \$21 value)**

Buy the **DJ-G1T Two Meter Hand-held Radio**  
and get:  
the **EJ-16U CTCSS tone decoder unit**  
**(A \$57 value)**

Buy the **DX-70T Mobile/Base HF**  
and get:  
the **EBC-9 mobile mounting bracket** AND  
the **EDS-4 remote mounting cable**  
**(A \$63 value)**

Buy the **DR-610T Two Meter + 440 Mobile/Base Radio** and get:  
the **EBC-8 remote head mounting bracket** AND the  
**EDS-3 remote mounting cable**  
**(A \$55 value)**



**THE NEW VALUE LEADER IN AMATEUR RADIO™**

**438 Amapola Ave.**  
**Suite 130**  
**Torrance, CA 90501**  
**Phone: (310) 618-8616**  
**Fax: (310) 618-8758**  
**Internet: <http://www.alinco.com>**

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### ALINCO® RADIO Free Accessory Offer

Model: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Purchase Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

Name: \_\_\_\_\_ Call Sign: \_\_\_\_\_

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City: \_\_\_\_\_ State \_\_\_\_ Zip: \_\_\_\_\_

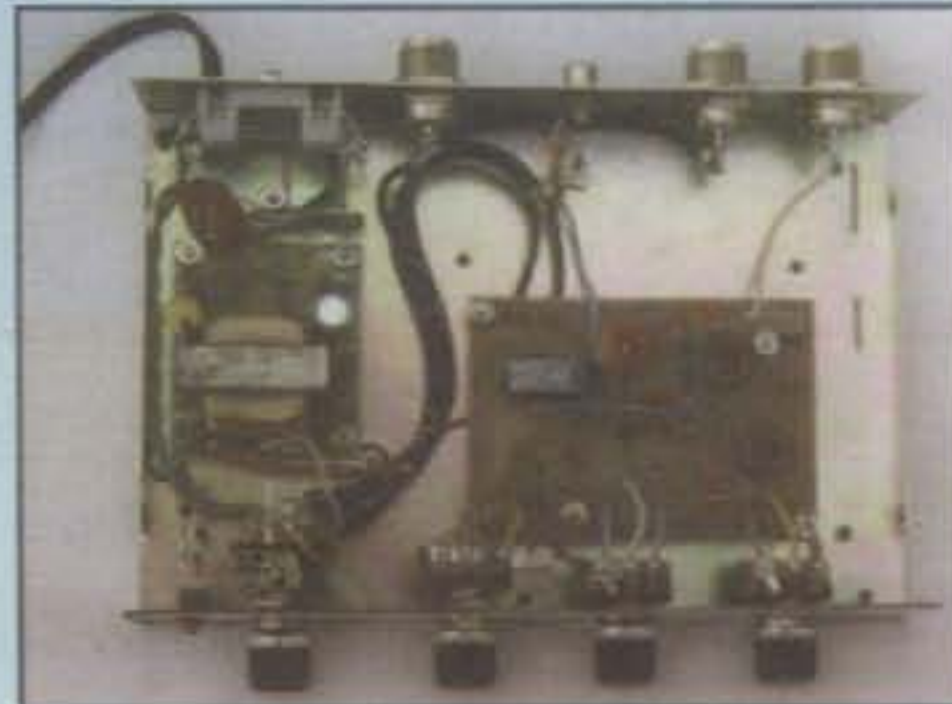
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Mail this form with a copy of your sales receipt to Alinco® Radio. Please allow 4 to 6 weeks for delivery. This offer not valid with any other. Offer valid in the U.S.A. and Canada between 3/1/96 – 6/30/96 and must be postmarked no later than 7/5/96. Void where prohibited. Not valid with any other offer.



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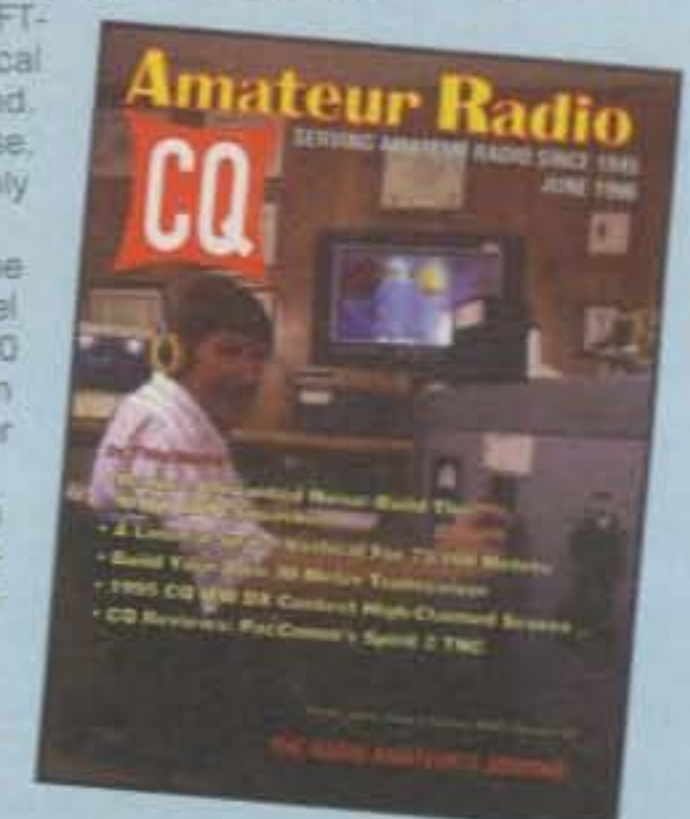
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**ON THE COVER:** "Radio" should be the middle name of Hardy Landskov, N7RT, of Phoenix, Arizona. Hardy's passion is radio technology: he works as a radio engineer for Motorola by day and experiments by night. His FT-990, while appearing untouched, is a technological marvel with virtually every receiving circuit modified. Hardy's station is complemented by his old workhorse, a homebrew 3-1000Z, built in 1971 and running on only its second tube!

Outside, Hardy's station is first-rate as well. One tower supports a 2-el 80M Yagi at 140 ft. and a 4-el 40M KLM at 150 ft. There's also a homemade 10/15/20 meter quad (7 elements on 10M and 5 elements on 15/20M) on a 40 ft. boom at 112 ft. on the other tower (see March 1977 QST for details).

In addition to radio, Hardy enjoys working on engines, sailing, and skiing. His wife, Arlene, is currently studying Morse code and should be joining our ranks shortly. (Photo by Larry Mulvehill, WB2ZPI)



# HF Travels - So Enjoyable With Your TS-50S!

## Powerful Portability

Kenwood's popular TS-50S is an extra-compact HF transceiver that's perfectly sized for mounting in a vehicle or taking on a DXpedition. Yet it's powerful too, offering spectacular TX/RX performance that's on a par with the big rigs. Maximum RF output is 100 watts (25W on AM), and all modes — LSB, USB, CW, AM and FM — are supported. The new ultra-light PS-40 compact switching power supply (option) is great for travel.

## Intuitive Menu System

When time's at a premium, the user-friendly menu system allows you to rapidly adjust just about any setting with a minimum of fuss. The menus are also accessible via the supplied microphone.

## TS-50S HF TRANSCEIVER



Operating ease is further enhanced by 100 memory channels and extensive scan functions.

## DDS with Fuzzy Logic Control

The fuzzy logic control circuitry allows for slow or fast tuning of the band.

## AIP (Advanced Intercept Point)

Kenwood's renowned AIP system raises dynamic range to 105dB, giving the TS-50S first-class receiver performance.



PS-40

Super lightweight companion  
switching supply for TS-50S

## Other Features

- RF output power control (100W, 50W, 10W)
- Large LCD panel with digital bar meter
- Auto-mode capability
- Dual VFOs (A and B)
- TF-SET
- Carrier-operated scan stop mode
- Switchable AGC circuit (SLOW/FAST)
- All-mode squelch
- CW reverse mode
- 20dB attenuator
- IF shift ■ Noise blanker
- Multi-function microphone supplied
- Optional YK-107C 500Hz CW filter
- Optional AT-50 external antenna tuner
- Optional PS-40 switching power supply
- Optional TC-50 travel case



## TS-60S

50 MHz ALL-MODE TRANSCEIVER

## 6-Meter All-Mode Performance

Confidently holding its own against much larger rigs is the TS-60S 50MHz all-mode transceiver. Thanks to a pair of MRF492 final transistors, it delivers an impressive 90 watts in SSB, CW and FM modes (23W in AM).

## First-Rate Interference Reduction

In addition to Kenwood's AIP circuitry, the TS-60S is equipped with IF shift (SSB & CW), a 20dB attenuator, CW reverse mode, and a pulse noise blanker. A 500Hz CW filter is optional.

## 100 Memory Channels

The TS-60S may be small in size but it's big on memory: 100 channels store transmit and receive parameters such as frequency, mode, and filter settings. Memory shift transfers data directly to the VFOs.

## Multi-Function Microphone

The supplied MC-47 remote-control microphone has 4 programmable function keys that provide rapid access to chosen menu functions — perfect for mobile operation.

## Other Features

- DDS (Direct Digital Synthesizer) with fuzzy logic control
- Large LCD panel with digital bar meter
- Auto-mode capability ■ Dual VFOs (A&B)
- Dual-menu system ■ All-mode squelch
- Switchable AGC circuit (SLOW/FAST)
- Full break-in and semi break-in
- TF-SET ■ TO and CO scan stop modes
- Relay & ext. ALC terminals
- 3-position RF output power control
- Dimmer control ■ Auto power-off
- Optional PS-40 switching power supply
- Optional TC-50 travel case

ISO 9002

Meets ISO Manufacturing  
Quality System

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# ZERO BIAS

## AN EDITORIAL

**W**hat is your scansorial potential? *Scansorial* is one of those great words that you think you should know, or that sound like something that has nothing to do with the word's real meaning. It's also a bit frustrating when you can't figure out the meaning from the context in which the word is used. *Scansorial* came up as one of a list of words supplied to me by Wayne, W4MPY, as sort of an editorial challenge. I'm supposed to use these words in future editorials and in context. Obviously, thanks to Wayne I have spent some time checking out my dictionary.

*Scansorial* has nothing to do with scanners or the ability to scan. (I guess that was too obvious.) It's an adjective describing something in terms usually meant for something else. It stems from a class of birds and the position of their toes, which makes these birds able to do what we amateurs take for granted. The word means capable of or adapted for climbing. We who hoist copper wire and aluminum tubing as high up as humanly and legally possible have been known to climb just about anything. So thanks to Wayne and a bit of obfuscation, we finally get around to the topic of antennas.

Antennas have become an interesting topic of conversation again. It's not so much the imminent need. However, some people have seen the warm glow of light at the end of the tunnel. Those who have lived, prospered, and found niches on honor rolls and all-time records through one or more sunspot cycles are chortling in the spring-fever anticipation of the new cycle. There are those who know, with that wary inner eye, that it's all coming back, and this time they intend to do it better. Hence, antennas bigger and much better than last time. It's the subtle musings and willingness to sacrifice to the RF deity that separates those who have been there before from those who are about to be bitten by the bug. Those who know are quite willing to cast out the naysayers who tell us that at the height of a cycle a wet noodle is just as good and will work just as well. It isn't and it won't.

We have sat out our quiet time, like tribesmen around a communal fire, swapping great stories of fabled DXpeditions and wondrous contest accomplishments. Those new to the tribe are not quite sure whether or not to believe the stories, but they listen anyway, hoping to pick up the skills needed just in case the stories are true. We have spent our time comparing notes on what we haven't heard and how dead a band can really get. However, many of us, unlike our kindred tribesmen, know that the sun will shine again and the hunt will continue.

Most of us who have lived through a cycle or two know that the "world" simply didn't go away overnight. No giant switch in the sky was thrown to the Off position only to be

thrown On a couple of years later. The "world" won't come back all at once either. Each is a gradual process. It's what you hear and how well you hear that determines how fast more of the "world" comes back to you. With more metal up there you increase the likelihood of you hearing more of them and them hearing more of you.

We're still in the germinal stage of this new cycle, and the antenna bug has bitten several people I know. In fact, one of the staffers here at *CQ* (no name and no QTH for obvious reasons) recently had 70 bags of ready-mix cement delivered to his house. The cement disappeared into a hole in the ground that same day. I think that something tall will sprout out there in the next few weeks.

If you think about it, though, this is probably the best time to get started preparing for this new cycle. Most of us look at the cycle's rise time as a long way off, so we tell ourselves there's plenty of time to get started. At some point there's a sort of plateau. Everything is going great considering what you're working with, and you don't want to chance missing out on anything by taking down what you have. Then comes the decline, however slow, where you can rationalize that it really doesn't matter, as things will only get worse bit by bit, so why bother. It's a circular logic that doesn't go anywhere, but makes you angry over wasted time and also makes you somewhat envious of those who took advantage of the time.

Even those who generally rail and rant against overcrowded band conditions, too many contesters, and too many DXpeditions have been stilled by our solar quietus almost to the point where their stomach acid has been neutralized. They, too, know what's coming up and are rearing to go. Our families have gotten used to being reacquainted with us and almost take for granted our availability and willingness to attend social functions. That too will slowly change. Little by little that healthy glow we've acquired through repeated outside exposure will be replaced by the familiar pallor that marks us as serious amateurs and signifies that the new cycle is here and we're part of it. The long winter is almost over.

So at this stage of the new cycle, why antennas? Well, for HF fans it's a way of literally keeping in touch with the outside world of one's community, getting some fresh air and sun stored up, and ever so subtly (almost subliminally) letting your neighbors know you're alive and well. It's a way of "sharing the good news," although to some it might not exactly be good news. Some folks might have assumed that you moved or took up a new hobby.

On a more practical note, it's also a good way of sharing the lore of amateur radio with a newcomer. To somebody new to amateur radio, antennas as well as other things are an

abstraction, something you read about or potentially are tested on. Antennas are something we use all the time and with which we should be familiar. If we decide to string up some more wire antennas or even something more elaborate, it can be a great teaching exercise, plus it can provide us with a willing helper.

Speaking of teaching exercises and antennas reminds me that our next "Antenna Special" issue is coming up in August. Over the years I've posed a question to numerous antenna experts on a specific mechanical process that affects many amateurs who live on a basic city lot. Initially, most have said that the answer is simple. However, when they look at it for a while, it apparently is not that simple, and to date no one has supplied the answer. Some time ago at a hamfest I was talking to Paul Carr, N4PC, about the problem, and he said that it didn't sound too hard and that he'd work it out.

Well, recently Paul called to let me know that he thinks he has it worked out using relatively simple math and an average calculator. He expects to get everything in order, tried and tested, written and delivered to me in time for the August issue. While I won't go into the specifics now, I think that the article should become a classic saver over the years. It's purely mechanical in nature and not a new antenna design.

Whatever area of your station you decide to start with, it's safe to begin making plans now. Although we probably won't see considerable differences for a year or two, remember that traditionally a sunspot cycle has a markedly sharper increase than decrease. If you were licensed in the last few years, you're about to move from abstraction to reality—at least amateur radio reality. The stories you've heard around the "communal fire" are true, and probably are even better than you've heard.

For the rest of us who have been through at least one previous cycle, although we may have forgotten, everything else will be back. Once more the dulcet, polyphonic sounds of "He's listening up"; "What's his call?"; "Where is he?"; "Up 5"; etc., will fill the air. Who can forget that warm, reassuring feeling we get from our fellow amateur who very carefully and meticulously tunes his rig and amplifier to the point of utmost perfection. Yes, everything is coming back, both the good and bad, and yet for most of us it will be overwhelmingly good.

Right now my shack has its new cycle paint job, with everything squeaky clean and ready to go. It probably will never be this clean again for another eleven years, but who cares? I'm still checking out "the perfect chair" and a place to put one of those small, portable refrigerators. It's a great hobby.

73, Alan, K2EEK



### SWR-121 HF Antenna Analyser™ 1-31.999 MHz

This compact, battery powered unit measures, computes, and plots a curve of your VSWR vs. frequency on its high resolution LCD display. Control the unit via keypad. Covers 1-31.999 MHz. View SWR over entire range, or at just one frequency. Measures return loss in dB. Self-contained RF source. No need for a frequency counter.

Interfaces with a PC for printing and saving plots to disk with optional **AEA AACOM™** software. Check any kind of antenna and make sure it is optimized.

*Commercial units available.*



**NEW**

### DSP-232™ Multi-Mode Data Controller

The new DSP-232 has two software selectable radio ports for 9600 & 1200 bps VHF Packet, HF Packet, Pactor, Amtor/Sitor, CW, RTTY (ASCII & Baudot), and NAVTEX. Works as a node in VHF Packet and includes GPS features. AEA's SIAM™ Signal Identification mode is built in. This unit is the premier data controller today and will handle new applications in the future.

**AEA has big plans for the DSP-232.**

AEA's approach takes full advantage of the fast host processor and 32-bit DSP chip—converting analog signals to DSP data and then running the data through DSP modems. This gives you superior filtering, allowing you to cut through noise and receive signals. The DSP chip is coupled with hardware memory ARQ, hardware HDLC, and the DCD state machine for increased performance. Full mailbox for Packet, Pactor, and Amtor with 32K RAM. Expandable to either 128K or 256K RAM. *See AEA FAX III 900 & AEA ACARS software.*



### PK-232MBX™ Multi-Mode Data Controller

Still the best low-cost multi-mode TNC available. Modes include: Packet (HF & VHF), Amtor, Pactor, RTTY (Baudot & ASCII), CW, and WeFAX. Receives Navtex and TDM. Two switchable radio ports. Built-in 18K (32K RAM) PakMail™ mailbox for Pactor, Packet, and Amtor mail. New GPS features allow HF or VHF Packet location transmission with APRS™. New DAMA protocol. Ask around, you will find many proud PK-232MBX owners.

### IsoLoop™ 10-30

### HF Antenna

(with cover open)



This compact omnidirectional HF antenna covers 10-30 MHz and is rated at 150W—perfect for those who live in antenna restricted areas or who have space limitations. No rotor, no tuner, ground plane, or radials are required. Simple set-up, easy operation, and great performance.

The outer loop measures 35" and is flexible so it can fit through attic doors and other tight openings. Comes with LC-2 manual tuner, power supply for LC-2, and 50 ft. of shielded control cable.

*See your favorite amateur radio equipment dealer for pricing and availability.*

24-hour Literature Request Line: (206) 712-8054

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# The AEA HF System



**NEW GPS**

### PK-900™ Multi-Mode Data Controller

The PK-900 has two radio ports you can use at the same time. With the true Gateway, Packet operators on your Port 2 can use your HF rig on Port 1 to link to, monitor, and leave mail for other Packet, Pactor, and Amtor stations. **This is truly a cross-mode, cross-frequency Gateway!**

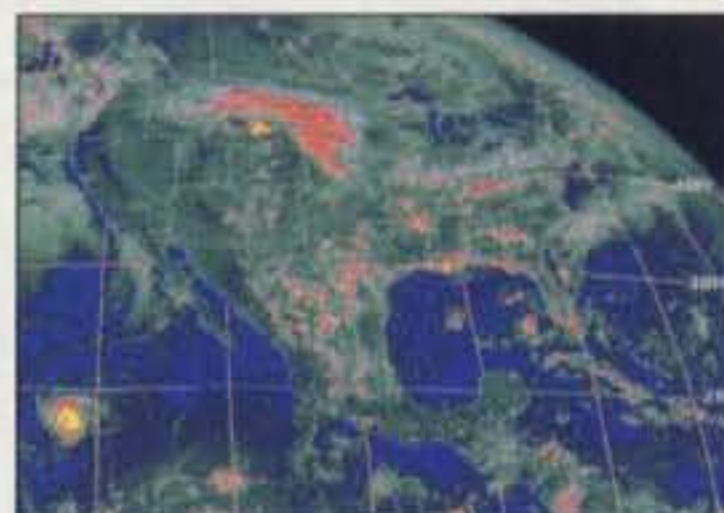
The operating modes include: 1200 bps VHF Packet (9600 bps optional), HF Packet, Pactor, Amtor, CW, RTTY (ASCII & Baudot), NAVTEX, TDM, WeFAX, and SIAM™. PakMail™ mailbox for Packet, Pactor, and Amtor.

Three processors provide powerful analog signal filtering. Also incorporates hardware memory ARQ, hardware HDLC, and DCD state machine—all work to let you hear weak signals and cut through noise.

Comes standard with GPS firmware for use with or without APRS™ software. Functions as a node in VHF packet and identifies TCI/IP, TheNet, and NetRom stations. DAMA support included.

### KK-1™ Keyboard Keyer

Connects with standard computer keyboard to send hi-speed CW. CW trainer. Sends Farnsworth spacing on the air! Optional **AEA KKCOM** software available.



### AEA FAX III™

DOS software and demodulator system displays NOAA HF WeFAX images in 16 shades of gray. You can color the image with 256 colors. No TNC is needed. Also decodes RTTY, CW, & NAVTEX!

**AEA FAX III 900™:** Software-only version for DSP-232 & PK-900 owners. Demodulator is built into the TNC.

### MacRatt™III

The new MacRatt terminal control program makes full use of the newer Mac computers. Controls all AEA data controllers for all modes.

### PC PakRatt for Windows™ 2.0

**NEW**

This terminal control program works with Windows 3.1 and '95. Operate two TNCs at once. Makes working all modes and features of all AEA TNCs easier. QSO logging ability. AEA Log Windows 3.0 logging interface.

### Log Windows™ 3.0

**NEW**

This is AEA's premier logging and award tracking program. Offers unbelievable capabilities in managing your log books, controlling your radios, rotors, and TNC. Can interface with PC PakRatt for Windows, callbooks, & QSL mgr.

### AEA ACARS 900™

**NEW**

This optional software lets DSP-232 and PK-900 owners decode the air to ground communications of aircraft. See cargo and system status of airplanes. Requires a VHF receiver or scanner covering 129-132 MHz.

☆ Call the Lit Line for AEA's Catalog

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2006 196th St. Southwest

P.O. Box C2160

Lynnwood, WA 98036

# ANNOUNCEMENTS

**•SMIRK QSO Party** - Sponsored by The Six Meter International Radio Club, this event will be held 0000Z June 15 to 2400Z June 16, on 6 meters only, voice and/or CW. All voice contacts between the 48 contiguous states must be made above 50.125 MHz; CW below 50.100 MHz or above 50.125 MHz. Only DX contacts between 50.100 and 50.125 MHz. Exchange callsign, SMIRK #, and grid square. No crossband or partial contacts allowed. Scoring: 2 points for each contact with a SMIRK member and 1 point for each contact with a non-SMIRK member. Final score is total points x total grid squares worked. For log forms send legal-size SASE (and also send completed logs postmarked no later than July 15) to Pat Rose, W5OZI, P.O. Box 393, Junction, TX 76849-0393. Awards will be given to each high scorer in each state, province, or foreign geographical division.

**•Second Diploma of Scientific Research** - As in 1995, funds collected from this event will be devoted entirely to cancer research. Participation is open to hams and SWLs worldwide, and the event is scheduled for 2400Z June 14 to 2400Z June 30 on all frequencies CW, SSB, FM (no repeater). Call "CQ - Second Diploma of the Scientific Research". Report: time UTC, listening report, and progressive number. Scoring: 2 points for each QSO; 6 points for each QSO with the special station "JOLLY;" and 10 points for each satellite QSO. Some awards available. For more info, or to submit a log, mail to Luca Ferrara, IK8YYY, P.O. Box 17, Roma Centro, Italy. Logs must be received no later than Sept. 30, 1996.

**• The following Special Events are slated for June:**

**KB1BQK**, from Derryfield Park, Manchester, New Hampshire; Amoskeag Radio Club; to celebrate Manchester's Sesquicentennial; June 8, 1200-2000 UTC; operation near 20m/14.245, 15m/21.045, 40m/ 7.245, 40m/7.035 CW, QSLs upon contact/request to Amoskeag RC, P.O. Box 996, Manchester, NH 03105.

**KB2UDX**, from the Chittenango Landing Canal Boat Museum, Chittenango, New York; The Madison/Oneida ARC (MOARC); to celebrate the museum's Canal Festival Day; 0900-1730 EDT June 29; operation in the General portions of 75, 40, and 20 meter phone bands

and the Novice phone subband of 10 meters. For a commemorative certificate, send QSL and SASE to MOARC, Box 241, Verona, NY 13478.

**KB2VAR**, from Sardinia, New York; Pioneer Radio Operators Society; 175th anniversary of Sardinia Community Days; 1400-2200Z June 30; General 80-15 meters, 145.390 2 meters. For QSL send SASE to Mike Buttino, N2LBV, 12109 Savage Rd., Sardinia, NY 14134.

**KY2F**, from Oswego County Airport Fulton, New York; Oswego County Amateur Radio Emergency Service; during the Experimental Aircraft Assn.'s Young Eagles Days; operation in the lower half of the General 80, 40, 20, 15, 10 meter phone bands. For certificate send QSL and large SASE to Fred Swiatlowski, KY2F, P.O. Box 5281, Oswego, NY 13126.

**5-land**, from the second annual Hurricane Party; Houston, Texas; The Clear Lake ARC; to mark the beginning of hurricane season in the Gulf of Mexico and to promote hurricane awareness; 0000 UTC June 1 through 2400 UTC June 2; operation in the General portion of the HF bands and KA5GLX repeater (442.75 MHz, Tone 103.5). For certificate, send QSL and 9 x 12 SASE to member station worked.

**WB6DWY**, from the center of the town of Sonoma, California; The Valley of the Moon ARC; to celebrate the Sonoma Sesquicentennial festivities marking the 150th anniversary of the Bear Flag Revolt in Sonoma; 1500 UTC June 22 to 0400 UTC June 23; on  $\pm$ 7.250, 14.250, and 21.350 MHz SSB. For a commemorative QSL, send QSL to WB6DWY, 358 Patten St., Sonoma, CA 95476. For info, call Darrel Jones, WD6BOR, 707-996-4494.

**KC8BEB**, from Henry Ford Museum, Dearborn, Michigan; Garden City ARC; the American Automobile Centennial; 1400-2000Z June 15 and 1400-2000Z June 16 on 7.255, 14.255, 21.330, 28.380. Send QSL and #10 SASE to GCARC, P.O. Box 482, Garden City, MI 48135.

**KB8JUA**, Dayton, Ohio; to celebrate Dayton's Bicentennial; June 15 and 16, 1500-2200Z; operation on CW 7.125, 14.125, 21.125, 28.125; phone 7.275, 14.275, 21.375, 28.475. For certificate, send 9 x 12 SASE to Mike Priest, KB8JUA, 626 Creighton Ave., Dayton, OH 45410.

**WD9GTW**, from Mt. Carmel, Illinois; R.A.D.I.O.; Mt. Carmel Airport Appreciation Days; 1500-2200Z June 1; General phone subbands on 15, 20, and 40 meters, 28490 on 10, and 146.940. Send QSL and SASE to R.A.D.I.O., 827, Broadmoor, Mt. Carmel, IL 62863.

**KB8TAH**, from De Smet, South Dakota; The Lake Area Radio Klub and The Huron ARC; to celebrate the 25th anniversary of the Little House on the Prairie Pageant; June 28-30, 1700-0200 UTC daily; operation on phone 3.870, 7.265, 14.265, 21.340, and 28.340 MHz; CW 40 kHz up from the bottom of each band 80-10 meters. For a certificate, send 9 x 12 SASE (two units of postage) to Lake Area Radio Klub, P.O. Box 642, Watertown, SD 57021-0642.

**B-land**, from Lenexa, Kansas; The Greater Kansas City metro area amateurs; in conjunction with the second annual hamfest and barbecue at Longview Lake, Shelter House No. 7; 1700 UTC June 9 to 0100 UTC June 10; operation on 28.300, 14.295, 7.234, 7.140, and 145.320 MHz (simplex). For special QSL, send QSL and SASE to Rick Carver, KG8XH, 13425 W. 56th Terrace, Shawnee, KS 66216.

**VC3D**, from the RAC Canada Day Contest, Vaughan, Ontario, Canada; The Thornhill Radio Amateur Club; to celebrate Canada Day 1996; July 1, 1996. For a club certificate or QSL card, send SASE and QSL to VE3YQY, c/o Gord Yazer, 24 Lindemann Street, Thornhill, Ontario L3T 5M8 Canada.

**VE3MIS**, from Streetsville, ON Canada; Mississauga ARC; Streetsville Bread & Honey Festival; June 1 & 2 from 1300-2200Z both days; 80-10 meters SSB. For QSL send SASE and QSL to MARC, c/o Michael Brickell, VE3TKI, 2801 Bucklepost Cres., ON L5N 1X6 Canada.

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

June 1, **Sangamon Hamfest**, Illinois State Fairgrounds, 4-H building, Springfield, Illinois. Contact Don Pitchford, WD9EBK, RR#1 Box 104, Springfield, IL 63707 (phone 217-789-4519). (Exams.)

June 1, **ACARC Spring Hamfest**, Adams County

(Continued on page 110)

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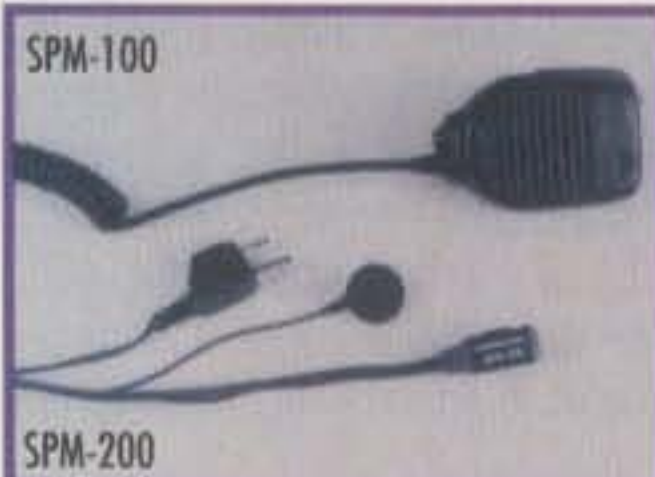
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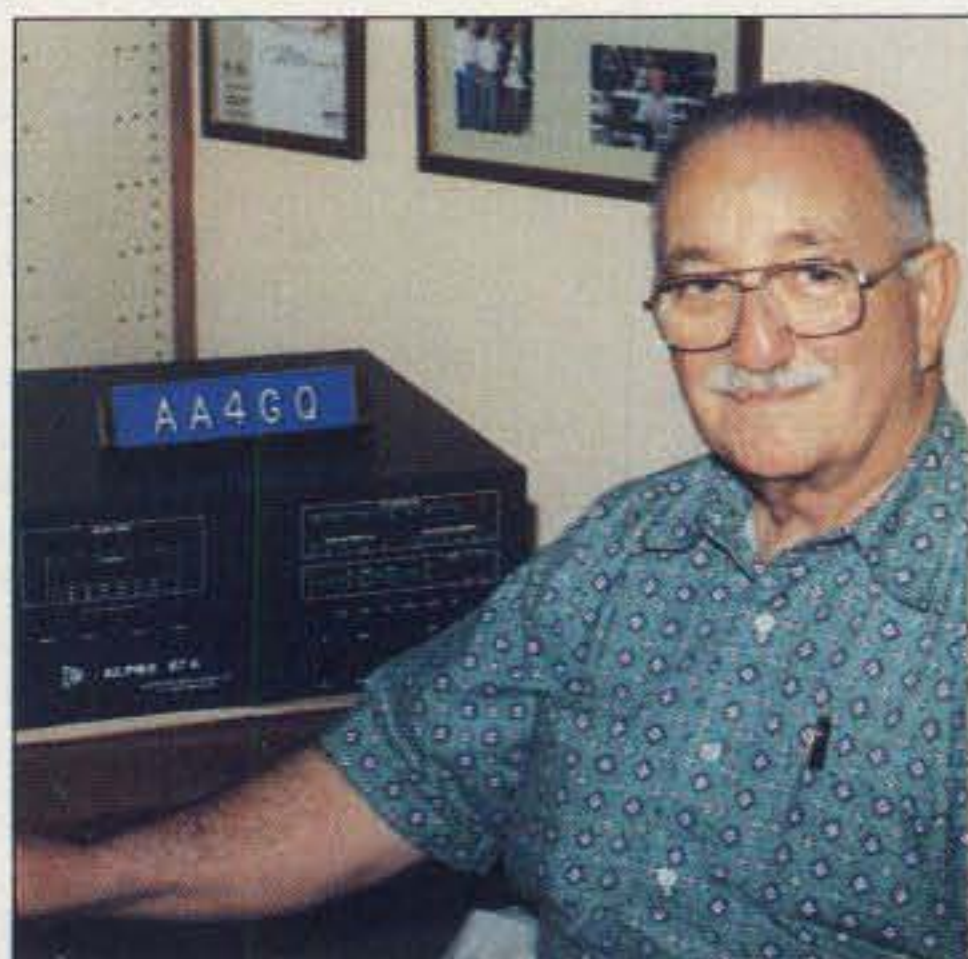
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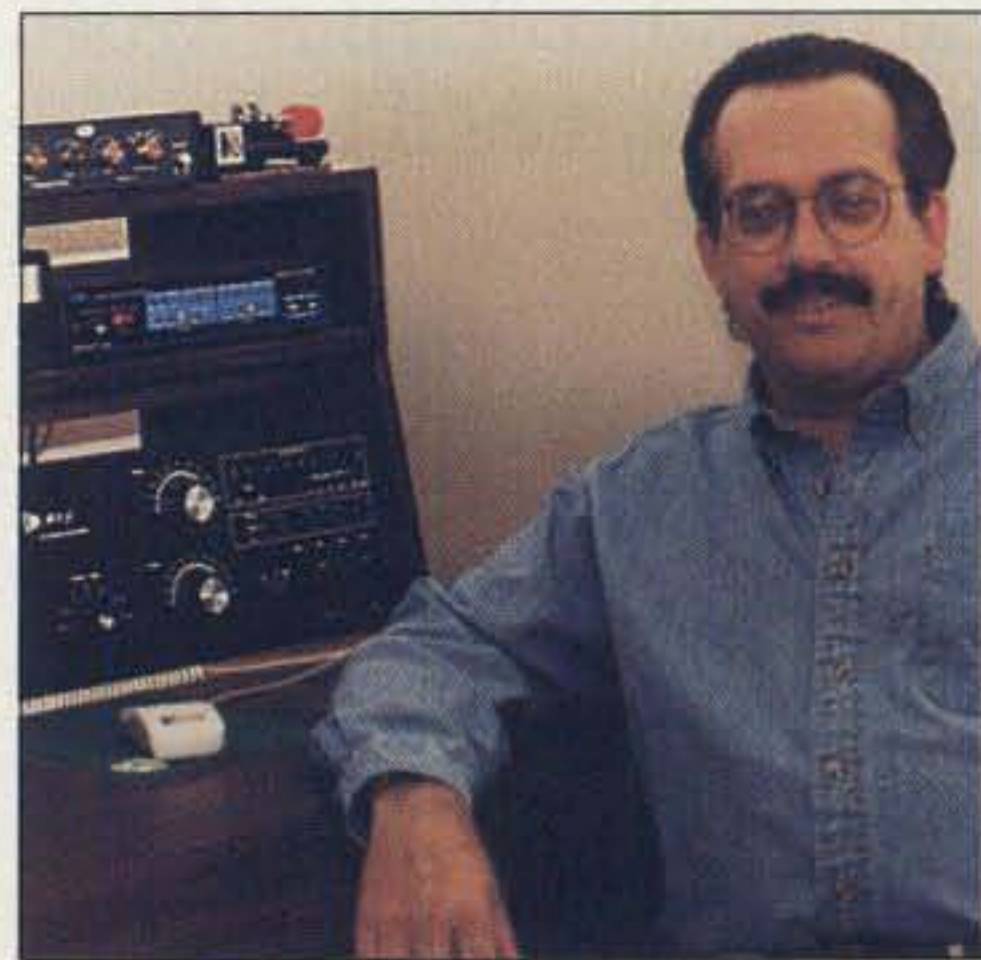
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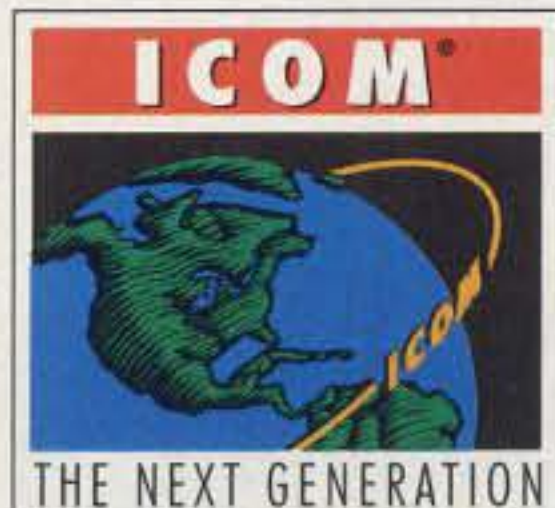
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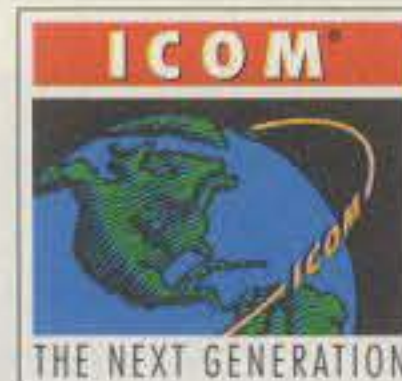


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# Build Your Own 30 Meter Transceiver

*The right project on the right band can bring you the excitement of QRP operation. KI6BP brings us another of his intriguing homebrew transceivers.*

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

**T**his article describes an eye-popping 30 meter QRP transceiver—something you can build and put on the air right now. With many bands sour during the solar minimum, 30 meters remain strong. Because 30 meters is capable of DX throughout the day and evening hours, it offers you the best chance to work some new and exotic QRP stations. So heat up your soldering iron, dump those spare parts out on the bench, and give this project your best shot.

Let's start with a brief summary. The receiver is a single-down-conversion superhet. The incoming signal quickly converts to the intermediate frequency (IF), where high gain and selective filtering occur. On the surface the idea is simple, and it works well on congested DX bands because it preserves dynamic response. For selectivity, it has two IF crystal filters and a 400 Hz audio filter.

The transmitter starts with a crystal-controlled signal that up-converts using the VFO, and amplifies in three class-A stages, and then finally in a single class-C output stage. The keying circuit is wave-shaped for a rise and fall time of about 5 milliseconds, and the antenna is TR-switched through a relay. The fixed-tuned RF power output is about 4 watts at +13.6 VDC, and lets you work contests with extra QRP points.

Only the local oscillator and VFO are common to both the transmitter and receiver. This adds construction flexibility, letting you add your ideas and build the receiver and transmitter independently.

## Some Thoughts About 30 Meters

As the solar cycle enters its minimum, many HF bands become limited to a few daylight hours for most contacts. Even 20 meters starts to close down at about sunset, and this makes the band congested during the day. On the other hand, 30 meters is open most of the time, day and night, even when the solar cycle is at its lowest. The 30 meter band has the advantage of low D-layer absorption.<sup>1</sup> Daylight DX on 30 meters is about 3K meters, and at night signals skip into Europe off the F-layer.



*The completed project.*

Because 30 meters has a low power restriction, it is a popular QRP band. You will often hear G-QRP Club (UK radio amateurs) signal around 10.106 MHz, and there are usually a few central Europe stations lurking nearby. The ARRL and CQ international DX contests feature separate categories and "multipliers" for QRP operation. It's on 30 where many of these stations make their big scores.

Most QRP<sup>2</sup> rigs operate CW because the circuits are easy to build and low power is effective. It makes sense because you generally need 15 or 20 watts with SSB to work any appreciable distance. A low-power SSB signal is very small, and there is competition for any SSB DX. However, with a few watts of CW and some patience, you can work the world. Because of its simplicity and low cost, this QRP rig is a great place to start homebrewing.

## A Brief Circuit Description

You'll quickly recognize most of the circuits in this transceiver because they are all proven designs that appear often in amateur publications. Let's start with the receiver shown in fig. 1. "In the beginning" antenna signals enter a double-tuned preselector. A fixed interstage coupling capacitor between resonators (3.3 pF)

sets their Q and bandwidth to about 565 kHz. This bandwidth is a trade-off among insertion loss, standard parts, and performance. The common-gate RF amplifier, Q1, is a low-noise device with enough gain to overcome antenna noise, resonator, and the passive mixer losses.

The mixer is a passive DBM. I chose a high-pass low-pass diplexer for IF-port filtering because the local oscillator (LO) and IF-port frequency ratio was small.<sup>3</sup> The direct-coupled class-A voltage amplifier, Q2+Q3, has enough collector current (needed to avoid saturation with large input signals) to pass most, if not all, signals you might meet on the 30 meter band. The design might be weak where power variations are large, such as on 20 meters, but for 30 meters this stage is just right. Even though the band power limit is low, there is the occasional signal that rocks your front end, and a variable pin-diode attenuator (see fig. 7) gives you some extra signal reduction to avoid distortion.

A three-section ladder crystal filter precedes the high-gain IF amplifier, U1. I selected the IF filter 650 Hz bandwidth as a trade-off. I find that a very narrow IF-filter width lets you tune through stations between key strokes and not hear them. On the other hand, if the width is too wide, then nearby signals appear

\*c/o CQ magazine

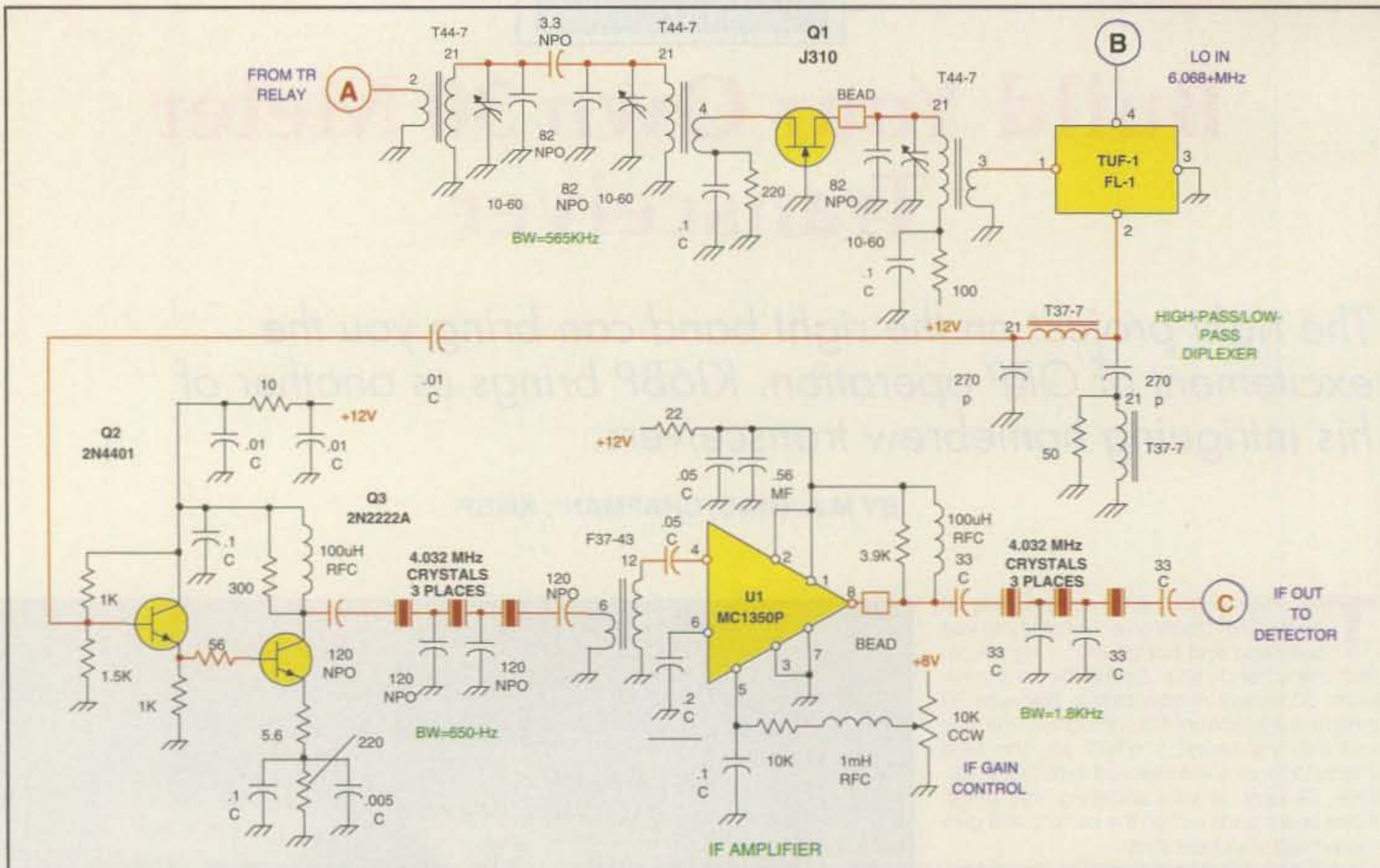


Fig. 1— The receiver preamp, mixer, IF amplifier, and crystal filters. A good substitute for Q1 is a @N4416. The DBM, TUF-1, is a small version of the popular SBL-1 device.

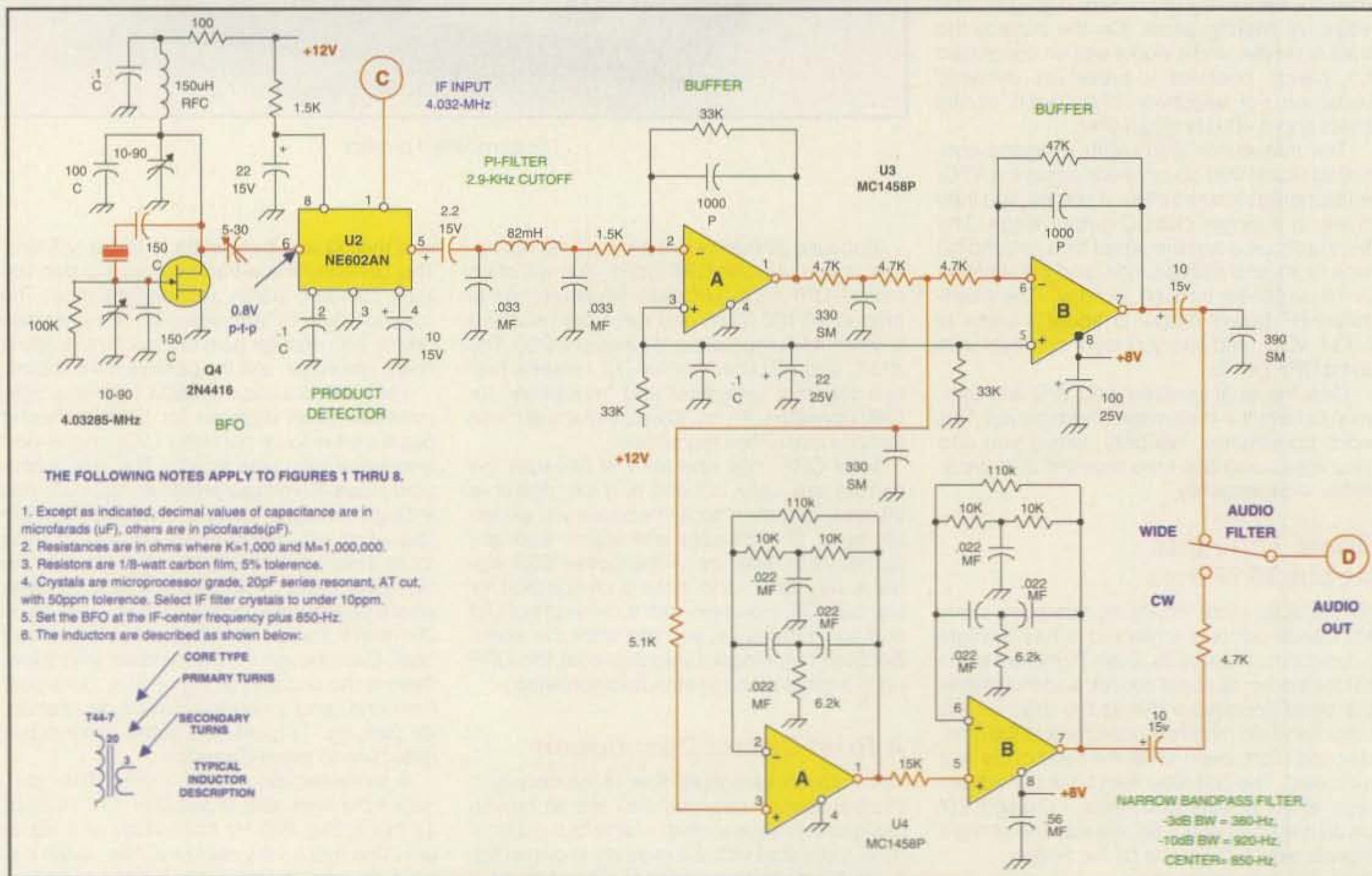


Fig. 2— The product detector, audio preamp, and CW filter circuits. Set the BFO frequency 850-Hz above the IF center. Component tolerances will shift the narrow audio filter passband center and gain slightly.

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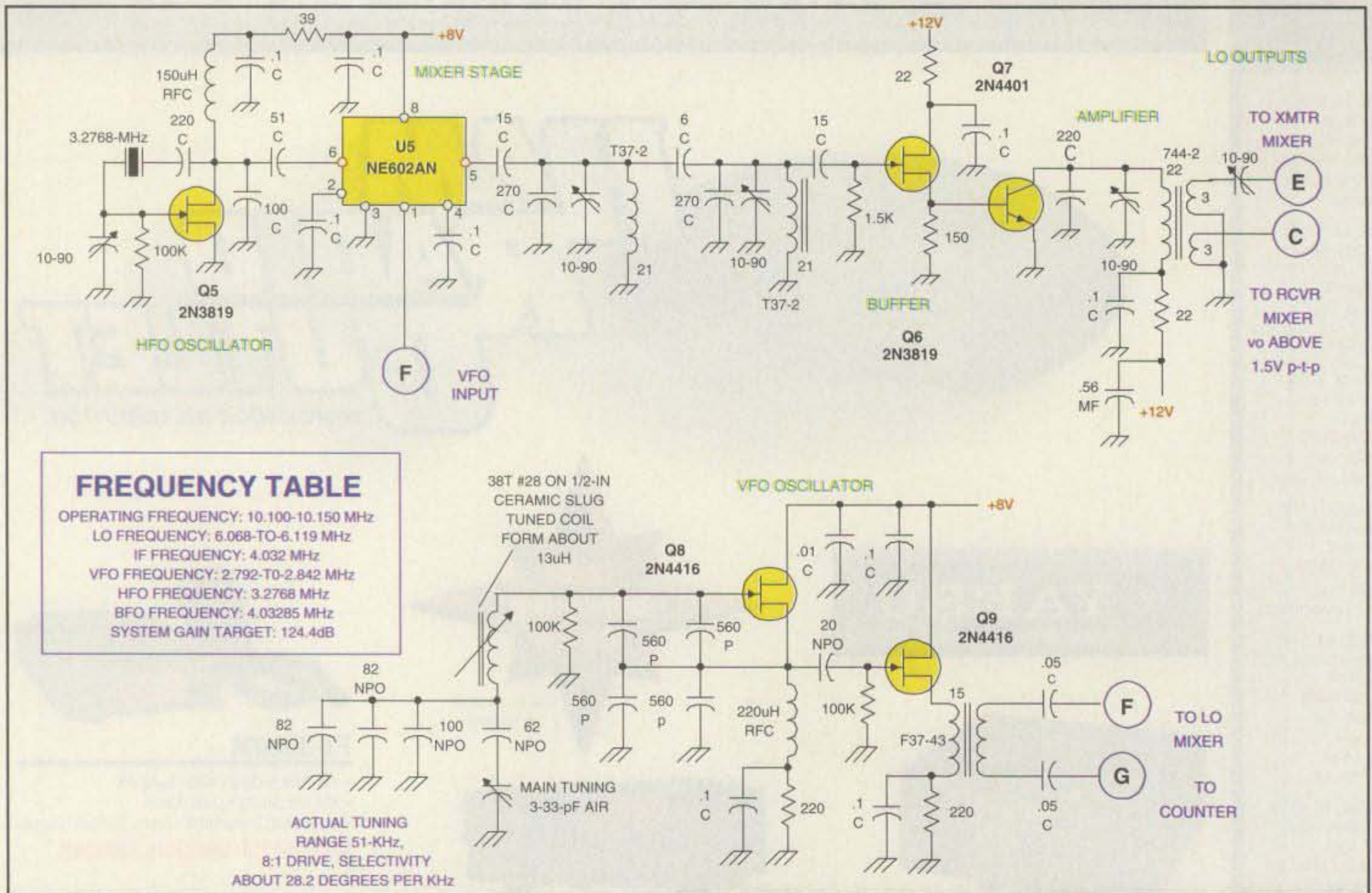


Fig. 3— A Clapp VFO signal actively mixes with a pierce oscillator level, filtered and buffered with a FET/BJT amplifier for two output levels. The LO signal is used in the receiver for down conversion and in the transmitter for up conversion. The VFO output is tapped for a counter frequency reference.

in the passband. This filter width works well on 30 meters. If you decide to reduce the IF filter width in your system, keep this tuning problem in mind; it will affect how you operate.

The IF amplifier, U1, really kicks the signal. I chose to use a front-panel gain control here because it's my operating preference. I find that there is ample time to correct for signal-level variations on 30 meters because of its low power conditions. This lets you eliminate AGC circuits and simplify your receiver. A second three-section 1.8 kHz wide crystal filter follows the IF-stage to clean up passband skirts before detection. Some authors call this second filter a "noise filter" because it removes noise added to the tuned signal in the IF amplifier, U1. The RL circuits in the collector of Q3 and U1 match the crystal filter input resistance, and the filter ends with the mixer input resistance. If you decide to increase or decrease the filter width, you'll need to match it correspondingly.

Fig. 2 shows that an active DBM, U2, acts as a product detector. I chose an active device to get initial audio gain without adding another stage. Because the active DBM-LO injection level needs are low, a simple Pierce oscillator acts as a BFO. The crystal frequency is adjustable to set the beat tone to your listening preference. The BFO offset should be 850 Hz above the IF-center frequency or nominally<sup>4</sup> 4.03285 MHz. If your IF-filter crystal center frequency is above or below this, adjust the

BFO slightly. You'll notice in fig. 2 the CW filter passband is about 400 Hz, but centered at 850 Hz. Ideally, the BFO offset (850 Hz) and this audio filter center frequency (850 Hz) should match. To peak your system, measure and adjust the BFO offset so that it matches the CW filter center. The audio filter passband depends on part tolerances and varies from its ideal center. My audio filter was off by about 15 Hz.

Detected audio output from U2 looks into a 2.9 kHz pi filter. The filter has a lumped capacitor input that shunts mixer RF products directly to ground and quickly cleans up the audio. After buffering and filtering in the op-amp stages, a front-panel switch selects between the audio filter conditions—either 2.9 kHz wide or 400 Hz narrow. You'll find that most of your tuning will be with the wider 2.9 kHz audio signal, and only occasionally will you need the narrow 400 Hz signal. The narrower audio signal is "bland" and lacks fidelity, making it seem dull and lifeless by comparison. It really picks stations out of the noise when you need it.

Fig. 3 shows the local oscillator. A crystal oscillator, Q5, generates a low-level signal that mixes in U5 with the VFO, Q8 and Q9, to form the local oscillator. The mixed signal leaving U5 passes through a DTC (double-tuned circuit). The 1.5K ohm gate resistor in Q6 ends the mixer DTC filter. Q6 and Q7 form a strong voltage amplifier that generates two signals for the separate transmit and receiver mixers. This

combination filter-amplifier was computer designed to get good single-stage performance. This computer-aided design allowed me to iterate a variety of arrangements trading filter bandwidth, insertion loss, and output levels. The signal gain between U5 and the receiver mixer needs to be about 25 dB. When you add in filter insertion losses, you quickly realize the critical needs of this design. The VFO used in the LO is the all-familiar W7ZOI/ W1FB Clapp variation.<sup>5</sup>

The transmitter scheme in fig. 4 starts with a 4.032 MHz crystal oscillator, Q10, that looks into an active DBM, U7. This mixer up-converts the 4.032 MHz signal and LO to develop the 10.1 MHz transmit signal. A post mixer double-tuned filter cleans up the transmit signal before buffering by a direct-coupled class-A amplifier stage, Q11 and Q12. This amplifier properly ends the mixer filter and pushes the signal up enough to drive the transmit power stages.

Another DC-coupled amplifier, Q13+Q14, in fig. 5, provides most of the transmit low-level voltage gain. I also designed this stage with computer aids trading gain and stability. A class-A broadly tuned power buffer stage, Q15, pushes the signal up enough to drive the output power amplifier looking into the antenna circuits. The PA, Q16, output stage filter reduces any unwanted harmonics. Both the buffer and PA stages are proven designs described in many journal articles. I recom-



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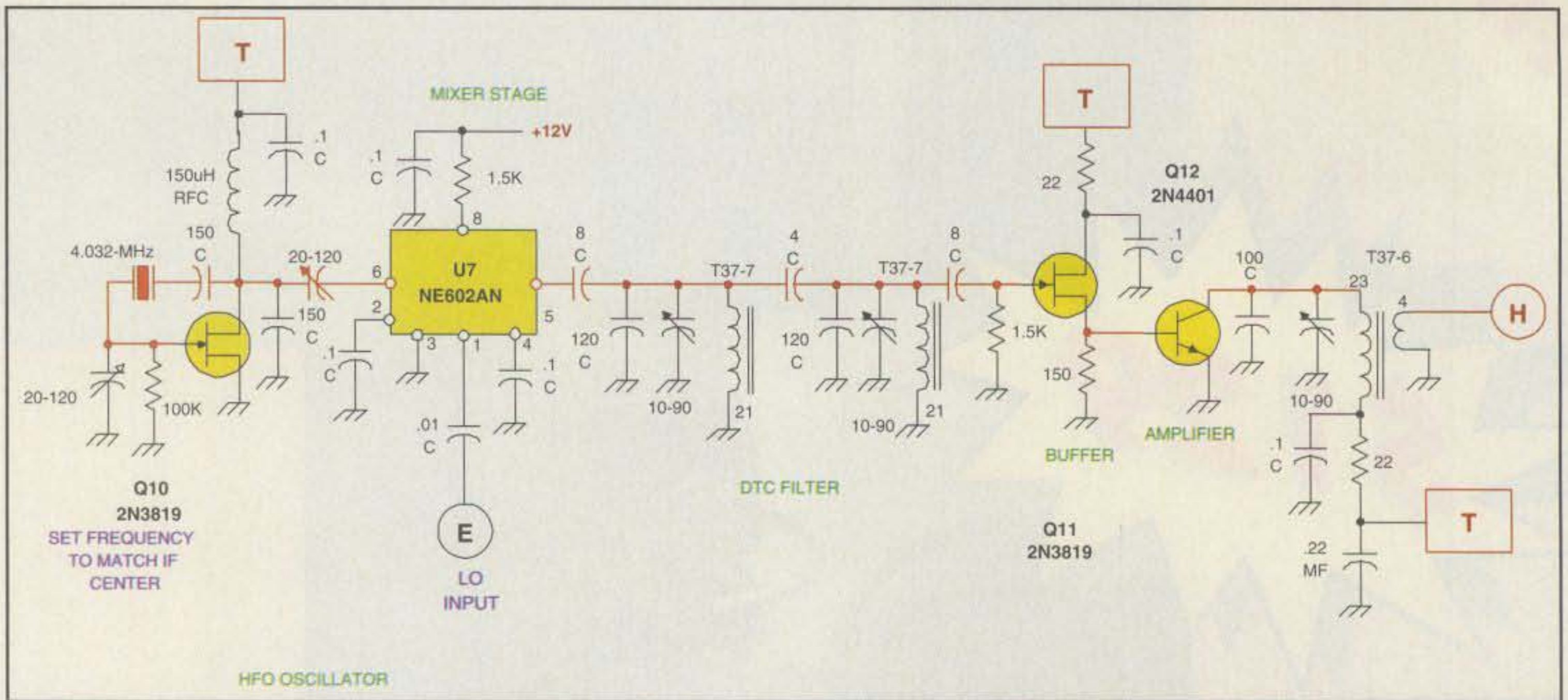


Fig. 4—A Pierce oscillator signal mixes with the LO to generate the transmit signal. A DTC filter and amplifier stage prepare the signal for final buffering and amplification in the PA stages.

mend a separate +13.6 VDC supply be used in the PA stage to reduce coupling problems. Broadband BJT amplifiers, like Q15 and Q16, seem to be the choice of most QRP builders. These amplifiers are easy to build and stabilize, and they usually have good efficiency. However, self-oscillation is a common

problem in these types of amplifiers. Extra precautions here ensured good interstage matching and adequate Vcc filtering. In addition, the emitter and filter return lines are kept short and tied to a stiff RF ground. This reduces any stray inductance that can cause instability. To ensure that there was plenty of driving power, I

added Q15, an extra class-A buffer stage. This buffer swamps the low resistance between the Q16 base-to-ground that aids stability. If you're feeling brave, you may use the obvious tricks to push the buffer levels up (Q13, Q14,

(Continued on page 100)

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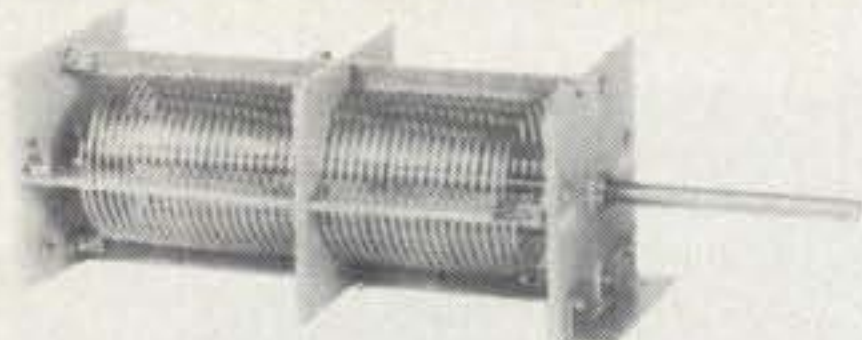
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## Built-in Dummy Load

A full-size 300 watt non-inductive 50 ohm dummy load is built into the MFJ-989C.

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

Some "legal limit" tuners don't have a built-in dummy load. They want you to pay for an external dummy load that just gets in your way.

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The MFJ-989C's premium, low-profile all-aluminum cabinet has a sub-chassis that adds strength and RFI protection.

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# The PacComm Spirit 2 Terminal Node Controller

BY LEW McCOY\*, W1ICP

**W**hen I got involved with packet radio and the World Wide Web, I was more than anxious to review the new PacComm Spirit 2, which is a terminal node controller (TNC). The most exciting thing about the Spirit 2 is its speed—raw speed, high speed. It is just amazingly fast.

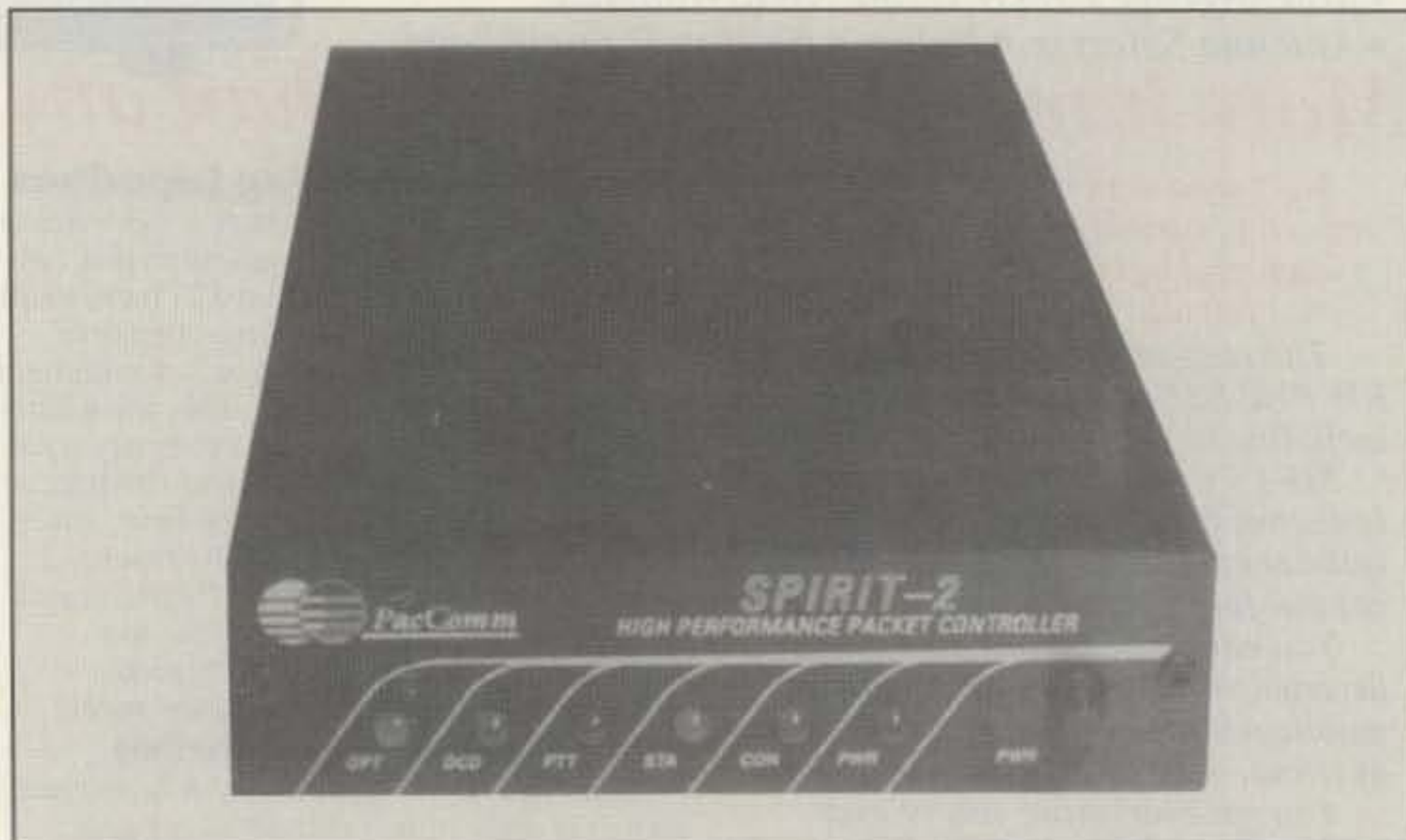
Let's get some specs out of the way first. The black, anodized aluminum case measures 5 inch wide, 9.5 inches deep, and 1.38 inches high. Power is obtained from a separate supply (which comes with the unit). The back of the unit has a serial 9-pin port, power supply input, and two data connectors. The front has LED indicators, power, connect, status, press to talk, and carrier detect. It also has a multipurpose LED that normally indicates the status of your personal message.

Oh, yes, the speed. It supports radio baud rates from 4.8 kB to 56 kB! The connection to the computer also supports speeds up to 56 kB. Internally, the CPU runs at 9.8 MHz, or optionally 19.6 MHz. This processing speed is nearly eight times as fast as the original TAPR TNC-2. To tie this back into the real world, NETSCAPE (we assume every reader knows that NETSCAPE is a program used to browse the Internet) really flies over amateur radio at these speeds. This unit also has 128K of battery-backed RAM.

As far as compatibility is concerned, the PacComm Spirit 2 can run the TheNet, X1J, ROSE, and TEXNET firmware. The unit reviewed here is the standard model with a 9.6 kB primary modem filter and the 9.8 CPU clock.

There are four other models available. One is designed for mountaintop nodes and supports 9.6 kB and 38.4 kB. A second node model runs at 19.6 MHz and supports 9.6 kB and 19.2 kB. If you are building a really fast network, the backbone model runs at 19.6 MHz with support for 38.4 kB and 57.6 kB. The last model is a satellite model designed to operate full duplex with the amateur satellites.

\*Technical Editor, CQ, 1500 W. Idaho St., Silver City, NM 88061



The front view of the Spirit 2 shows the activity indicators.

Obviously, I would rate this unit very highly. It has been a pleasant experience running packet and "surfing" the World Wide Web.

List price of the Spirit 2 is \$239.00, and it is manufactured by PacComm Packet Radio Systems Inc., 4413 N. Hesperides St., Tampa, FL 33614-7618. ■



An RS-232 port is available on the rear of the unit. At the left is the radio socket.

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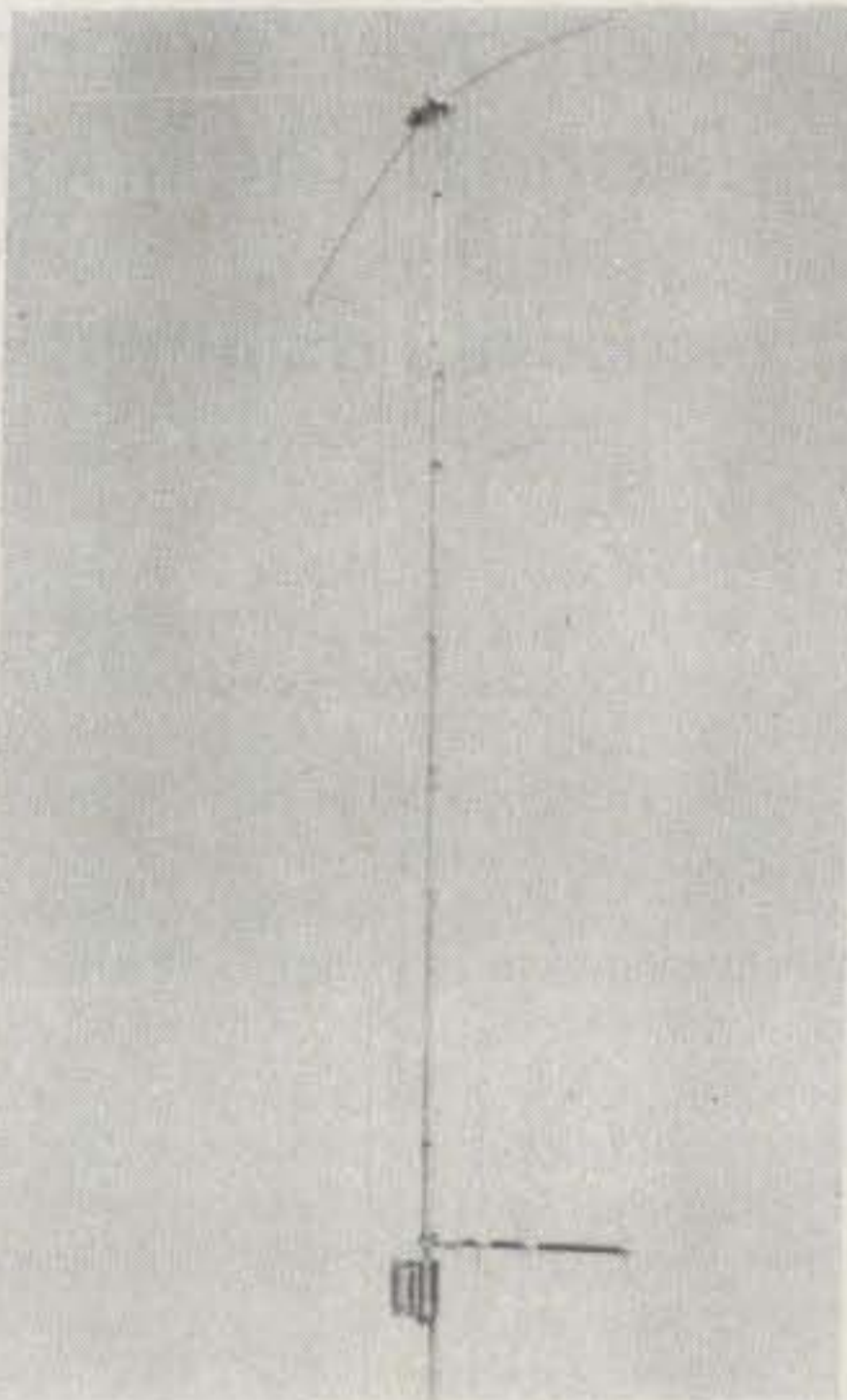
It's easy to tune because adjusting one band has minimum effect on the resonant frequency of other bands.

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- on small lots, backyards, apartments, condos, roof tops, tower mounts.

## Separate Full Size Radiators

Separate full size quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows



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in all parallel radiators.

This forms a very large equivalent radiator and gives you incredible bandwidths.

These radiator stubs provide automatic bandswitching -- there is absolutely *no loss* due to loading coils or traps.

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On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network™* provides automatic impedance matching for lowest SWR on these low bands.

Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

## No Ground or Radials Needed

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation.

You can mount it from ground level to roof top and get awesome performance.

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The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore™* high power current balun. It's wound with Teflon® coax and *can't saturate*, no matter how high your power.

## Built to Last

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is used in the main structure.

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## MFJ Super Hi-Q Loop™

MFJ's tiny 36 inch diameter **MFJ-1786** **\$299<sup>95</sup>** high efficiency loop antenna lets you operate 10 to 30 MHz continuously -- including the WARC bands!



It's ideal where space is limited -- apartments, small lots, mobile homes, attics, motor homes.

Enjoy both DX and local contacts when you mount it vertically. You get *both* low angle radiation for excellent DX *and* high angle radiation for local close-in contacts. Handles 150 watts.

**Super easy-to-use!** Only MFJ-1786 Super Remote Control has *Auto Band Selection™*. It auto-tunes to your desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune push buttons and built-in two range *Cross-Needle* SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- not a lossy thin flat-strip -- gives you highest possible efficiency.

Each plate in MFJ's superb tuning capacitor is welded for low loss and polished to prevent high voltage arcing. It's welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches and a continuous *no-step* DC motor for *smooth precision* tuning.

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Designed as a high performance antenna for 80 and 40 Meters, the **MFJ-1792** **\$159<sup>95</sup>** features a full size quarter wave radiator for 40 Meters -- that's a full 33 feet of ruthless radiating power.

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The entire length radiates power.

High strength 6061-T6 aluminum tubing, super strong solid fiberglass insulator, *Frequency Adaptive L-Network™*, heavy duty swing mount. Handles 1500 watts PEP. Requires guying and radials, counterpoises or ground screen.

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Carry it like a suitcase, tuck it in a corner of your car or check it as baggage on a plane.

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# Closer, But Still No Cigar

*At least through early 1986, Alaska apparently had not given up on reasserting jurisdiction over Wrangel Island, Herald Island, and the De Long Islands. The saga continues . . .*

BY DR. THEODORE J. (TED) COHEN\*, N4XX

The ink barely had dried on the October 1995 issue of *CQ* when I received a note to the effect that at least through early 1986, the State of Alaska had requested the U.S. Government to reassert jurisdiction over the De Long Islands, the subject of my article "Close, But No Cigar . . . The Discovery of a New 'Country'—Almost!"<sup>1</sup> Enclosed with the note, which was written by John D. O'Larey,<sup>2</sup> KL7HBK, was a copy of Senate Joint Resolution No. 32 in the Legislature of the State of Alaska, Fourteenth Legislature, Second Session. Introduced on January 20, 1986, the Resolution "[requested] the Government of the United States to reassert jurisdiction over Wrangel Island, Herald Island, Henrietta Island, Jeannette Island, and Bennett Island . . ." The latter three islands, of course, also are known as the De Long Islands.

No less than 28 reasons were cited in support of the Resolution, including the following:

"WHEREAS Alaskans and other Americans remain justifiably grateful for the fortitude shown by Captain Thomas Long and the crew of the Whaling bark Nile from New London, Connecticut who, on August 14, 1867, were the first to confirm the existence of a 1,740 square mile island in the Chukchi Sea; and

"WHEREAS Wrangel Island, named by Captain Long after the former governor of Russian Alaska Baron Ferdinand Petrovich von Wrangel, is located some 270 miles northwest of Cape Lisburne, Alaska and is larger than the State of Rhode Island; and

"WHEREAS Wrangel island and its nearby satellite island, Herald Island, were placed by the United States Coast and Geodetic Service within the District and later Territory and State of Alaska in publications from 1900 through 1977; and

"WHEREAS the De Long Islands of Henrietta, Jeannette, and Bennett were first discovered in the East Siberian Sea, were claimed, and named by U.S. Navy Commander George W. De Long during his 1879-1881 expedition into the Arctic who, with his crew, died when their ship, the Jeannette, was crushed and sunk by ice floes; and

"WHEREAS on May 13, 1924, Secretary of State Charles Evans Hughes stated that the American Lomen Brothers were the proprietary owners of Wrangel Island; and

"WHEREAS the Soviet government subsequently asserted a spurious claim to the American De Long Islands of Henrietta, Jeannette, and Bennett; and

"WHEREAS unlike the governments of Canada and Great Britain, the United States has never surrendered its claims of sovereignty over these islands;

"BE IT RESOLVED by the Alaska State Legislature that the Government of the United States assert and reassert American sovereignty over Wrangel Island, Herald Island, and the De Long Islands of Henrietta, Jeannette, and Bennett, their resources, and their territorial shelf in behalf of the American People; and be it

"Further RESOLVED the Governor of the State of Alaska is requested to initiate appropriate legal claims for relief before the U.S. Foreign Claims Settlement Commission, the U.S. Court of Claims or other legal forums of the United States as may be appropriate."

The Resolution was referred to the Finance Committee, where it presumably languished and died.

It is interesting to note that two months earlier, the matter of Wrangel Island ownership was the subject of a newspaper article by Stephen Haycox, a professor of history at the University of Alaska-Anchorage. Writing in the November 3, 1985 issue of *The Anchorage Times*,<sup>3</sup> Haycox

noted that in 1916 the Russian czarist government laid claim to the island for reasons related to its position on the Siberian continental shelf. Fearing that the Russians would occupy the island, a team of five people from the United States and Canada made an attempt to establish a base there. Unfortunately, all but one perished, an Eskimo seamstress who later was rescued by an American party. In 1924 the Russians did what many had feared: "(t)he gunboat *Red October* landed on the island, and took as prisoners the Americans who had been left there by the earlier rescue party." Finally, in 1926, the Russians claimed Wrangel Island as Soviet Territory.

According to Haycox, "(T)he United States never has officially vacated its claim to the island." He also noted that even though there have been a number of attempts to contest the Russian claim (the Resolution in the 1986 Alaska State Legislature apparently had been preceded by one in the 1985 Alaska State Legislature), the United States appeared to have had little enthusiasm for ever challenging the Russian claim.

So, will Wrangel Island, Herald Island, and the De Long Islands ever return to the territorial sovereignty of the United States? If they did, they probably would count as a new "country" for DXCC purposes because of the "250 mile" rule. Regardless, absent a signed formal agreement between the United States and Russia, it's safe to say that we haven't heard the last of the matter. ■

## Footnotes

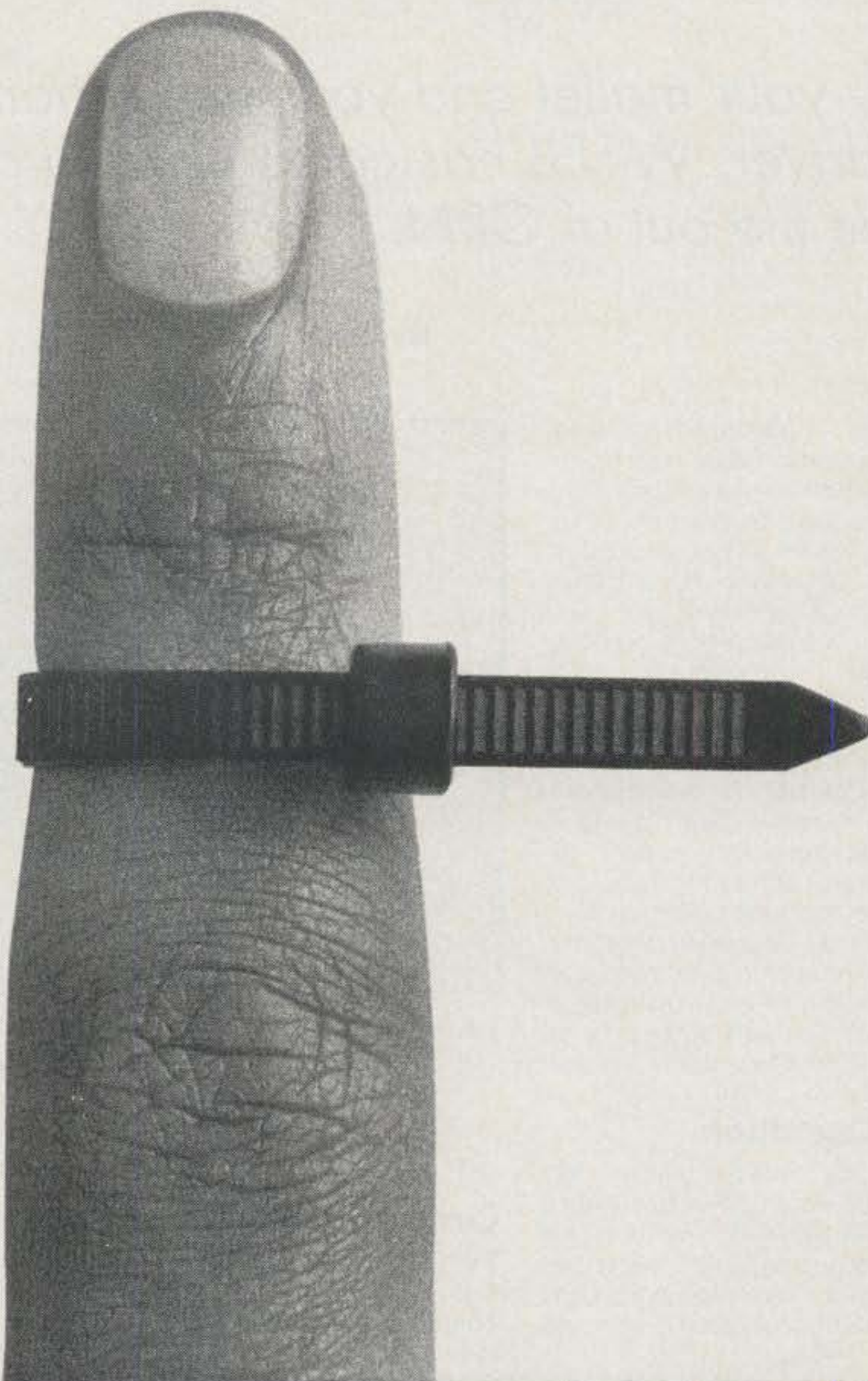
1. Cohen, T. J., "Close, But No Cigar . . . The Discovery of A New 'Country'—Almost!" *CQ*, October 1995.

2. O'Larey, J. D. (KL7HBK), Private Communication, November 16, 1995.

3. Haycox, S., "Wrangell (sic) Island ownership remains unclear," *The Anchorage Times*, November 3, 1985.

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# How To Build A Simple QRN Squasher

*Put away your mallet and your sledgehammer, and shut down the pile-driver. W1FB has come up with a much better way to squish the life out of QRN.*

By Doug DeMaw\*, W1FB

Urban dwellers, in particular, are beset by all manner of manmade noise. Power lines cause the majority of the local interference. In a worst-case situation the noise may completely obliterate all but the loudest of amateur signals. Other forms of local QRN cause similar reception problems. Sync buzz from TV receiver horizontal oscillators, noisy appliances, and the like are common culprits we amateurs contend with.

Noise blankers in commercial receivers are seldom effective, although certain types of line noise can be reduced with these circuits. Traditional blankers cause loud signals to sound distorted, and strong signals near in frequency seem to splatter across the frequency of interest. A better noise-cancelling method is needed. This article describes a simple, inexpensive noise-reduction circuit you can build in a few hours. It can cancel up to 50 dB of local manmade noise with minimal or no reduction in the strength of the desired signal.

## Principle of Operation

It has been known for decades that the correct way to eliminate local QRN is to cancel it ahead of the receiver rather than within it. This prompted me to design the circuit shown in fig. 1. After "fine tuning" the prototype of the QRN Squasher, I had a unit that worked well and was easy to build.

The noise canceller requires two noise input signals. One source is via the main station antenna. The other is by means of a relatively short sense antenna. The two noise signals must be balanced in amplitude by adjusting gain control R10 of fig. 1. Noise from the sense antenna is passed through T1, where in-phase and out-of-phase energy (relative to the noise from the main antenna) appears across the transformer secondary winding (3,4). Phasing control R2 and balance control R1 are adjusted alternately so that the two noise sources are 180 degrees out of phase with one another. This cancels the noise. The incoming noise must retain the same phase and amplitude in order for the settings of R1, R2, and R10 to remain constant.



Front view of the completed unit. The front-panel design and lettering were done on a computer as described in the text.

## Circuit Description

The QRN Squasher contains a T-R relay (K1) that allows the operator to transmit up to 100 watts through the unit. K1 has 2-A contacts and is controlled by the transceiver circuit that actuates the relay in a linear amplifier. J4 is connected to the transceiver control line to accomplish this. A series diode, D10, is used in the control line to prevent DC control voltage from the transceiver and/or linear amplifier from entering the DC circuit of the QRN Squasher. Without D10 it may be impossible to turn off the Squasher, even when S1 is in the OFF position.

Protection diodes are connected to ground at J1 and J2 to ensure that Q1 and Q3 are not damaged by RF-energy leakage across the contacts of K1B, or if the sense antenna might have excessive RF voltage on it. The encircled letter A and associated dashed lines in fig. 1 show where four more 1N914 diodes can be connected to ground (as with D1 through D4) for protection of Q2. Should the K1 contacts have excessive leakage, stray transmitter RF energy would be stepped up by T2, thereby damaging Q2. D9 suppresses voltage spikes

that occur when the K1 field coil is de-energized upon switching from transmit to receive.

Energy from T1 is supplied to R1 and R2. They are used to provide noise that is 180 degrees out of phase from that which arrives via J2. After the desired phase is obtained, the

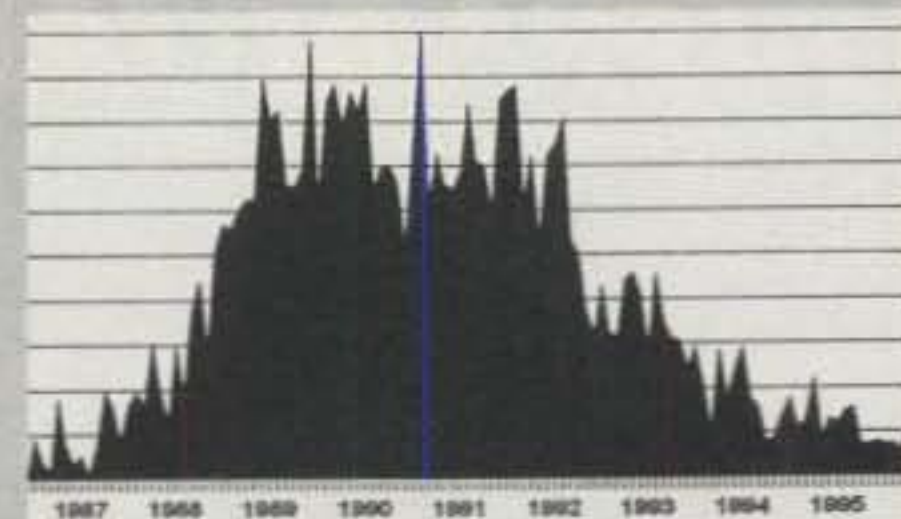
Fig. 1— Schematic diagram of the MK-II QRN Squasher. Capacitance is in  $\mu\text{F}$ . Resistors are  $1/4$  watt carbon composition or carbon film. DS1 is a red LED. All diodes are 1N914 except D10, which is a 1 amp, 50 PRV type. K1 is a 12 volt, DPDT, 16-pin DIP relay (Mouser No. 526-R40-11D2-12, or equiv. Clare or Ormon unit). R1 and R2 are 2K ohm linear controls (Mouser No. 31VC302). R10 is an audio-taper 1K ohm control (Mouser No. 31VJ301). RFC1 is a 2700  $\mu\text{H}$  (2.7 mH) choke (Mouser No. 434-05-272J). S1 is a 3-pole, 2-position miniature phenolic wafer switch. T1 and T2 have 14 turns of No. 24 enameled wire on Amidon FT-50-43 ferrite toroids. The smaller windings have 7 turns of No. 24 wire. FT-37-43 toroids may be used by increasing the turns to 20 and 10, respectively, and using No. 28 enameled wire. →

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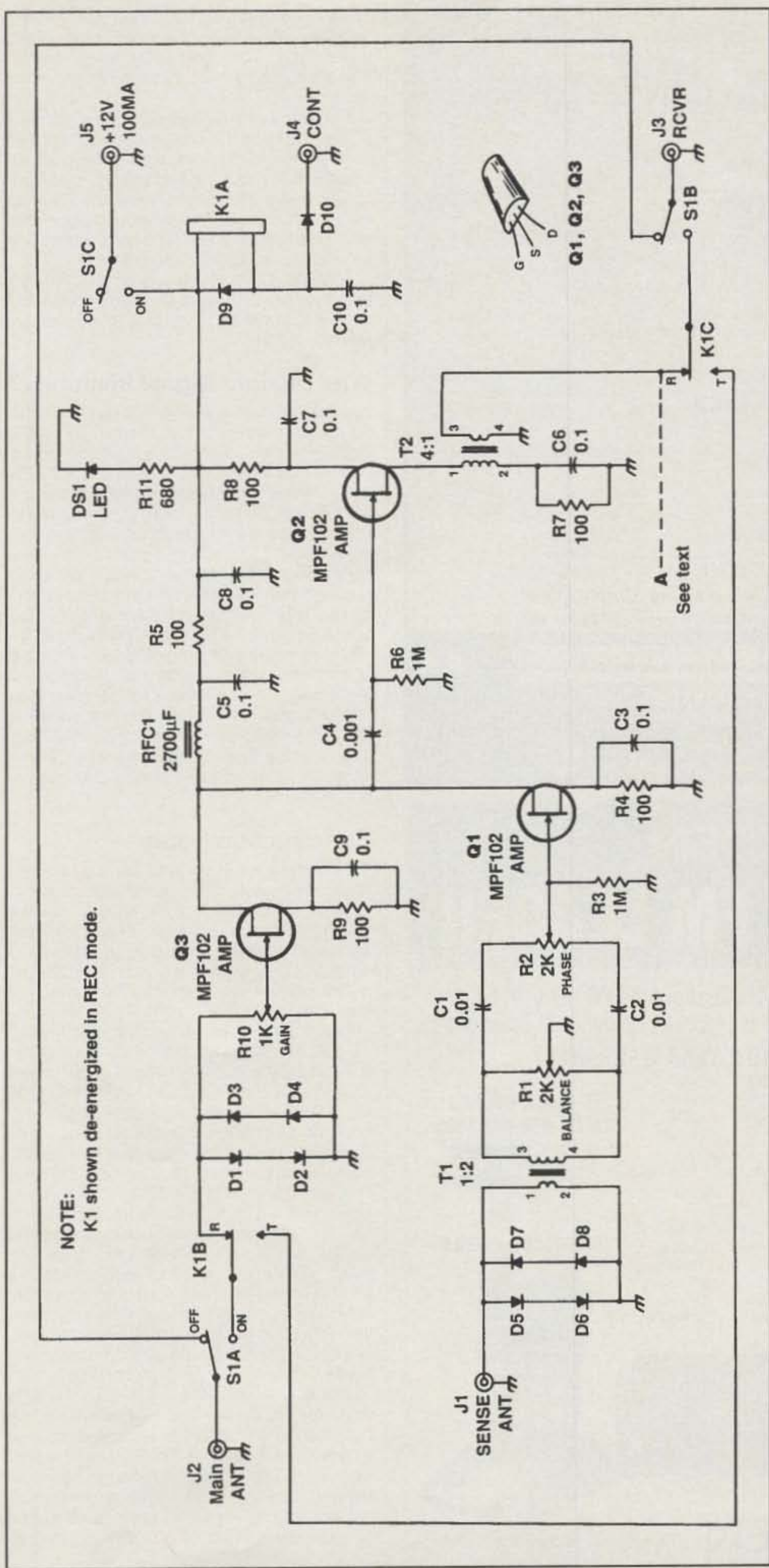


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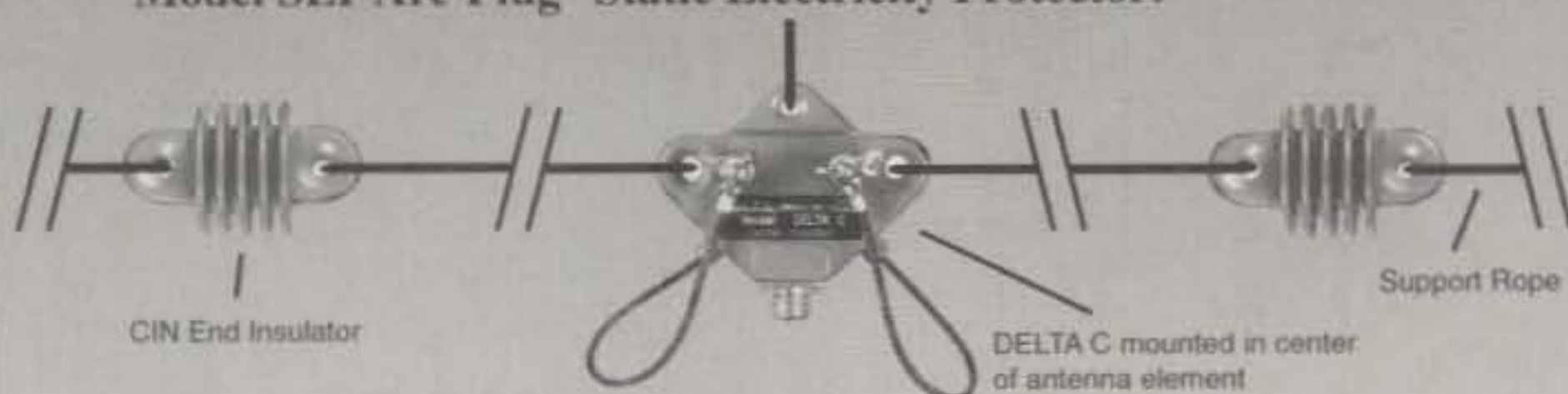
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noise is fed to Q1 and amplified. Noise of the opposite phase, from the main antenna and Q3, is routed to the gate of Q1 and combined with the noise from Q1, at which time cancellation occurs.

T2 matches the Q2 source (200 ohms) to the 50 ohm input of the receiver, via J3. Q2 has been added to compensate for the desired-signal energy loss caused during noise cancellation. The commercial noise cancellers do not include this extra amplifier, and signal loss may run from 6 to 10 dB. The bandwidth of the fig. 1 circuit is 100 kHz to 60 MHz.

A 2N4416 or equivalent high  $g_m$  JFET is a better device for use at Q1, Q2, and Q3, but an MPF102 or NTE451 will provide acceptable performance.

## Why Desired Signal Immunity?

You are probably wondering why the QRN Squasher doesn't null the desired CW or SSB signal. That's a reasonable question. The answer is that the local noise source is of relatively constant amplitude and phase. Incoming amateur signals vary in phase because of ionospheric refraction. The sense antenna does not respond to incoming signals in an identical manner to the main antenna, especially if one antenna is vertical and the other is horizontal. This prevents maintaining a constant phase and amplitude relationship between the two signals fed to the fig. 1 circuit. We must keep in mind that once the noise is cancelled, the amplitude and phase relationship must remain constant if cancellation is to continue. This does not happen with CW and SSB signals because their amplitudes and phase are constantly changing, except in the case of ground-wave communication.

## Construction Notes

PC boards for this project may be obtained from FAR Circuits.<sup>1</sup> The accompanying photograph shows the assembled unit. A scale etching pattern is provided in fig. 2 for those who want to make their own PC boards. A parts-placement guide is shown in fig. 3. This is an x-ray view, as seen from the component side of the board.

I used SO-239 rear-panel connectors for J1, J2, and J3. RCA-style phono connectors are suitable at J4 and J5. My cabinet once housed a CATV converter. It measures 1<sup>3</sup>/<sub>4</sub>"H x 7<sup>3</sup>/<sub>4</sub>"W x 5<sup>1</sup>/<sub>2</sub>"D. There is plenty of unused space within the box. I included a built-in +12 volt power supply because of the extra space. I used my computer to create the face for the front panel. This was done under GRAPHICS while using WordPerfect 6.0a software. I created a 7<sup>3</sup>/<sub>4</sub>" x 1<sup>3</sup>/<sub>4</sub>" thick-border figure box, then typed in the control labels with Helvetica boldface font. Next I used my copy machine to transfer the artwork to white poster board. The completed face was sprayed twice with clear lacquer, then affixed to the front panel with woodworker's contact cement. A similar glue-on face was made for the rear panel to identify the jacks.

The long leads that carry RF signal energy within the box are made with RG-174 miniature coax cable. The shield braid is grounded at each end of each lead. The PC board should be mounted on metal standoff posts near controls R1, R2, and R10. This will ensure the shortest connecting leads practicable. C10 and D10 are attached at J4 rather than being included on the PC board.

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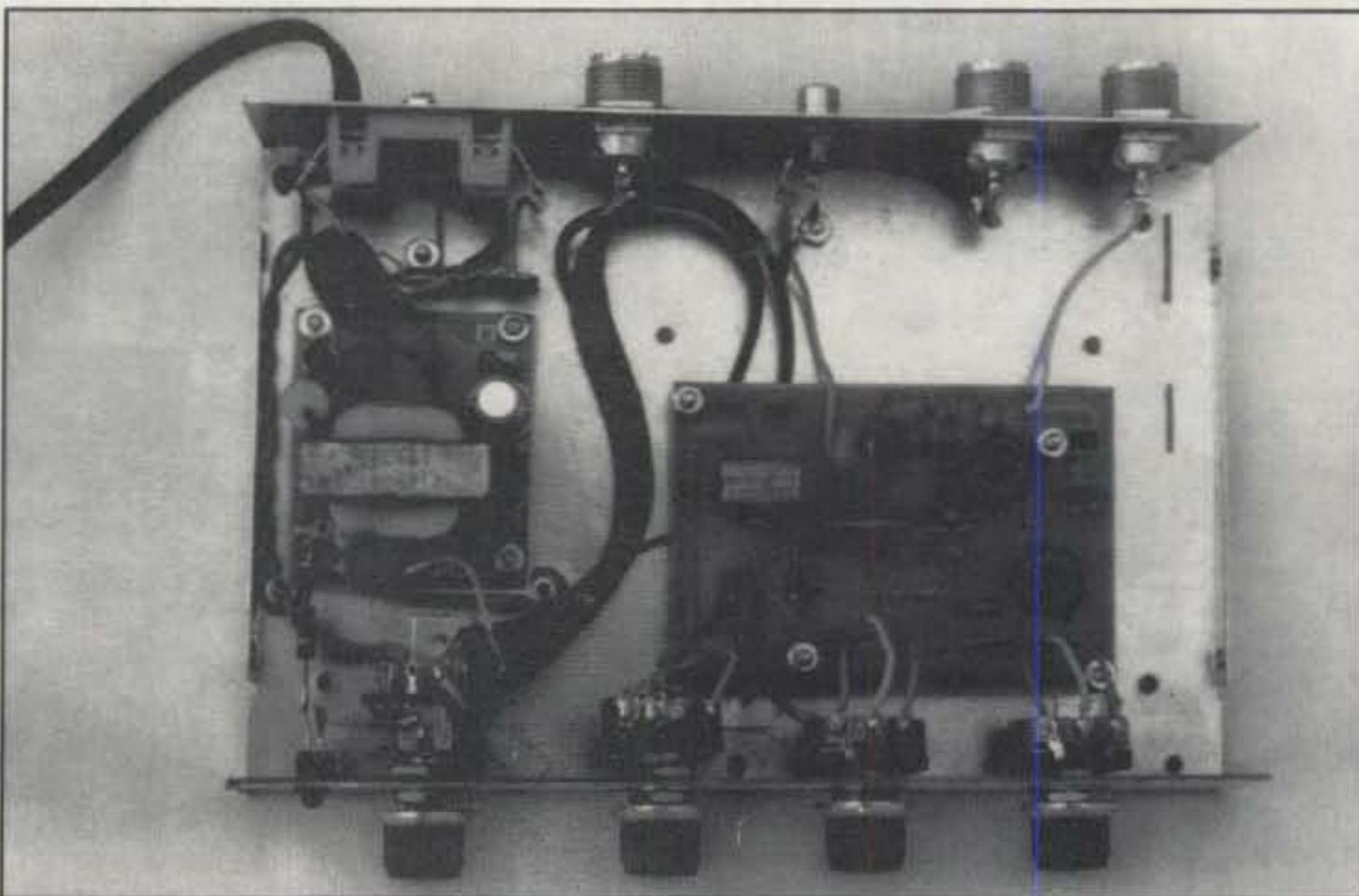
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A grounding terminal should be available on the rear panel of the box. It may be necessary to ground the enclosure to prevent unwanted hand-capacitance effects while nulling the noise at the upper end of the HF spectrum. I used a No. 6 solder lug for this purpose.

## Operation

A sense antenna made from 20-30 feet of wire is ample for use with the fig. 1 circuit. The lower the operating frequency the longer the sense antenna must be. I have had good results with only 15 feet of wire from 3.5 to 29 MHz. Slightly more wire is needed for 160 meter operation. The sense antenna should favor the noise source. In some situations a vertical sense antenna will work better than a horizontal one, or vice versa.

Adjustment requires tuning in a moderately strong signal with S1 in the **OFF** position. Next place S1 in the **ON** position and adjust R10 for a signal reduction of roughly 6 dB. Now tune the receiver to a clear frequency near to that of the desired signal. Adjust R1 and R2 alternately to remove the manmade noise. Advance R10 and repeat the nulling procedure until a complete null cannot be obtained. Back down the setting of R10 to a point where a complete null is obtained. There is interaction between the three controls. Therefore, careful adjustment is required for obtaining deep nulls. There may be occasions when a slight signal loss must be accepted. There have been times when I had a complete noise null with the desired signal stronger than with S1 in the **OFF** position. Adjustment of the QRN Squasher is similar to



Interior view of the assembled QRN Squasher MK-II. Note how close the PC board is to the three panel potentiometers. The power-supply module is at the left.

that of an antenna tuner. Alternate tweaking of R1, R2, and R10 is required. You will discover that R1 and R2 may produce nulls at different settings. Experiment with the positions of both controls in order to obtain the deepest null without sacrificing the strength of a desired signal.

**CAUTION:** Be absolutely certain that K1 is working properly *before* the transceiver is keyed. If it fails to close on TRANSMIT, all the RF power from the transmitter will be dumped into T2. This will destroy Q2 and some of the other components. K1 may be tested after final

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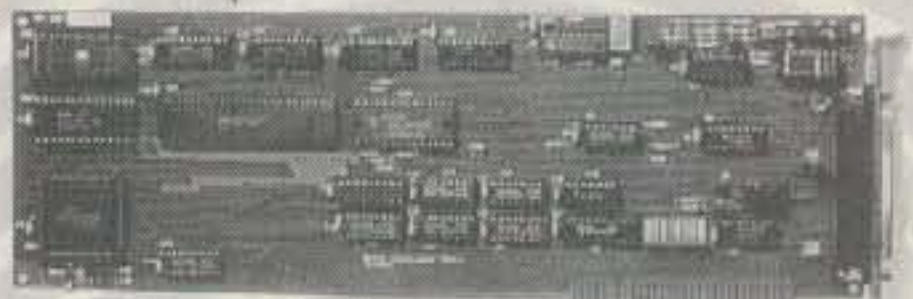
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CIRCLE 62 ON READER SERVICE CARD

28 • CQ • June 1996

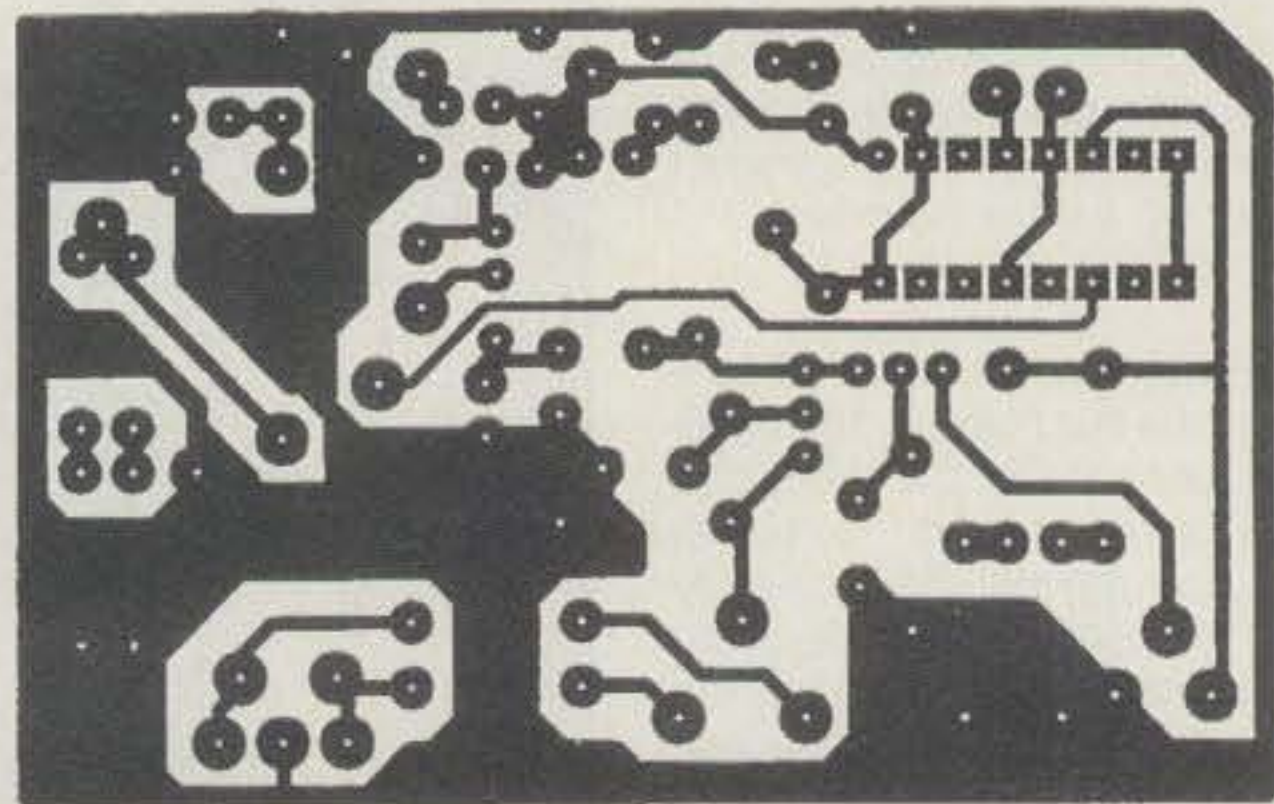


Fig. 2- Scale etching pattern for the PC board as seen from the etched side of the board.

assembly by shorting across J4. Diode D10 must be installed as shown in fig. 1, with the anode toward K1A. If not, K1 will not close on TRANSMIT.

### In Summary

It is important to realize that noise cancellers of this type do not eliminate or reduce atmospheric static crashes. There must be a smart engineer who could apply this principle to that type of noise by means of fast sampling and digital techniques. He or she would not only become instantly famous, but could become wealthy! I am not that type of engineer. My forte lies with analog circuitry.

The QRN Squasher works also on atmospheric "white noise," such as that found on 160 meters before daylight. This variety of noise is relatively constant in amplitude, and the phase does not appear to change.

You may experience additional noise that differs from that for which nulling has been accomplished. Some types of manmade noise

come in clusters. You may null one type of noise and find that another variety of noise appears. Unfortunately, only one of the noises can be nulled at one time. Perhaps cascaded noise cancellers would solve this problem. I have not tried that approach.

This gadget is suitable also for mobile use. The sense antenna should be installed in the engine compartment, where it can pick up the offending electrical noise. Spark-plug and alternator noise can be cancelled with the circuit of fig. 1.

The QRN Squasher is a "frequency conscious" device. It must be readjusted when changing bands, or when making large frequency excursions within a band. The lower the operating frequency the more pronounced this effect becomes.

### Notes

1. FAR Circuits, 18N640 Field Court, Dundee, IL 60118. The price of the board is \$4.00 plus \$1.50 shipping and handling. ■

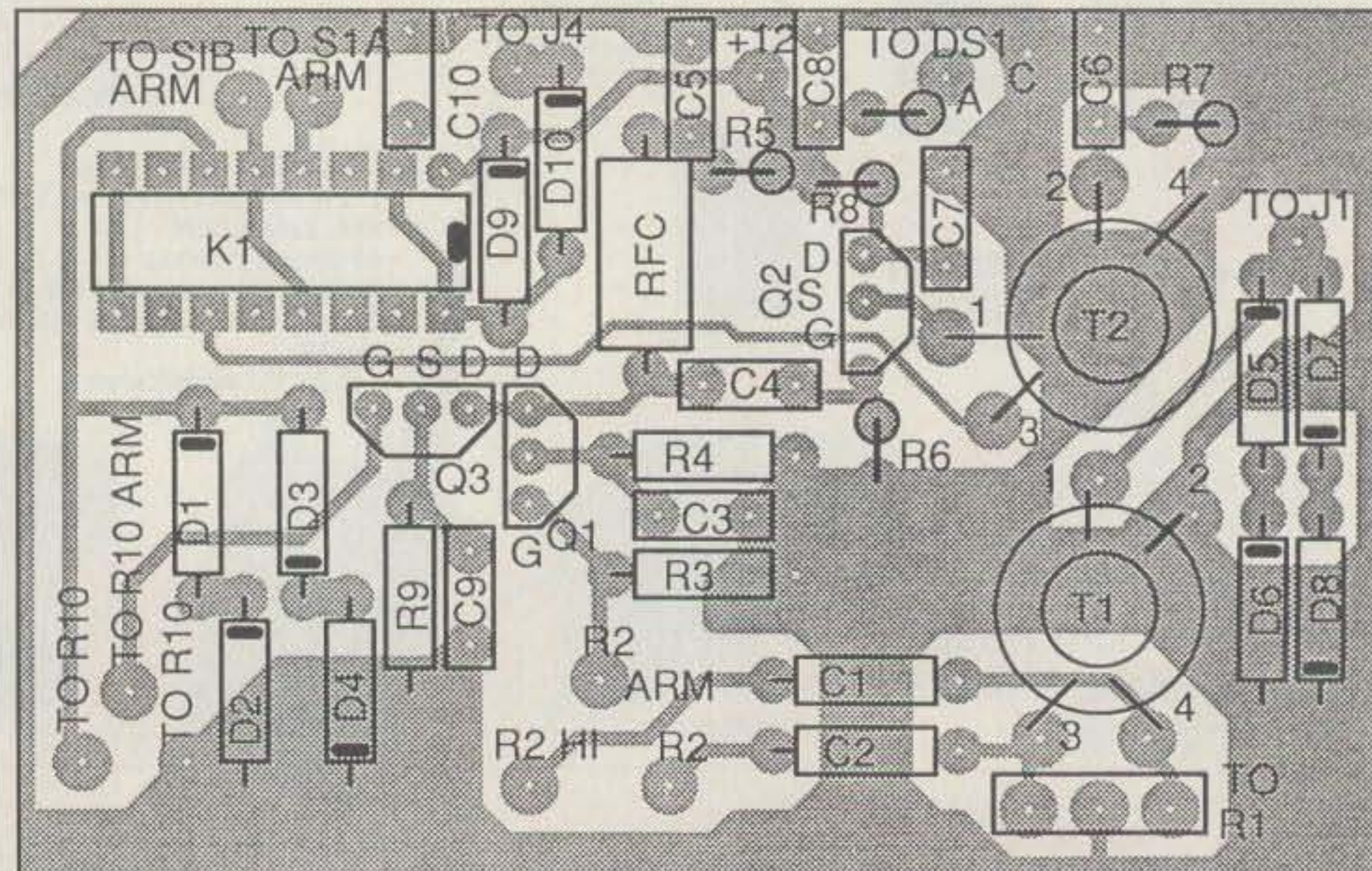


Fig. 3- X-ray view of the component side of the PC board showing the parts placement.

Say You Saw It In CQ

# No More "Little Gun"

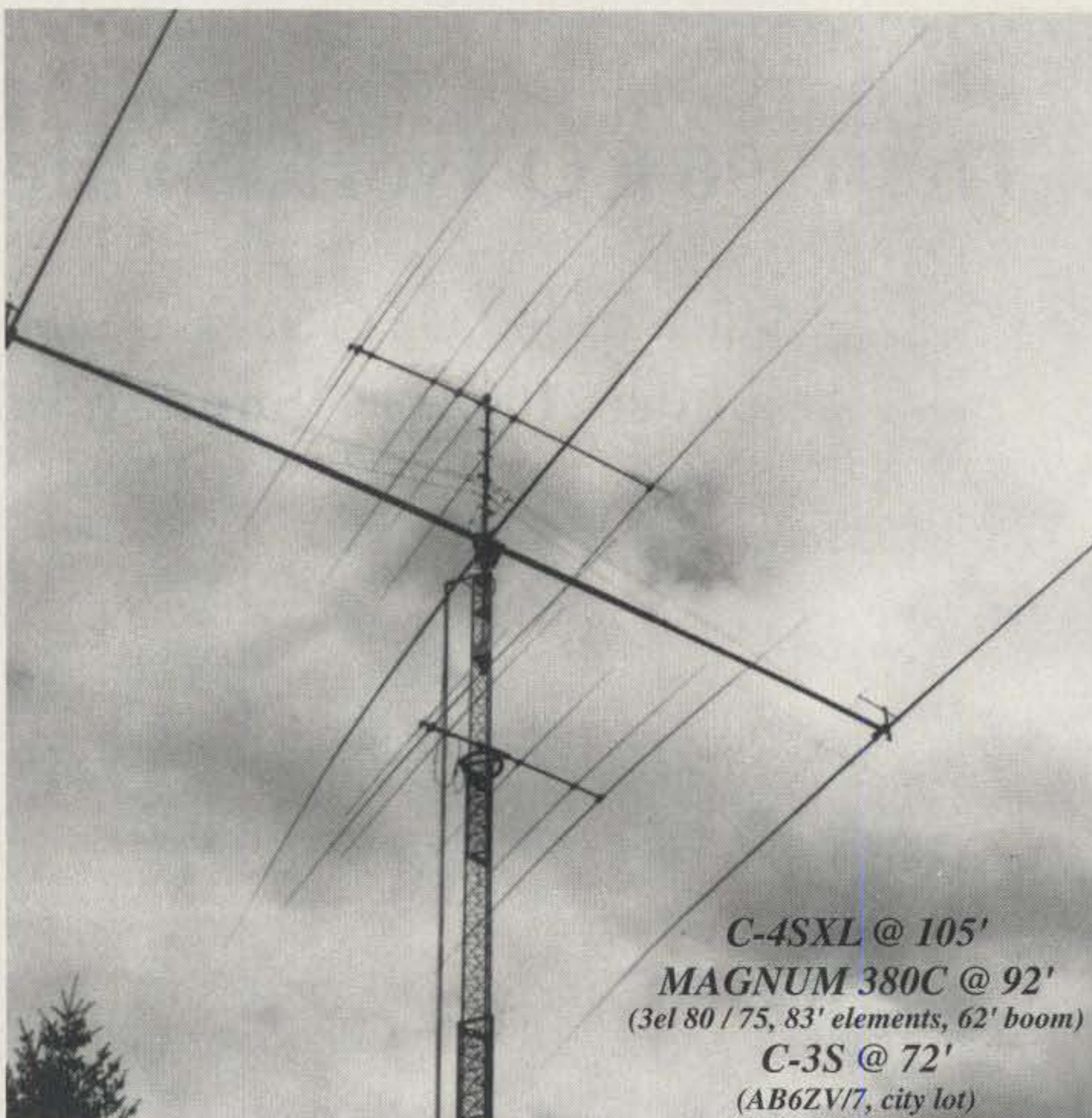
It used to be that using a tribander moved you into the "little gun" class for local competition. No longer.

**Force 12** Classic 3-Band antennas are competitive with monoband installations because that is what they are. These antennas are three horizontally stacked and interlaced monobanders with a common driver cell. Each of the monobanders begins as a 2 element and is enhanced by the presence of the additional elements on the boom. To emphasize the effect of the design, the antennas have about 2.5dBd gain on 17 and 12 mtrs even though there are no elements resonant for bands. The driver is an improved open sleeve, developed and tested by **Force 12** in 1993. It excites 20-15-10 with a 50 ohm feedpoint and does not employ traps or phasing systems. This is the most efficient and simple multiband feed system ever used.

The Classic 3-Band series antennas average 4.5dBd gain on 20-15-10, more than the claimed higher numbers in trapped antenna specifications. For reference, a common 4 element 20 mtr monobander on a 26' boom has about 5.7dBd. When considering that the **C-3** has an 18' boom and the **C-3S** has a 12' boom, you can see these antennas provide a lot of gain for their size; not only on one band, but on all three. They have no traps to weather or blow up, no phasing lines to deal with and are rated at 5KW. They are also the lightest and have the lowest profile, while maintaining an 80 mph wind rating, with optional higher velocities. Average assembly time for a **C-3** is about 90 minutes and a **C-3S** is about 60. Everything comes ready to go with pre-aligned element-to-boom brackets, bundled elements and Easy-On™ mounting. All that is needed is simple hand tools and a hand riveter (available everywhere or from us). Slide the elements sections together with the supplied anti-oxidant, "pop" the rivets, bolt the elements on to the existing brackets and you are done. An RF choke or 1:1 balun should be used for the feedpoint.

The 40 mtr band can be added to either the **C-3** or **C-3S** to make the **C-4** and **C-4S**. The 37' 40 mtr dipole uses the **Force 12** linear loading system for highest efficiency and provides 130 kHz 2:1 coverage. A **C-4C** conversion is available for field upgrades. For those who would like 2 elements, the **C-4XL** is the core **C-3** with a 2el 40 on a 30' boom and the **C-4SXL** is the core **C-3S** with a 2el 40 on a 23' boom. There is also the **C-3XL**, which is a 3el 20, 3el 15 and 4el 10 on the same boom with three feedlines.

Stacking a pair of these antennas enables a physically small installation to compete with much larger monobanders. The computer model gives about 2.5dB more gain for the stack compared to a single antenna (27-35' vertical spacing); however, those who use stacks know the improvement is more dramatic. Taking into account only the 2.5dB, the stack is about even with a 40+' boomlength 20 mtr monobander; however, the added benefits of the stack, plus diversity in aiming makes a formidable installation. The photograph shows the **C-4SXL** for (2el 40 + 20-15-10) stacked above a **C-3S** (20-15-10). You might not need the 3 element 80 mtr in the middle! A rotatable dipole for 80/75 on the mast will be another eye-opener. They are available as the **EF-180S** (54' long), the **EF-180B** (66.5') and the **new EF-180C** (83').



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**Announcing:****The 1996 CQ World-Wide VHF Contest****Starts: 1800 UTC Saturday, July 13, 1996****Ends: 2100 UTC Sunday, July 14, 1996**

**I. Contest Period:** 27 hours for all stations, all categories. Operate any portion of the contest period you wish.

**II. Objectives:** The objectives of this contest are for amateurs around the world to contact as many amateurs as possible in the allotted 27-hour period, to promote VHF and above activity, to allow VHF and above operators the opportunity to experience the enhanced propagation available at this time of year, and for interested amateurs to collect VHF and above Maidenhead grid locators for awards credits.

**III. Bands:** All authorized amateur radio bands above 50 MHz may be used, as authorized by local law and license class.

**IV. Class of Competition:** (1) Single op fixed station. (2) Multi-op class I fixed station. (3) Multi-op class II fixed station. A fixed station is defined as one that is a regular home station location. You may operate from your home station or you may be a "hired gun" at another home station to qualify for a fixed station category. A multi-op class I station is one that operates five or more transmitters simultaneously on all authorized amateur frequencies above 50 MHz. A multi-op class II station is one that operates four or less transmitters simultaneously on all amateur frequencies above 50 MHz. (4) Single op portable station. (5) Multi-op class I portable station. (6) Multi-op class II portable station. A portable station is defined as one that you set up away from a regular home station location. (7) Rover station. A rover station is one that is manned by no more than two operators, must travel to more than one grid locator, and must sign "rover" or /R. The spirit of this class is to encourage operation from rare grid locators by persons who are inclined to do so. It is not the intent of this class to encourage one operator to move from one super station to another super station in another grid locator in order to compete in this category. (8) QRP station. Anyone operating a station running 25 watts output, or less, is eligible to enter this category. There are no location restrictions. You can operate from your home QTH, or from the highest mountain you can find. However, you cannot run more than 25 watts output on any band.

**V. Exchange:** Callsign and Maidenhead locator grid locator (4 digits—e.g., EM15).

Signal reports are optional and need not be included in the log entry.

**VI. Multipliers:** The multiplier is the number of different grid locators worked per band. A "Grid Locator" is counted once per band. Exception: the rover who moves into a new grid locator can count the same grid locator more than once per band as long as the rover is himself or herself in a new grid locator location. Such change in location must be clearly indicated in the rover's log. It is required that rover category operators maintain separate logs for each grid locator location.

A. The rover who changes location during the course of the contest is free to contact as many other stations as he or she wishes. The rover becomes a new QSO to the stations working him or her when that rover changes grid locator.

B. The grid locator is the Maidenhead grid locator to four digits (FM13).

**VII. Scoring:** One point per QSO on 50, 70, and 144 MHz; 2 points per QSO on 222 and 432 MHz; 4 points per QSO on 903 and 1296 MHz; 6 points per QSO on 2.3 GHz and above. Work stations once per band, regardless of mode. Multiply total QSO points times total number of grid locators (GL) worked. Contest entrants may not transmit on 146.52 MHz, or your country's national 2 meter FM simplex calling frequencies, or commonly recognized repeater frequencies for the purpose of making or requesting contacts. Contacts made within your own country, in the DX window of 50.100-50.125 MHz, are discouraged. Contacts made on the SSB calling frequencies of 50.110 MHz, 50.125 MHz, and 144.200 MHz are discouraged. Contest participants are required to use UTC as the logging time.

**Incentive scoring:** Operators completing two-way CW or MCW contacts may add one point to the QSO value for each contact. As an example, W1XX works stations as follows:

37 QSOs, with 3 QSOs on CW ( $34 \times 1 = 34$ ;  $3 \times 2 = 6$ ;  $34 + 6 = 40$ ) and 10 GL's (10 multipliers) on 50 MHz.

45 QSOs ( $45 \times 1 = 45$ ) and 8 GL's (8 multipliers) on 144 MHz.

26 QSOs ( $26 \times 2 = 52$ ) and 4 GL's (4 multipliers) on 222 MHz.

38 QSOs ( $38 \times 2 = 76$ ) and 5 GL's (5 multipliers) on 432 MHz.

2 QSOs ( $2 \times 4 = 8$ ) and 2 GL's (2 multipliers) on 903 MHz.

6 QSOs ( $6 \times 4 = 24$ ) and 2 GL's (2 multipliers) on 1296 MHz.

W1XX therefore has 245 QSO points ( $40 + 45 + 52 + 76 + 8 + 24 = 245$ )  $\times$  21 multipliers ( $8 + 4 + 5 + 2 + 3 = 21$ ) = 5,145 total points.

**VIII. Awards:** Engraved plaques will be awarded to the top-scoring stations in each category in the world (for a total of eight plaques). Certificates suitable for framing will awarded to the top-scoring stations in each category in each continent. Certificates may also be awarded to other top-scoring stations who show outstanding contest effort. Certificates will be awarded to top-scoring stations in each category in geographic areas where warranted. Geographic areas include states (U.S.), call areas (Japan), provinces (Canada), and countries, and may also be extended to include other subdivisions as justified by competitive entries.

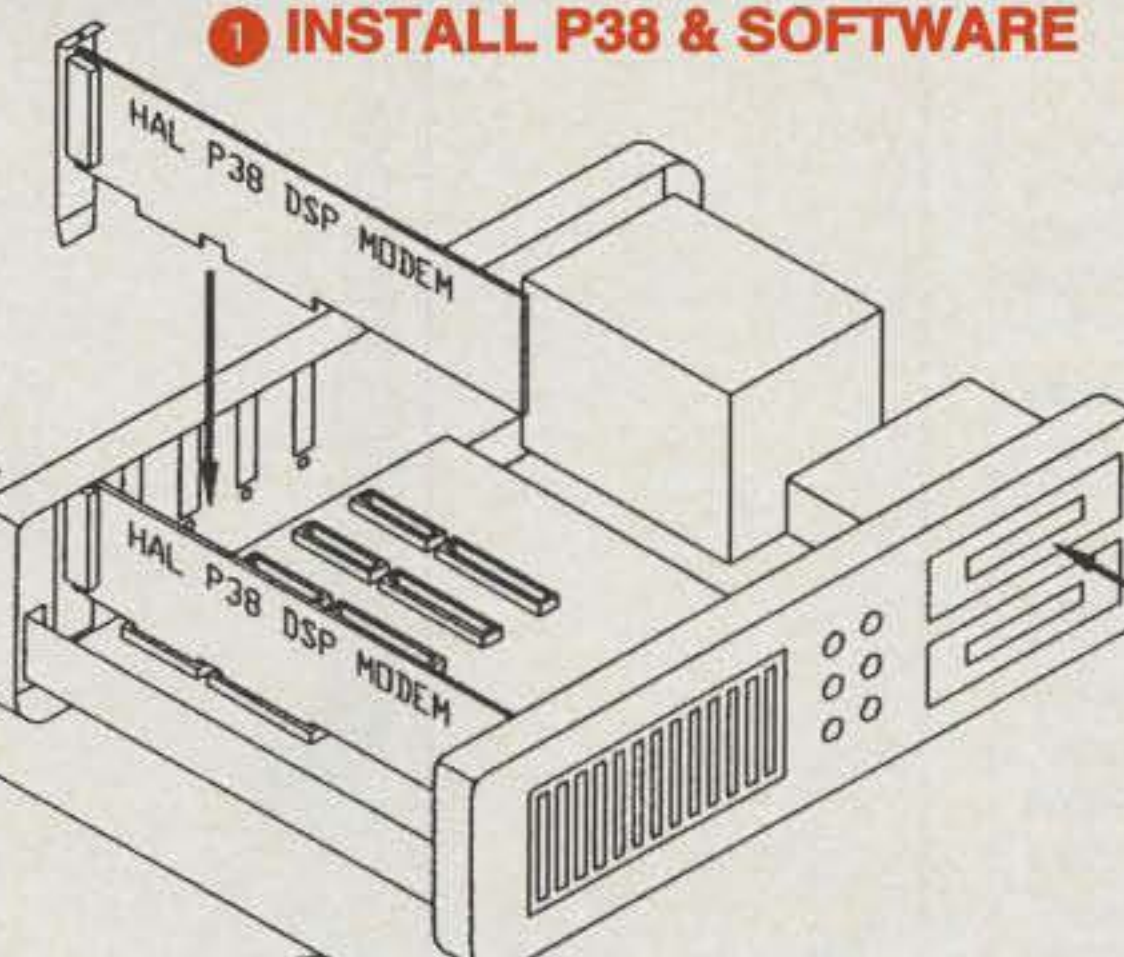
**IX. Miscellaneous:** An operator can sign only one callsign during the contest. This means that an operator cannot generate QSOs by first signing his callsign, then signing his daughter's callsign, even though both callsigns are assigned to the same location. All contacts above 300 GHz must use coherent radiation on transmissions and employ at least one stage of electronic detection on receive. A station located exactly on a dividing line of a grid locator must choose only one grid locator from which to operate for exchange purposes. A different multiplier cannot be given out without moving the complete station at least 100 meters.

**X. Log Submissions:** You must request log sheets from: the CQ VHF Contest, CQ Magazine, 76 N. Broadway, Hicksville, NY 11801. Include an SASE with your request. Completed logs must be postmarked no later than August 31, 1996 to be eligible for awards. All logs should be mailed to: Joe Lynch, N6CL, VHF Contest Chairman, P.O. Box 73, Oklahoma City, OK 73101. Logs may be submitted on disk, provided a hard copy of the log is sent with the disk and the data is in an ASCII format compatible with an IBM-PC type computer.

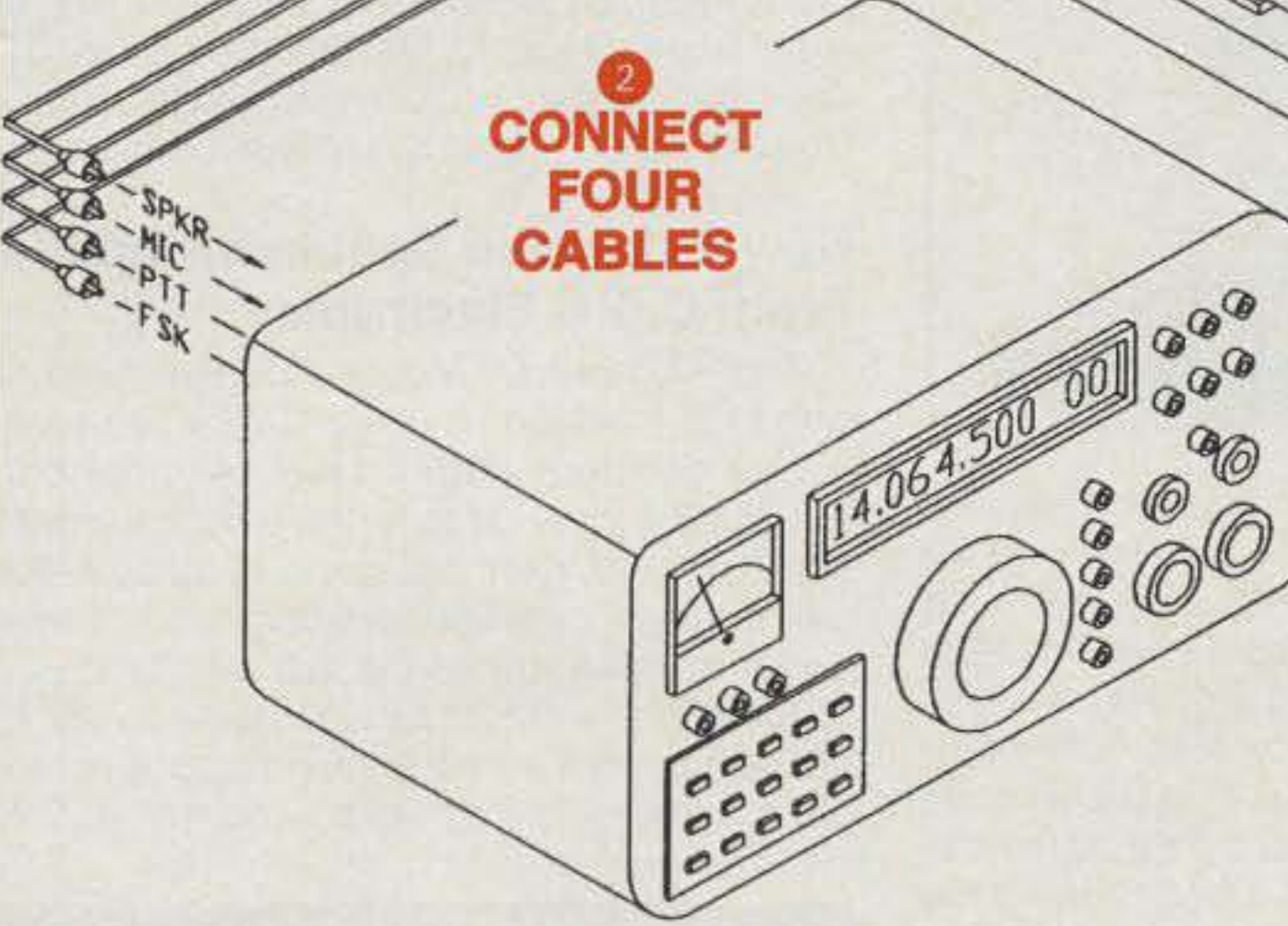
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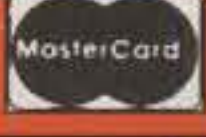
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# SHOWCASE

## Comet "Quick-Disconnect" Mobile Antenna Mount

Comet Antenna has designed a new "quick-disconnect" mobile antenna mount. The CQ-5M consists of two separate sections—a trunk-mount base that is attached to the trunk edge with four set screws, and an antenna-mount base that fits inside the trunk-mount base. Sliding a lever wedges the antenna-mount base securely in place.

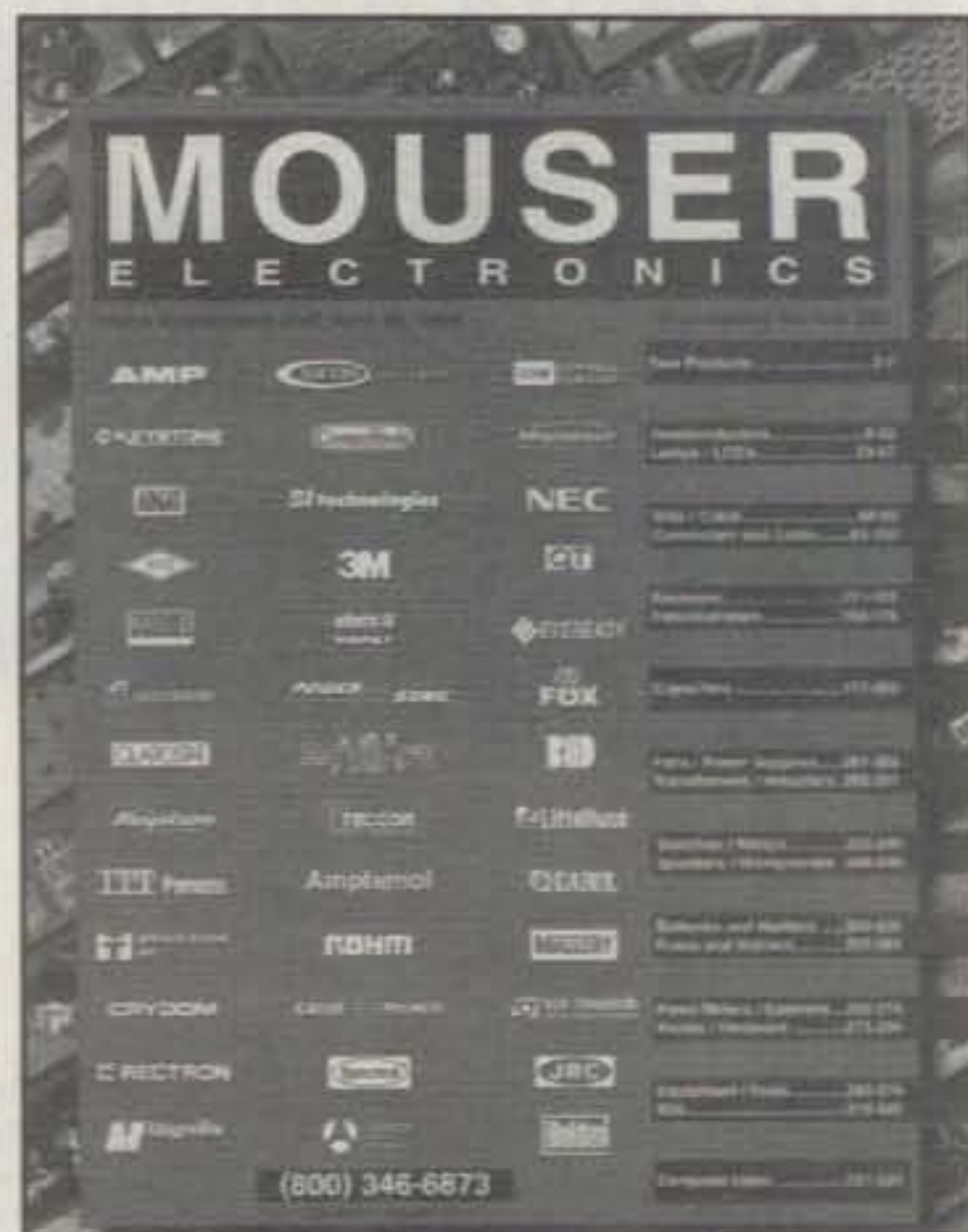


Comet's 17 foot deluxe coax cable assembly is included with the CQ-5M. The first 12 inches of coax is RG-188A/U style, allowing easy entry into the trunk, without causing cable damage or starting a water leak. The coax balance is double shielded, low loss, with gold-plated connectors. Two offset washers rotate around the antenna connector to adjust the antenna to vertical position. The bottom of the trunk mount base is rubber coated to prevent damage to the vehicles paint. It has a wide foot print to support large antennas. There are two versions available. The CQ-5M has an SO-239 antenna connector and a PL-259 transceiver connector. CQ-5N has N-type connectors. The CQ-5M and CQ-5N are available for a list price of \$66.95 each. For more information on Comet products and a complete catalog contact NCG Company at 800-962-2611, or circle number 111 on the reader service card.

## Mouser Releases New Catalog

Mouser Electronics® has published their newest electronic components catalog. The catalog is 324 pages and contains over 61,000 products from more than 120 electronics manufacturers. Products from Mouser's newest vendors including Clarostat, Bud Industries, Mill-Max, and others are featured in the catalog. They are added to a list of products from AMP, Keystone, the 1996 IC Master, NEC, SGS Thomson, Belden, Switchcraft, QT Optoelectronics, and Littlefuse.

The catalog provides both complete specification drawings and up-to-date, guaranteed prices for all products. Mouser provides same-



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## New Extension Speaker/Amplifier From C & S Electronics

The ALC247 Extension Speaker/Amplifier with built-in Audio Level Controller provides a nearly constant output level. A three-band equalizer is provide to further reduce unwanted noise and tailor the audio to meet individual requirements. The large signals are attenuated and the low levels are amplified while reducing the ambient and low noise levels. The unit is powered from the included power module or external 12 V power source. The ALC247



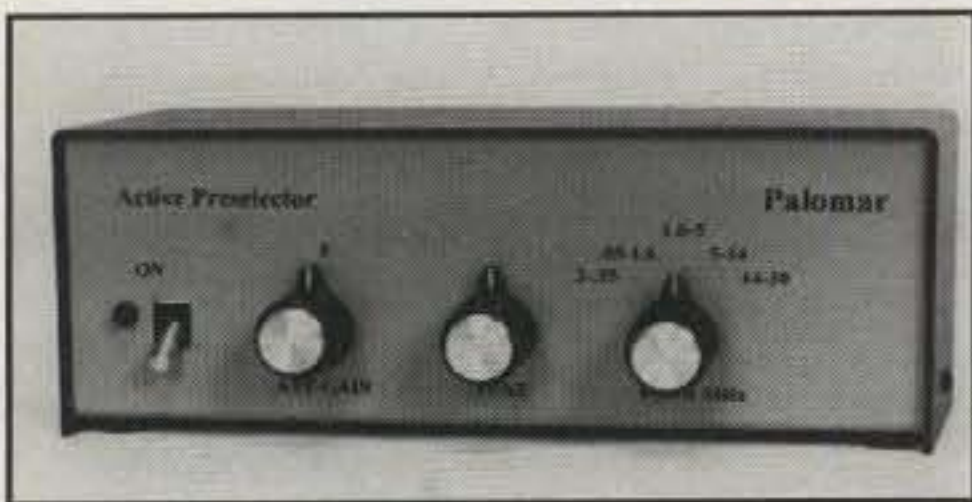


is for use with amateur radio, commercial radio, SWL, scanner, CB, PA, and TV applications when a constant audio level is desirable for comfort and safety. The ALC247 measures 4" x 6" x 3" inches and is available for \$49.95.

For more information, contact C & S Electronics, P.O. Box 2142, Norwalk, CT 06852-2142 (phone 203-866-3208, fax 203-854-5036) or circle number 113 on the reader service card.

### Palomar Active Preselector

Palomar Engineers is now offering a new preselector for SWLs and medium-wave DXers. It covers 200 kHz to 30 MHz in five bands. Its high Q tuned circuits reduce cross modulation and receiver overload from strong out-of-band signals. A new FET-bipolar amplifier tolerates higher signal levels without overload to operate in high signal density environments. Another feature is continuous control of gain and attenuation. Connectors are SO-239 and it operates on 12 VDC.



The Model P-508 Active Preselector is priced at \$99.95 plus \$6 shipping and handling. The Model PS-90 AC adapter is available for \$9.95. For further information, contact Palomar Engineers, P.O. Box 462222, Escondido, CA 92029 (phone 619-747-3343; fax 619-747-3346) or circle number 106 on the reader service card.

### LinkMate From Link Plus

Link Plus Corporation has added a new family member of Lincompex technology to their product line. The LinkMate is a half-duplex Lincompex for fixed or mobile applications. Lincompex is an audio processor that regulates the noise and interference in the transmission medium by linking a compressor at the transmitter with an expander at the receiver. The LinkMate was created to optimize transmitter talking power, while automatically enslaving the received interference and noise to the voice. Combined with a DSP, the LinkMate provides an alternative for amateur voice communications previously available to only government and military users.

For more information, contact Link Plus Corporation, 9052 Old Annapolis Road, Columbia,



MD 21045 (410-995-1919); or circle number 105 on the reader service card.

### JBI Radio Interface Kit

JBI Products and Technologies has introduced a computer-radio interface kit compatible with Kenwood, Yaesu, ICOM, Heathkit, and Ten-Tec transceivers. The kit can be constructed in about one hour and is powered directly through the computer COM port. It fits completely within the metal die-cast serial port connector. The kit comes complete with a PC-board, all components, 6 ft. cable, DB-25 con-



nectors, radio port connector, and control software diskette. Also available are a CW keying option and wired and assembled kits.

The basic radio control kit is available in kit form for \$29.95; \$45.00 assembled. Kits including the CW keying option are available (assembled kit form only) for \$59.00. (Quantity and club discounts are available.) Shipping and handling for the kits is \$4.50. For more information contact JBI Products, 1418 South Yale, O'Fallon, IL 62269-2738 (phone 1-800-JBI-8658, or 618-624-6227 in Illinois), or circle number 101 on the reader service card.

### GENESYS EARTALK MARK II

GENESYS Products Group has announced its next generation EARTALK specialty microphone. The EARTALK Mark II, model ET-MARKII provides the means for nearly hands-free two-way radio communications. The EARTALK Mark II combines a microphone and earphone built into an ergonomically designed earpiece, or EARMIC. The unit attaches via the mic-jack on handheld transceivers. During two-way radio transmissions, transmit audio is picked up from the inner-ear and passed via the EARMIC. Receive audio is provided by the EARMIC's internal earphone. Voice transmissions are activated by a PTT control assembly. Adjustments and volume control come exclusively from the user's radio. The ET-MarkII also features a PTT lock and comes standard with split plugs and an adjustable belt/shirt clip.

The EARTALK Mark II fits most amateur radio and many commercial land-mobile handheld radios. Models ET-MarkII (ICOM, etc.), ET-MarkII-K (Kenwood), and ET-MarkII-M (Motorola) suggested retail price is \$84.95.

For more information about the EARTALK Mark II or other radio accessories, contact GENESYS Products Group, Ltd., 10815 Gulfdale, San Antonio, TX 78216 (telephone 800-847-4745; fax 210-349-4300; or e-mail to genesys@connecti.com or visit their Internet WEB site <http://www.connecti.com/~genesys> or circle number 116 on the reader service card.

## R-X NOISE BRIDGE



### • Learn the truth about your antenna.

The Palomar R-X Noise Bridge tells you if your antenna is resonant or not and, if it is not, whether it is too long or too short. All this is one measurement reading.

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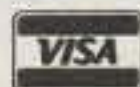


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**Frequency:** 500kHz - 1500MHz  
**Impedance:** 50 Ohm  
**Material:** Fiber Glass  
**Length:** 43.3 inches  
**Connector:** Low Loss "N" type  
**Mounting:** Mast mounting



**SCANMASTER 1500**



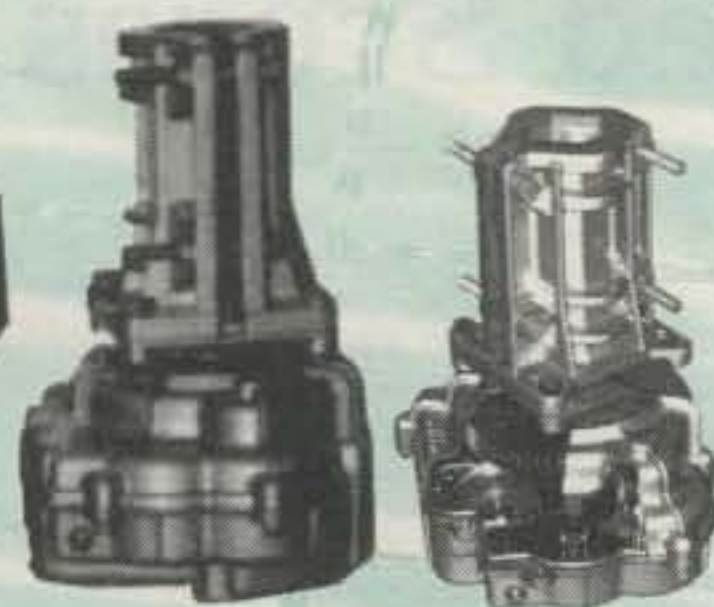
**World Wide Excellence with Proven Design**

**RC5-1**

**RC5-3 (Preset)**

Most popular for smaller antenna systems (A3S, A4S, EX14, KT14, KT34A, etc.).

Competes favorably with HAM IV and offers much higher quality at a surprisingly low price.



**RC5A-2**

**RC5A-3 (Preset)**

RC5A-2(-3) will handle most any antenna system. It out performs the T2X in every department and costs about the same. It's no wonder the RC5A-2 and the RC5A-3 are becoming the big sellers.



Model	Roto Tq.	Brk. Tq.	Sq.Ft.	Vert. Load
HAM IV	66ft#	417ft#	15	400
RC5-1/3	43	506	13	880
G800SDX	43-79(2)	288	17	1320(1)

Model	Roto Tq.	Brk. Tq.	Sq.Ft.	Vert. Load#
T2X	83ft#	750ft#	20	800
RC5A-2-3	116	1085	25	1540



**Reliability and High Performance**

**105TSX**

Designed for VHF/UHF and lighter HF beams. Competitive in price and is a runaway for quality and specs.



**1300MSAX**

GD<sup>2</sup>1800kgm<sup>2</sup>  
 1300MSAX is designed for larger antenna arrays and has forged steel gears that withstand large external forces. Double gear and twin drive design, plus powerful patented braking function. Preset and computer control. 100Volt motor for low power loss over long control cable runs. Compare to HDR300 & Yaesu G2800SDX.



**747SRX/ 750FXX**

GD<sup>2</sup>400kgm<sup>2</sup>  
 Use with larger Tri-Band beams, high rotating speed (35 sec) and 470° rotation. Compare 747SRX/ 750FXX to HAM IV. The 750 FXX is computer compatible. Note: 360° controller.



**Jim**  
 PROFESSIONAL SERIES

**DATONG ELECTRONICS LIMITED**

**SAS**

**BTR**



# AOR U.K. General Coverage Receiver

## AR7030... "Superior by Design"

The introduction of the all new AOR AR7030 shortwave receiver is offered to the discerning and dedicated listener. No matter how many new features are offered, ultimately a receiver will be judged on how well it receives! The AR7030 is the result of a combined project between AOR and a UK designer. The AR7030 represents the very latest and best design, featuring exceptionally strong signal handling and bristling with enhanced features. The AR7030 has been targeted to handle strong signals that are of prime concern of European listeners.



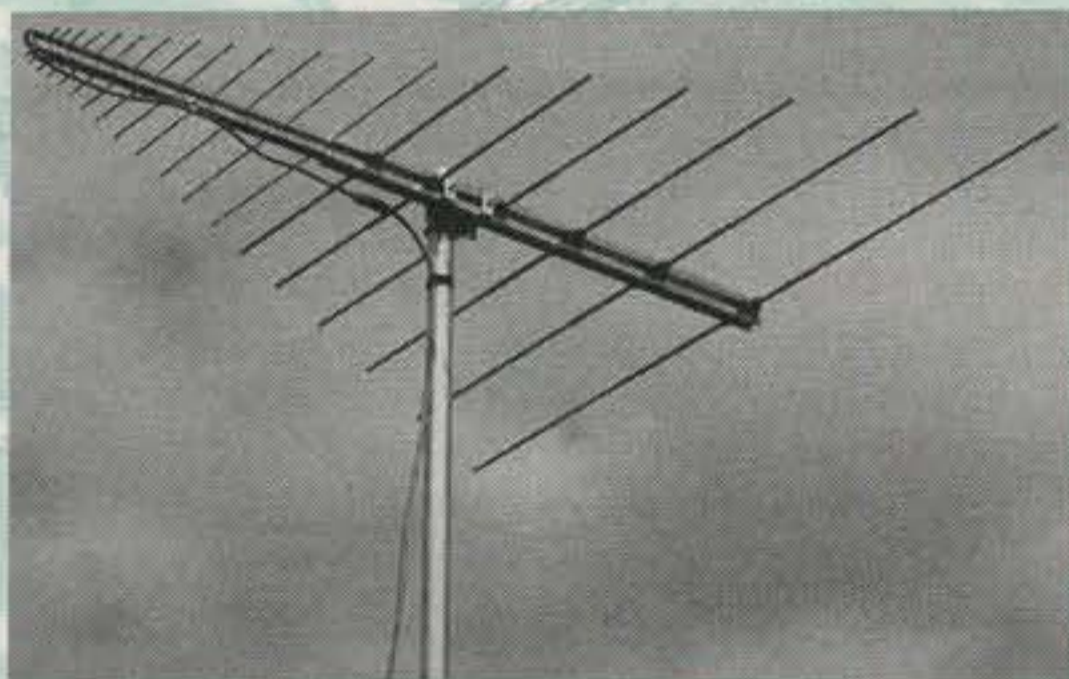
**NEW**

It offers greater than +35dBm IP3 (Intercept Point 3) and greater than 100dBm dynamic range. The DMOS FET QUAD first mixer with NCO drive DDS offers the ultimate performance.

All this and great sensitivity better than 0.5µV for 10dB S/N in AM mode and better than 0.3µV for 10dB S/N in SSB. Selectivity too is razor sharp offering greater than 90dB @ 10kHz SSB and greater than 100dB @ 20kHz. No other receiver "in the class" nor indeed at considerably higher price can match the sheer performance excellence of the AR7030.

## Log Periodic Antenna CLP5130 Series

- Wide Band • Low VSWTR • High Gain • Compact Size • Lightweight

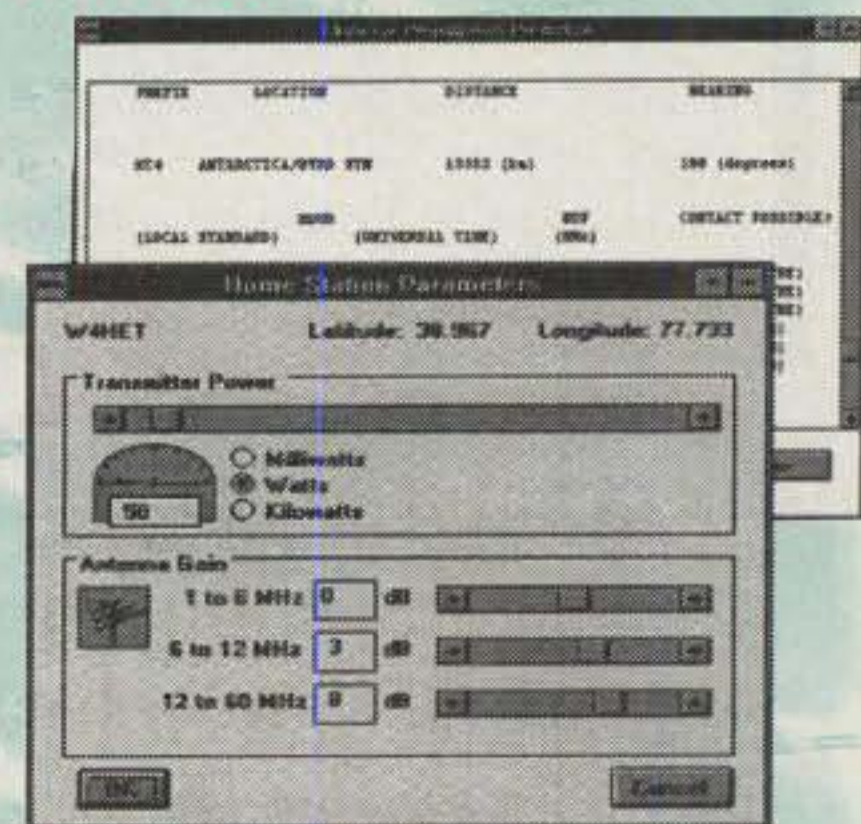


**One Antenna Does It All!** 25 - 1300MHz, the **CREATE CLP Series** offers outstanding performance with high forward gain and low transmitting VSWR of less than 2:1 across a broad range. Extra strong commercial grade aluminum and magnesium construction withstands the worst weather for unsurpassed long-term reliability. Multipurpose horizontally or vertically mounting with included hardware and complete instructions. Can pass as a conventional TV antenna. Perfect for apartment dwellers and those with limited space or antenna restrictions.



## Skywave Propagation Prediction Software for Windows 3.1/Windows 95

Tell SKYCOM where you are, your transmitter power and antenna gain. Enter the current Sunspot Number or Solar Flux measurement. SKYCOM's windows simplify data entry. Pick a location from SKYCOM's database of over 400 call sign prefixes, using SKYCOM's database search tools or map. You can tailor the SKYCOM database to your own needs by adding additional locations. Instantly obtain prediction reports that tell you the best time and frequency for your transmission. You can also obtain a detailed report that lists the vertical critical frequency, frequency of Optimum Transmission, Signal to Noise ratio, and other data. SKYCOM 2.0 includes an on-line beam heading reference to the direct and long path bearing and distances (in miles and kilometers) from your home station to all locations in the SKYCOM database.



# CONTACT YOUR FAVORITE DEALER TODAY!





## ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •



MODEL VS-50M

### SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-3A, RS-4A, RS-5A, RS-4L, RS-5L
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE

- THREE CONDUCTOR POWER CORD except for RS-3A
- ONE YEAR WARRANTY • MADE IN U.S.A.

### PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)

### SL SERIES



- LOW PROFILE POWER SUPPLY

MODEL	Colors		Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
	Gray	Black				
SL-11A	•	•	7	11	2 <sup>5</sup> / <sub>8</sub> x 7 <sup>5</sup> / <sub>8</sub> x 9 <sup>3</sup> / <sub>4</sub>	12
SL-11R	•	•	7	11	2 <sup>5</sup> / <sub>8</sub> x 7 x 9 <sup>3</sup> / <sub>4</sub>	12
SL-11R-MC	•	•	7	11	5 <sup>3</sup> / <sub>4</sub> x 7 <sup>1</sup> / <sub>4</sub> x 9 <sup>3</sup> / <sub>4</sub>	13
SL-11R-GE	•	•	7	11	5 <sup>3</sup> / <sub>4</sub> x 7 x 9 <sup>3</sup> / <sub>4</sub>	13
SL-11R-RA	•	•	7	11	4 <sup>3</sup> / <sub>4</sub> x 7 x 9 <sup>3</sup> / <sub>4</sub>	13
SL-11R-EFJ	•	•	7	11	5 <sup>1</sup> / <sub>8</sub> x 7 <sup>1</sup> / <sub>4</sub> x 9 <sup>3</sup> / <sub>4</sub>	13
SL-11MG	•	•	7	11	5 <sup>1</sup> / <sub>8</sub> x 7 <sup>1</sup> / <sub>8</sub> x 9 <sup>3</sup> / <sub>4</sub>	13
SL-15R	•	•	12	15	2 <sup>5</sup> / <sub>8</sub> x 7 x 9 <sup>3</sup> / <sub>4</sub>	13
SL-15R-GE	•	•	12	15	5 <sup>1</sup> / <sub>8</sub> x 7 <sup>5</sup> / <sub>8</sub> x 9 <sup>3</sup> / <sub>4</sub>	14
SL-15R-RA	•	•	12	15	4 <sup>3</sup> / <sub>4</sub> x 7 <sup>1</sup> / <sub>4</sub> x 9 <sup>3</sup> / <sub>4</sub>	14
SL-15R-EFJ	•	•	12	15	5 <sup>1</sup> / <sub>8</sub> x 7 <sup>1</sup> / <sub>8</sub> x 9 <sup>3</sup> / <sub>4</sub>	14

### RS-L SERIES



- POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Colors	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
RS-4L	•	3	4	3 <sup>1</sup> / <sub>2</sub> x 6 <sup>1</sup> / <sub>8</sub> x 7 <sup>1</sup> / <sub>4</sub>	6
RS-5L	•	4	5	3 <sup>1</sup> / <sub>2</sub> x 6 <sup>1</sup> / <sub>8</sub> x 7 <sup>1</sup> / <sub>4</sub>	7

### RM SERIES



MODEL RM-35M

- 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
RM-12A	9	12	5 <sup>1</sup> / <sub>4</sub> x 19 x 8 <sup>1</sup> / <sub>4</sub>	16
RM-35A	25	35	5 <sup>1</sup> / <sub>4</sub> x 19 x 12 <sup>1</sup> / <sub>2</sub>	38
RM-50A	37	50	5 <sup>1</sup> / <sub>4</sub> x 19 x 12 <sup>1</sup> / <sub>2</sub>	50
RM-60A	50	55	7 x 19 x 12 <sup>1</sup> / <sub>2</sub>	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5 <sup>1</sup> / <sub>4</sub> x 19 x 8 <sup>1</sup> / <sub>4</sub>	16
RM-35M	25	35	5 <sup>1</sup> / <sub>4</sub> x 19 x 12 <sup>1</sup> / <sub>2</sub>	38
RM-50M	37	50	5 <sup>1</sup> / <sub>4</sub> x 19 x 12 <sup>1</sup> / <sub>2</sub>	50
RM-60M	50	55	7 x 19 x 12 <sup>1</sup> / <sub>2</sub>	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 <sup>3</sup> / <sub>4</sub> x 5 <sup>3</sup> / <sub>4</sub>	4
RS-4A	•	•	3	4	3 <sup>3</sup> / <sub>4</sub> x 6 <sup>1</sup> / <sub>2</sub> x 9	5
RS-5A	•	•	4	5	3 <sup>1</sup> / <sub>2</sub> x 6 <sup>1</sup> / <sub>8</sub> x 7 <sup>1</sup> / <sub>4</sub>	7
RS-7A	•	•	5	7	3 <sup>3</sup> / <sub>4</sub> x 6 <sup>1</sup> / <sub>2</sub> x 9	9
RS-7B	•	•	5	7	4 x 7 <sup>1</sup> / <sub>2</sub> x 10 <sup>3</sup> / <sub>4</sub>	10
RS-10A	•	•	7.5	10	4 x 7 <sup>1</sup> / <sub>2</sub> x 10 <sup>3</sup> / <sub>4</sub>	11
RS-12A	•	•	9	12	4 <sup>1</sup> / <sub>2</sub> x 8 x 9	13
RS-12B	•	•	9	12	4 x 7 <sup>1</sup> / <sub>2</sub> x 10 <sup>3</sup> / <sub>4</sub>	13
RS-20A	•	•	16	20	5 x 9 x 10 <sup>1</sup> / <sub>2</sub>	18
RS-35A	•	•	25	35	5 x 11 x 11	27
RS-50A	•	•	37	50	6 x 13 <sup>3</sup> / <sub>4</sub> x 11	46
RS-70A	•	•	57	70	6 x 13 <sup>3</sup> / <sub>4</sub> x 12 <sup>1</sup> / <sub>8</sub>	48

### RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
RS-12M	9	12	4 <sup>1</sup> / <sub>2</sub> x 8 x 9	13
RS-20M	16	20	5 x 9 x 10 <sup>1</sup> / <sub>2</sub>	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 <sup>3</sup> / <sub>4</sub> x 11	46
RS-70M	57	70	6 x 13 <sup>3</sup> / <sub>4</sub> x 12 <sup>1</sup> / <sub>8</sub>	48

### VS-M AND VRM-M SERIES



MODEL VS-35M

- Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty [Amps]			ICS* [Amps]	Size [IN] H x W x D	Shipping Wt. [lbs]
	@13.8VDC	@10VDC	@5VDC			
VS-12M	9	5	2	12	4 <sup>1</sup> / <sub>2</sub> x 8 x 9	13
VS-20M	16	9	4	20	5 x 9 x 10 <sup>1</sup> / <sub>2</sub>	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13 <sup>3</sup> / <sub>4</sub> x 11	46
VS-70M	57	34	16	70	6 x 13 <sup>3</sup> / <sub>4</sub> x 12 <sup>1</sup> / <sub>2</sub>	48
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5 <sup>1</sup> / <sub>4</sub> x 19 x 12 <sup>1</sup> / <sub>2</sub>	38
VRM-50M	37	22	10	50	5 <sup>1</sup> / <sub>4</sub> x 19 x 12 <sup>1</sup> / <sub>2</sub>	50

# ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

## Software, Books, and More

This time around we turn our attention to some of the software and books that have accumulated in and around the ham-shack so far this past winter and spring, following up with some antenna notes you should find interesting. We'll turn first to the "soft stuff" and books.

### Software Notes

**SKYCOM 2.0.** In *The NEW Shortwave Propagation Handbook*, authors George Jacobs, W3ASK, Ted Cohen, N4XX, and Bob Rose, K6GKU, offer some astute observations on the future of HF propagation forecasting. They note that the major problem in the use of current HF propagation prediction programs is the fact that the programs' users have a wide range of experience and computer skills. As a result, many users find complicated, technically oriented prediction programs intimidating, to the extent that they shy away from using them, do a poor job of setting up HF circuit scenarios, and get poor results. The authors expect that "next-generation" prediction programs will be designed to achieve a high level of performance and productivity, regardless of the motivation or experience of the persons using them.

According to Bill Munson, SKYCOM Product Manager, SKYCOM 2.0 for the IBM PC and compatibles was created specifically to resolve some of these problems—to be computer software "for the rest of us." The program is intended to yield practical, plain-language predictions of the best times and frequencies to use to contact locations of users' choosing without their needing an in-depth understanding of the physics of HF propagation, and without having to read and interpret complex graphs, tables, or charts.

Using an enhanced algorithm based on the ionospheric model developed by the Naval Ocean Systems Center (NOSC), SKYCOM also takes into account the capabilities of the user's equipment to compute total path loss. The program efficiently and quickly identifies the key windows of opportunity for contact with any location the user chooses. The program's ease of use is enhanced by the Windows 3.1/Windows 95 graphical environment, an intuitive user interface, and helpful, step-by-step documentation.

SKYCOM is simplicity itself. To use it, you provide some simple input. You tell SKYCOM your location, transmitter power, and antenna gain, and you also enter the current solar activity—i.e., sunspot number or solar flux. You pick a location from the user-customizable database of over 400 callsign prefixes, using SKYCOM's database search tools or map (fig. 1).

With this input, you instantly obtain a "quick-look" prediction report that tells you the best time and frequency to use, in terms of "yes-no-maybe" contact possibilities. You also can obtain a detailed report that lists the vertical critical frequency, Frequency of Optimum

289 Poplar Drive, Millbrook, AL 36054

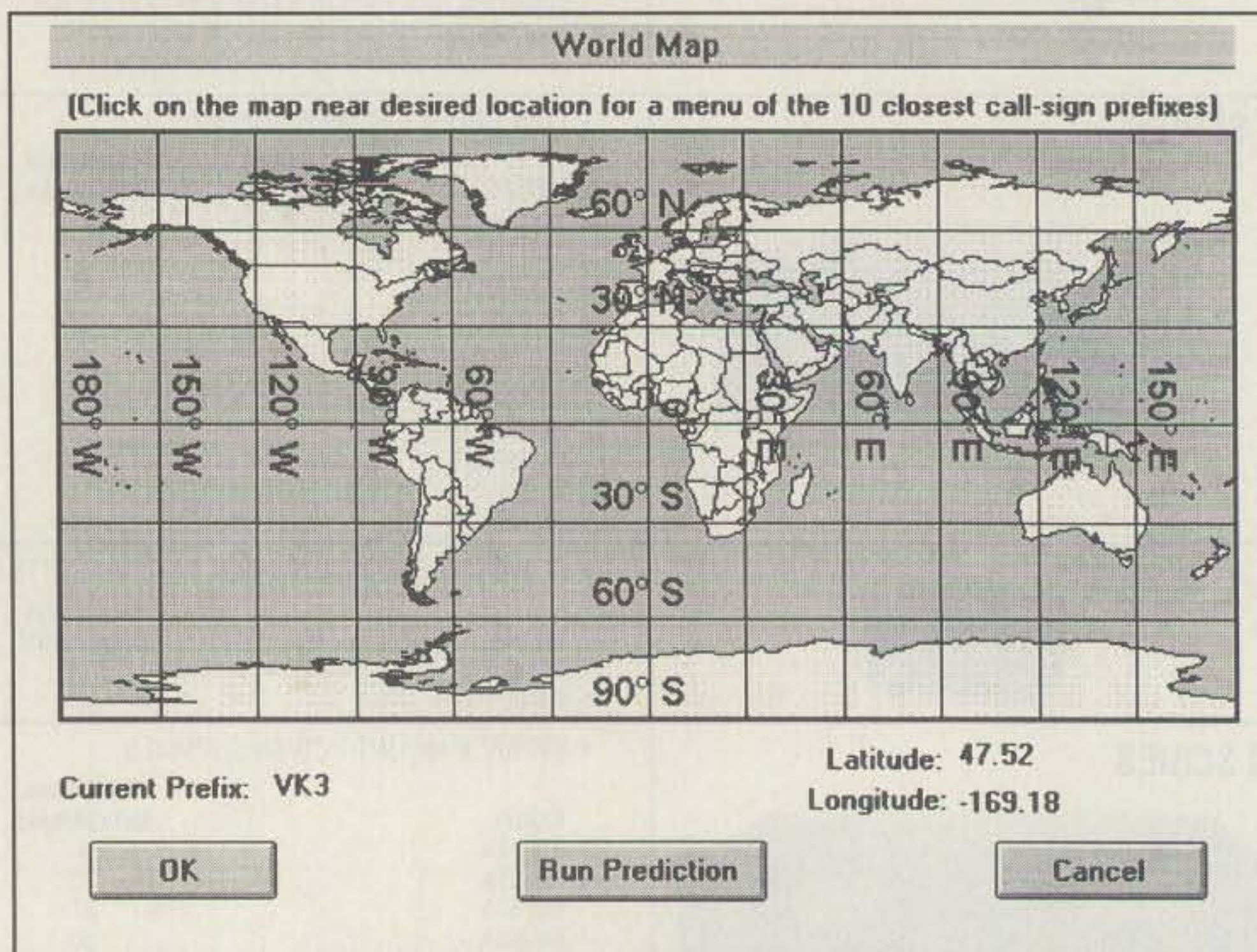


Fig. 1—The operation of SKYCOM 2.0 is simplicity itself. To use it, you tell SKYCOM your location, transmitter power, and antenna gain, and also enter the current sunspot number or solar flux. You also pick a location from the user-customizable database of over 400 callsign prefixes, using SKYCOM's database search tools or map, shown here.

Transmission (FOT), signal-to-noise (S/N) ratio, and other data. The program includes an online beam heading reference to the short- and long-path bearings and distances from your home QTH to all locations found in the program's database.

SKYCOM 2.0 is \$59.95 and can be purchased from amateur radio outlets or ordered directly from the publisher. For more information, contact Fuentez Systems Concepts, Inc., 11781 Lee Jackson Hwy., Suite 700, Fairfax, VA 22033 (1-800-989-1447), or check out their Internet Web site: <http://www.fuentez.com>.

*Postscript:* To avoid confusion on product names, I should point out that SKYCOM isn't related to the Canadian DOS product of the same name, which we reviewed in December 1994. It is related to SKYCOM 1.1 and 1.5, however, two DOS-based prediction programs, and it licenses the modeling portions of these programs from Engineering Systems, Inc. (ESI). We described ESI's SKYCOM and the Macintosh-based DX Window grayline program in our September 1989 column. Information on the ESI programs is available from Engineering Systems, Inc., P.O. Box 939, Vienna, VA 22183.

**Radio Amateur Callbook CD-ROM 1996.** For many years, more years than I really want to count, the *Radio Amateur Callbooks*, in North American and International editions, have been the "gold standard" upon which the

familiar QSL exchange system largely is based. Amateurs throughout the world use the books to confirm contacts, as the books provide rather complete and up-to-date address information. The two hardcopy editions contain 700,000+ and 600,000+ calls, names, and addresses, respectively, printed on some 3900+ pages. In addition, thousands of new licenses are added and about 100,000 existing licenses are revised annually in compiling the books.

The *Radio Amateur Callbook CD-ROM 1996* claims to be the most complete and extensive radio amateur directory on the market. Incorporating both the North American and International editions of the *Callbooks*, it has over 1.3 million online listings in more than 250 countries. With several countries not found in other directories, the CD-ROM offers excellent worldwide coverage.

Such extensive global coverage is impressive, since many international callsigns are hard to obtain. Many countries are pending settlement of political boundaries or are unwilling to release callsign data. Also, some countries try to prevent distribution of licensing data in machine-readable form, giving CD-ROM based publishers additional problems with which to contend.

The CD-ROM includes both Windows and DOS versions, although the latter's interface is somewhat spartan. The CD-ROM offers data



# MIRAGE... 160 Watts on 2 Meters!

Turn your mobile, base or handheld into 160 Watt powerhouses and talk further, longer, clearer... All modes: FM, SSB, CW... Superb GaAsFET preamp... Overdrive, high SWR, Over-temperature protection... Remote controllable...

*In Stock at ham dealers everywhere!*

B-5016-G

**\$299**

Suggested Retail

*Call your dealer for your best price*

- 160 Watts output
- All modes: FM, SSB, CW
- Low noise GaAsFET preamp
- Fully protected
- Automatic RF sense T/R switch
- Remote controllable

MIRAGE's most popular amplifier gives you 160 watts of brute output power for 50 watts in! The B-5016-G is ideal for your 20 to 60 watt 2 Meter mobile or base station. Power Curve chart shows typical output power for your input power.

You'll talk further, longer and clearer on all modes -- FM, SSB or CW -- and hear weak signals better than you've ever heard before!

You get a low noise GaAsFET preamp with an excellent 0.6 dB noise figure for pulling out weak signals. You can select a high 20 dB gain or a lower 15 dB gain to minimize receiver overload and intermod problems.

The B-5016-G is legendary for its ruggedness. We know of one that has been in constant use since 1979!

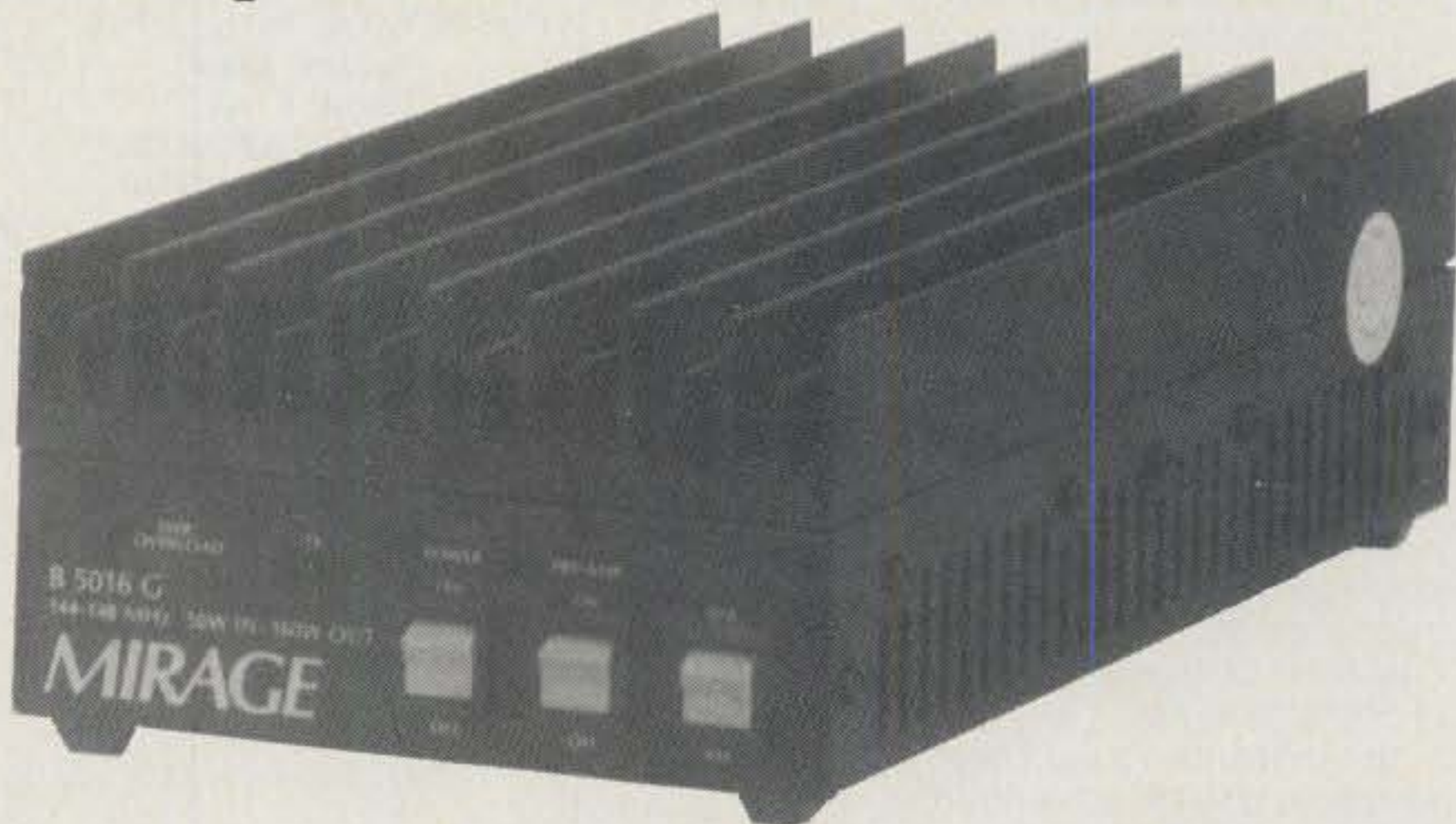
Your B-5016-G is fully protected with features found only in expensive commercial amplifiers.

High SWR or excessive input power can damage your amplifier. Protection circuits automatically bypass your amplifier to prevent damage and an LED lights to warn you.

Your expensive power transistors are protected from overheating by MIRAGE's Therm-O-Guard™. It automatically shuts down and bypasses your amplifier if needed.

The B-5016-G knows when you're transmitting and kicks in 160 watts of power. Adjustable time delay gives you smooth transmit/receive switching. Also has remote external keying.

You can remotely control your B-5016-G and place it out of the way. An RC-1, \$45, Remote Control Head, lets you turn



## Power Curve -- typical B-5016-G output power for your input

Watts Out	130	135	140	145	150	155	160	165	170
Watts In	20	25	30	35	40	45	50	55	60

Power On/Off, Preamp On/Off and select SSB/FM.

Extra heavy-duty heatsink spans entire length of cabinet. Draws 17 to 22 amps from 13.8 VDC. 12x3x5 1/2 inches.

### More 160 Watt, 2 Meter Amplifiers...

**B-2516-G, \$299.** Same as B-5016-G, but for 10 to 35 watt mobile or base stations. Gives you 160 watts out for 25 watts in.

**B-1016-G, \$379.** MIRAGE's most popular dual purpose handheld or mobile/base 2 Meter amplifier gives you 160 watts out for 10 watts in. For 0.2 to 15 watt transceivers.

**B-215-G, \$379.** MIRAGE's most popular handheld 2 Meter amplifier gives you 150 watts out for 2 watts in and 160 watts out for 3.5 watts in. For 0.25 to 5 watt handhelds.

### Call your dealer for your best price!

Turn your mobile, base or handheld into 160 watt powerhouses and talk further, longer, clearer... Call your dealer today for your best price!

## 6 Meter Amplifiers (50-54 MHz)

Bust through 6 Meters with 150 watts of brute power and work exotic DX! The A-1015-G, \$389, is the world's most popular all mode FM/SSB/CW 6 Meter amplifier. For 1 to 15 watt transceivers. 150 watts out for 10 in. A-1035-G, \$659, 350 watts out for 10 in. Both 12x3x5 1/2 inches.

## 70 cm Amplifiers (420-450 MHz)

MIRAGE's most popular 70 cm amp -- the D-3010N, \$365 -- gives 100 watts out for 30 in. For 5 to 45 watt mobile/base.

D-1010-N, \$395, 100 watts out for 10 in. Dual purpose -- for handhelds or mobile/base. D-26-N, \$269, 60 watts out for 2 in, for handhelds.

## Low noise GaAsFET Preamps

High gain ultra low noise GaAsFET preamps for receiving weak signals. Selectable gain prevents receiver intermod. 15 to 22 dB gain. Less than 0.8 dB noise figure. Automatic RF switching up to 160 watts. Choose In-Shack model or Mast-Mount (includes remote control) model to reduce loss. Rugged die-cast enclosure.

Frequency (MHz)	In Shack \$139	Mast Mount \$195
28-30	KP-1/10M	KP-2/10M
50-54	KP-1/6M	KP-2/6M
144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

Prices and specifications subject to change. © 1995 Mirage Communications

## Remote Control Head for Amps

Remote controls most MIRAGE amps. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). 1 3/4x3 3/4x2 1/2 inches. RC-1, \$45.

## Free Catalog/ Nearest Dealer

Write or call toll-free... 800-647-1800

MIRAGE has the world's largest line of VHF/UHF amplifiers -- 47 models... 6 Meters through 70 cm, all modes FM/SSB/CW, continuous duty repeater, Amateur TV, even commercial service.

Technical: 601-323-8287 Fax: 601-323-6551

# MIRAGE

COMMUNICATIONS EQUIPMENT  
300 Industrial Park Road  
Starkville, MS 39759, USA

MIRAGE... the world's most rugged VHF/UHF amplifiers

CIRCLE 146 ON READER SERVICE CARD

display by callsign, last name, city, license class, and issue and expiration dates.

You can search U.S. stations by callsign, last name, city, Zipcode, or county. You can search international data by callsign, or you can "text search" the international data by name, street, city, province, or region. There's a Windows clipboard feature for labels, and you can send data to logging, spreadsheet, wordprocessor, or label printing programs.

The CD-ROM also includes auxiliary data. A variety of text files are provided that you can view online; these are much like the listings in the traditional *Callbooks*. There are listings of prefixes, zones, DXCC countries, standard times by country, amateur radio census data, QSL bureaus, 6 and 10 meter beacons, Q-signals, international postal rates, and more. The Windows version offers Morse output of call-sign data, which can be used by the blind or anyone who wants help learning the code.

The CD-ROM is \$49.95 (the hardcopy *Callbook* editions are \$35 each). For more information, contact Radio Amateur Callbook, 1695 Oak St., P.O. Box 2013, Lakewood, NJ 08701 (1-800-278-8477). A free catalog is available.

**SmithWorks V2.0.** In last August's column we featured RFDC V2.0 offered by Dick Austin, K1QIZ, of Austin Antenna Ltd. RFDC, which stands for "R.F. Designs & Calculations," was and still is an extensive design program with numerous calculation functions.

We noted an optional addition to RFDC, SmithWorks, a computer version of the normally difficult to use Smith chart that can be understood and used by practically anyone with a bare minimum of electronics expertise. SmithWorks V2.0 also is available as a stand-alone program at \$75, or as an upgrade from V1.0 at \$35. A demo version of SmithWorks V2.0 is available from the publisher for \$2, which is refunded if a purchase results.

As we noted, the Smith chart is an inherently powerful tool for the solution of transmission line and waveguide problems, but it's normally available only if you're willing to invest considerable effort in learning its various intricacies, which are intimidating. The "Series Line Zoom" feature of SmithWorks eliminates most of the bewilderment; this feature minimizes the confusing lines, circles, and "electronic hieroglyphics" that are found on most Smith charts (see fig. 2).

SmithWorks V2.0 lets you enter up to 10 data points (more than you're likely to need) and then select one of the points on which to center your matching solution. Also added is the ability to match impedances by the insertion of a coaxial section; the program shows you how long the section should be and where to place it in the feedline. Another beneficial addition to the program is the provision for a screen dump to your printer.

For more information, contact the AustinSof Division, Austin Antenna Ltd., 10 Main St., Gonic, NH 03839 (603-335-6339). (Refer to our August 1995 column for more details on RFDC and SmithWorks, and to our December 1993 column for a discussion of other commercially available Smith chart programs.)

**KaWin.** Stan Huntting, KF0IA, sent a demo of KaWin, a Windows digital communications application. It offers all the advantages of host mode communications interfacing for Kantronics™ TNCs, and it's usable under Windows 3.1 and Windows 95.

KaWin is designed to be a window on the world of digital amateur radio that helps users fully realize the potential of their TNCs. As such, its emphasis is on VHF and HF packet radio,

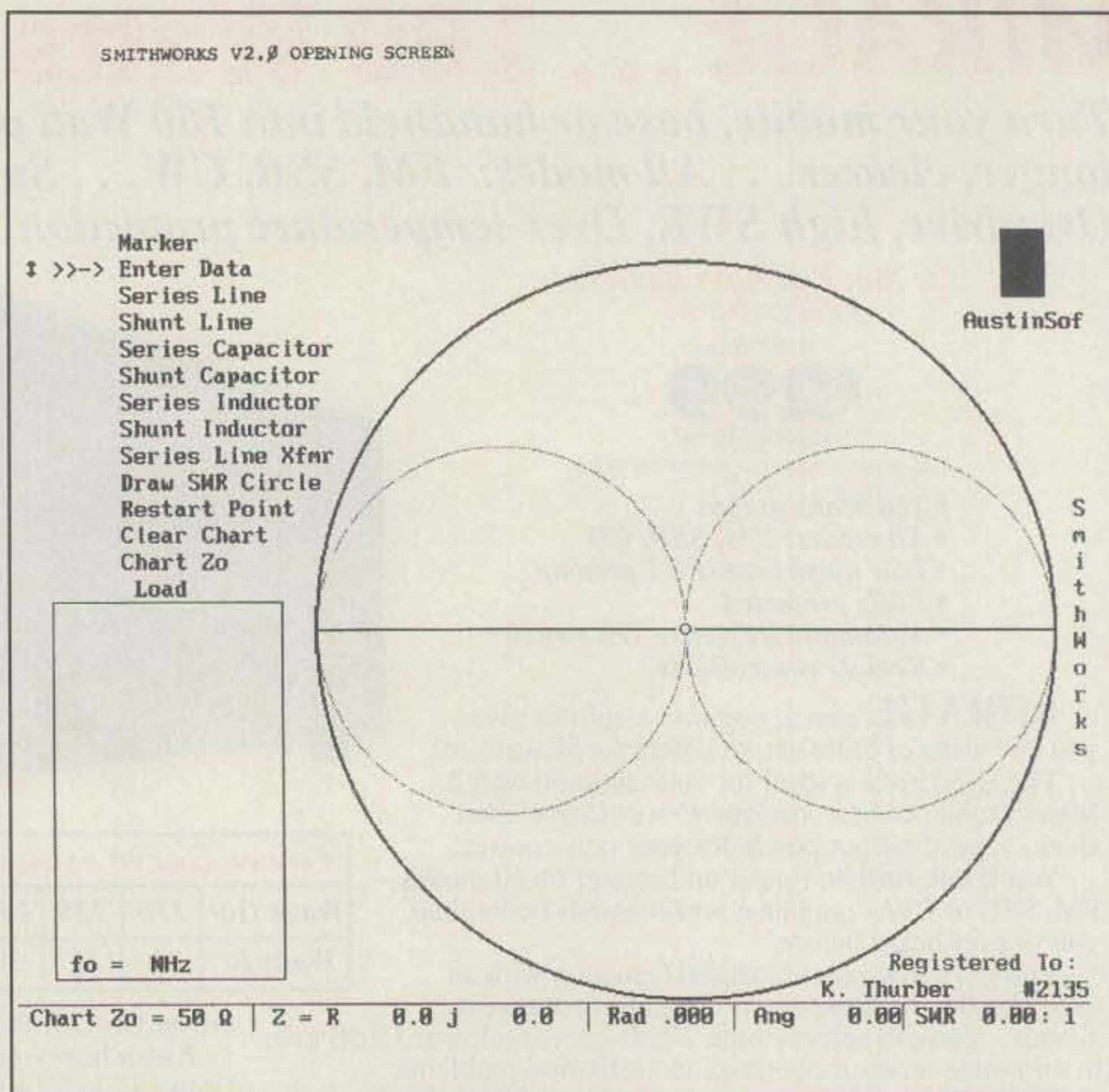


Fig. 2—SmithWorks V2.0 opening screen. SmithWorks is an "electronic Smith chart" that can be understood and used by practically anyone, as is apparent from this simple opening screen. While there are other Smith chart programs, most require a tedious trial-and-error approach. The "Series Line Zoom" feature minimizes the confusing lines, circles, and "electronic hieroglyphics" on Smith charts.

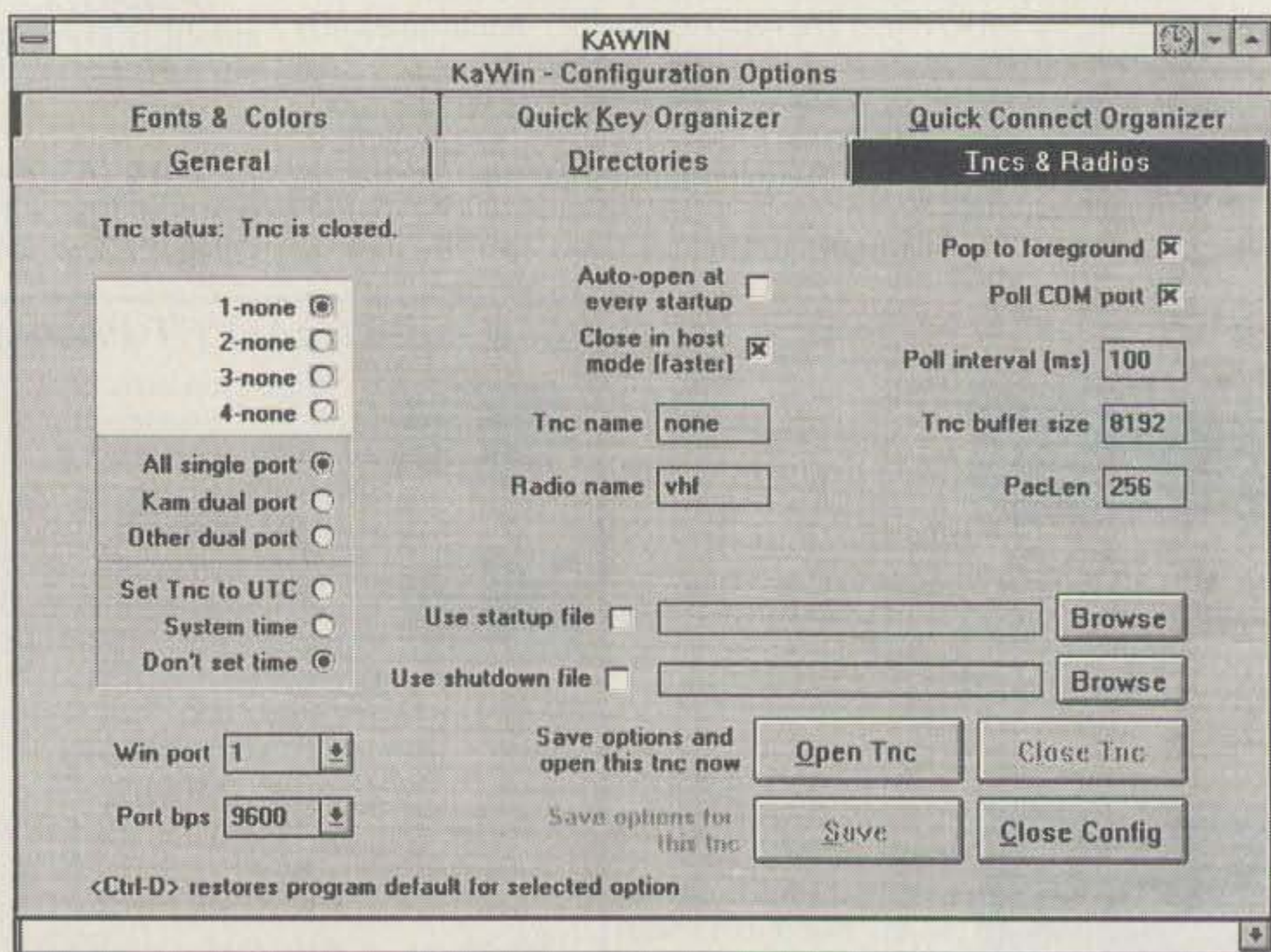


Fig. 3—KaWin, designed to control up to four Kantronics TNCs and eight VHF, UHF, or HF transceivers, is highly configurable and is easy to customize to your operating environment. Having said this, however, its intelligent defaults for its hundreds of configurable settings mean that you may never want to change them. Shown here are the program's configuration options screens.

plus support for CW, RTTY, ASCII, Navtex, AMTOR, PACTOR, and other modes. KaWin has the ability to integrate up to four TNCs at 9600 bps and eight transceivers in one system, and it fully exploits dual-port TNCs.

Having an intuitive graphical user interface, KaWin offers all the advantages of a native Windows application. It provides a natural visual metaphor and offers compatibility with both mouse and keyboard preferences. The program is easy to customize, allowing you to define up to 16 "quick keys" and offering CQ and brag file macros (fig. 3).

KaWin is shareware, or as its author describes it, "nag-ware" (although it's fully functional). Until registered, the program's "nag-meter" limits the duration of each execution of the program. Registration is \$79 from Stan Huntting, KF0IA, 4655 Pleasant Ridge Rd., Boulder, CO 80301-1731 (fax 303-444-2314).

**Norton pcANYWHERE.** While we haven't yet upgraded to Windows 95 (waiting for Windows 96 to excise the bugs, you know), we've nevertheless seen several enticing Windows 95-only programs cross our desk recently. One of these is Norton pcANYWHERE32 for Windows 95 and Windows NT. It's from one of our favorites, Symantec, which is aggressively introducing Win 95 applications and utilities to "fill the gaps" that Microsoft obligingly left with its rush to introduce its new operating system last August.

Norton pcANYWHERE32 is promoted by Symantec as an all-in-one solution that allows you to efficiently and effectively remotely access applications and data from a home or office PC, or a network, located anywhere in the world. It claims to be the only product of its kind to offer remote control, file transfer, and general communications with modem, direct cable, and LAN connections across Windows 95 and NT—all in one box. Some of the program's main selling points are true 32-bit design, one-click setup and connections, and fast file transfer (fig. 4).

The \$149 program is offered by Symantec Corporation, 2500 Broadway, Suite 200, Santa Monica, CA 90404-3063 (1-800-441-7234).

### Books for the Hamshack

#### Tune in on Telephone Calls, Third Edition.

In the May 1993 column we described a book by Tom Kneitel, K2AES, *Tune in on Telephone Calls*. Tom's book, of special interest to scanner radio monitors, covered all types of two-way telephone comms. These included cellular and noncellular mobile phones, cordless phones, radio paging, high seas telephone services, airline air-to-ground radio, military aircraft VIP phone calls, microwave and satellite relayed calls, and more. The discrete frequencies and channels used by these services also are listed.

Tom's book now is available in the third edition. The new edition covers recent developments, including 900 MHz cordless telephone channels, the 30 new frequencies for 46.49 MHz cordless phones, decoding and reading digital non-voice beepers, and more. The third edition is \$16.95 plus \$5 s/h from CRB Research Books, Inc., P.O. Box 56, Commack, NY 11725 (1-800-656-0056).

**New Riders' Official World Wide Web Yellow Pages, Second Edition.** Half the battle of effectively using the Internet, and especially the World Wide Web, lies in just *finding* stuff. The difficulty in untangling the Web has spawned a new online and paper-book publishing industry niche devoted to producing



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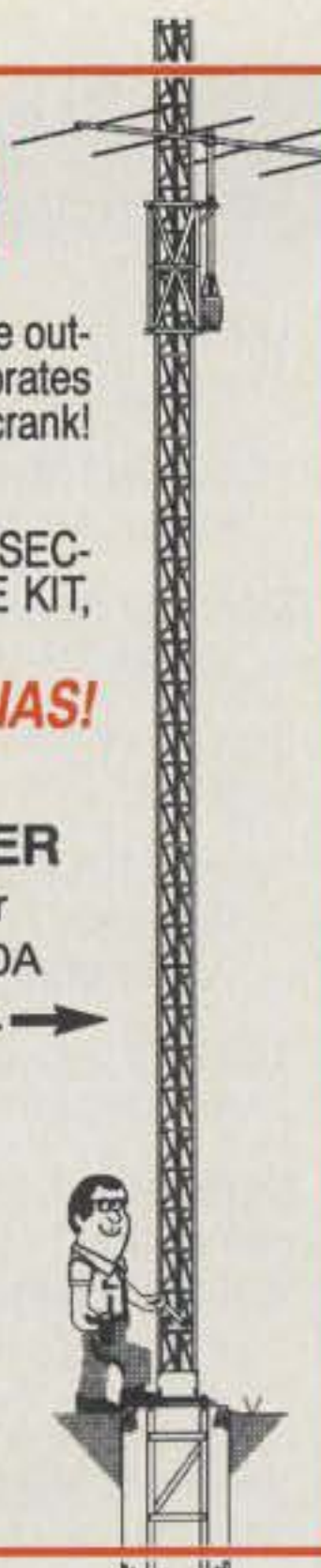
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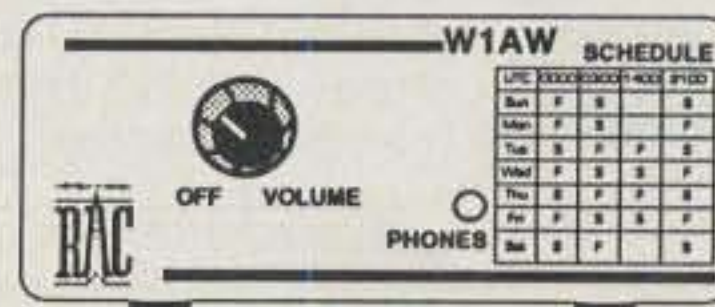
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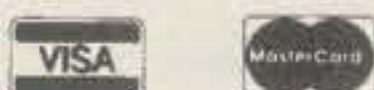
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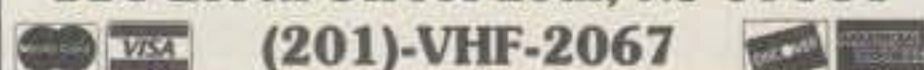
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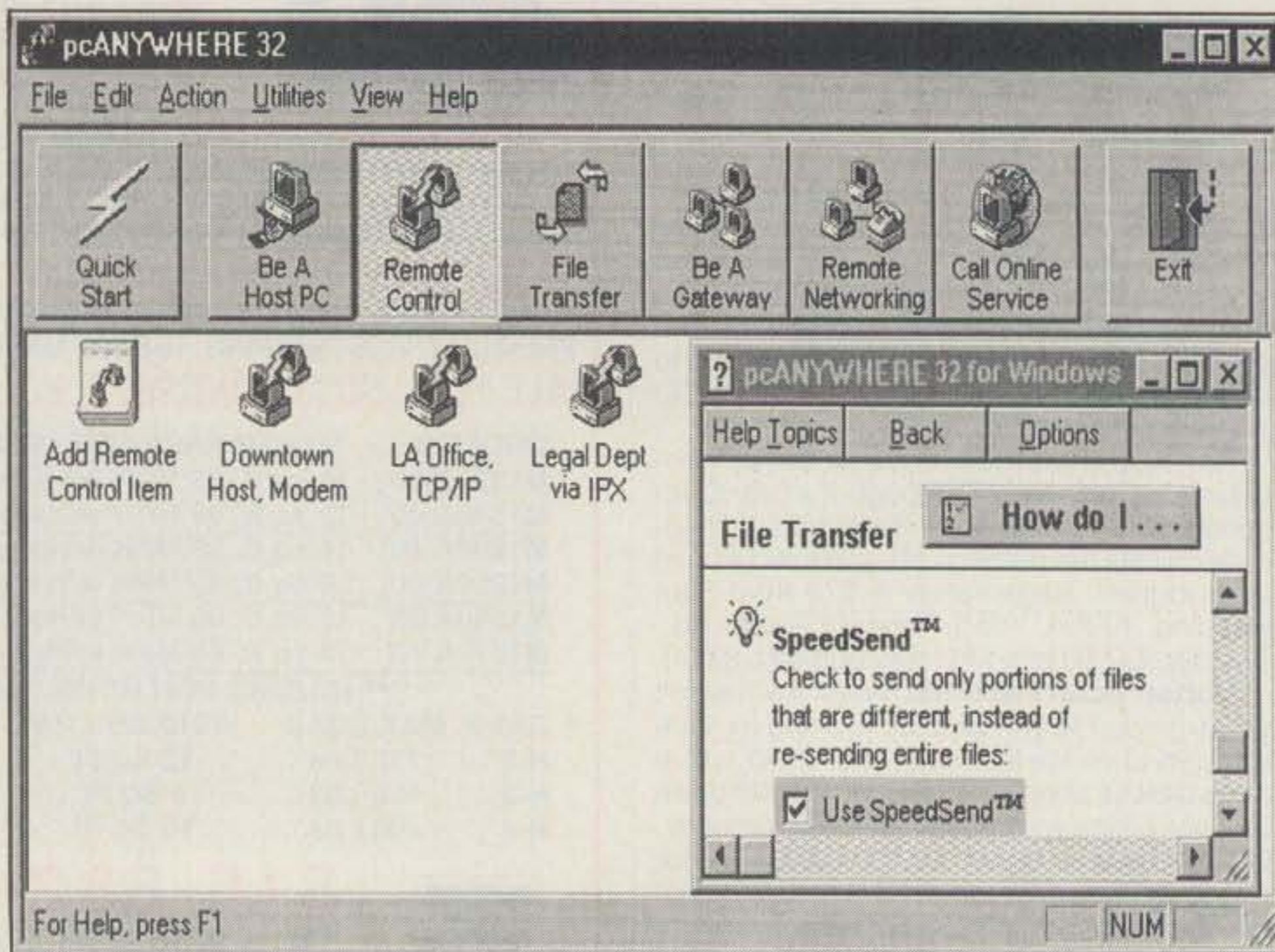


Fig. 4- The Norton pcANYWHERE32 for Windows 95 is an all-in-one software solution that provides instant, remote access to the office computer or network from the home or on the road. When you need to hook into remote applications, files, e-mail, or even remote printers, the program allows instant access to computers located anywhere. Some of the program's big selling points are true 32-bit design, one-click setup and connections, and very fast file transfer.

directories of Internet sites and resources.

One of the better Web guides is *New Riders' Official World Wide Web Yellow Pages, Second Edition*. This 957-page, 1996 tome proclaims itself as "the all-in-one guide to what's available on the World Wide Web." Organized like a phone book, the guide makes it easy for you to locate the information you need, when you need it. Certainly, it's one of the most comprehensive directories available to the services, information, and resources of the Web.

What makes the \$29.99 *New Riders/Macmillan* book unique is that it comes bundled with a companion CD-ROM that is, in effect, a "hotlink version" of the paper book. You need only identify it in your Web browser program and then point, click, and directly jump to any of the Web sites listed in the book.

The \$29.99 *New Riders* book/disc combo is from Macmillan Computer Publishing USA, 201 West 103rd St., Indianapolis, IN 46290 (1-800-858-7674). A free catalog is available.

Incidentally, as we have noted previously, Macmillan—like many other "with it" computer book publishers—has set up an Internet World Wide Web (WWW) site, called the Macmillan Information SuperLibrary™. It includes a complete online catalog, plus sample chapters and tables of contents for all their book imprints. You also can download a variety of useful software from their online library. Check out their Web site at the URL <http://www.mcp.com>. It's a good one.

**The Student's Guide to Doing Research on the Internet.** In last November's column we described another very useful Internet reference. While we normally don't review student books in the column, it nevertheless is an excellent book if you have a youngster who's trying to get his or her feet wet on the Internet but doesn't know how to begin. The book is the *Student's Guide to the Internet*, by David Clark, a 314-page, \$14.95 Alpha book from Macmillan Computer Publishing USA (see above).

Now there's at least one more student-oriented Internet book, one that you may find equally helpful. It's *The Student's Guide to Doing Research on the Internet*, by Dave and Mary Campbell. Like the Clark book, the Campbells' guide shows students how to use Internet tools to search for the information they need for their studies, such as using Gopher to find and access text archives, FTP to retrieve files, browsers to view Web pages, and WAIS to search online databases.

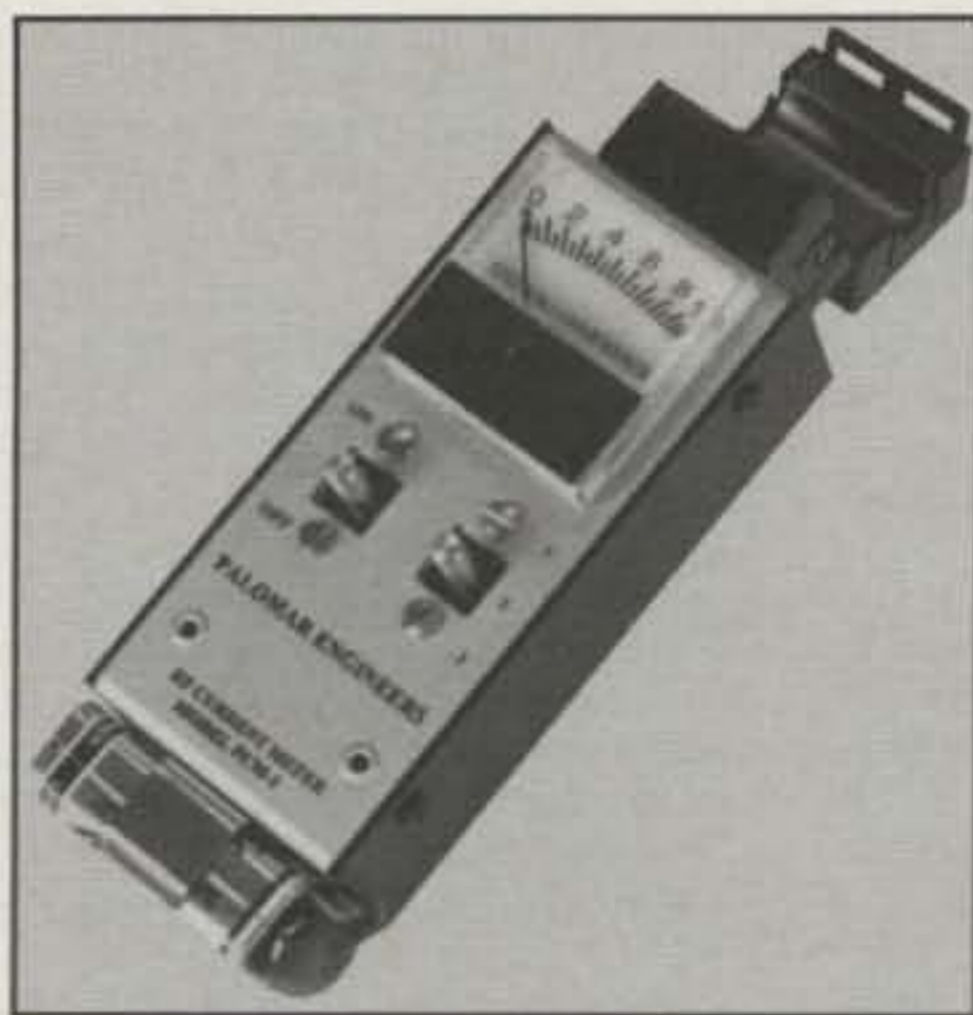
The Campbell book is organized largely by academic category, broken down by subject—sciences, history, literature, and many other subject areas, to suggest the best research sources for each class. There's also just enough technical information to make the book useful to more advanced students. Both books also may be good books for you if you're still confused about the Information Superhighway and how best to use it.

The 349-page book is \$14.95 from Addison-Wesley Publishing Company, 1 Jacob Way, Reading, MA 01867 (1-800-277-1936).

**The "Busy People" Series from Osborne/McGraw Hill.** We're all familiar with the "dummy," "idiot's guide," and similar-sounding start-from-scratch computer books that have come out in recent years. These books, of course, are designed to guide you to computer success even if you know nothing about PCs or software. Such books are useful for learning, but they may not so subtly assume substandard intelligence and technical illiteracy, and so are demeaning to many potential readers and users.

Osborne/McGraw-Hill has taken a slightly different approach with its new "Busy People" series. The several books in the series assume you are intelligent and literate, but don't have the time to learn as you would like. As such, they're cleverly billed as "the books to use when there's no time to lose."

I had the opportunity to preview two books



The clamp-on Palomar Engineers PCM-1 RF Current Meter is an innovative device that makes it possible to do things such as check ground radials one by one to find broken radials, help determine antenna efficiency, and detect RF currents on coaxial cable shields (or on any wire, from the smallest up to 1/2 inch in diameter). The unit is compact, handheld, and battery operated for use outdoors, at the antenna. No other equipment is required for use. (Photo courtesy Palomar Engineers)

fully illustrated. The books in the "Busy People" series include several time-saving features. These are labeled as fast forwards (quick reference sections), shortcuts (accelerated routes to completing a task), habits and strategies (tips and techniques), definitions (clever ways to remember the jargon), and cautions (pitfalls and problems to avoid).

You might even visualize each book as an integrated series of many how-to "quick start" sections of the type you usually head straight for in a software program's documentation when you're ready to install and use a new application. While there's little detailed treatment of the whys and wherefores, the authors rapidly "cut to the chase" in explaining things. The books' approach is refreshing.

For more information or a catalog, contact Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710 (1-800-227-0900).

### Antenna Notes

**The Palomar Engineers PCM-1 RF Current Meter.** An interesting new RF accessory from Palomar Engineers is their clamp-on RF current meter, the PCM-1 (see photo). This innovative device makes it possible to quickly and easily do things such as check ground radials one by one to find broken radials, help determine antenna efficiency, and detect RF currents on coaxial cable shields (or on any wire, from the smallest up to 1/2 inch in diameter). The unit is compact, handheld, and battery operated for use outdoors, at the antenna. No other equipment is required for use.

The PCM-1 isn't an RF probe; it actually measures current. It has three ranges: 0.1, 1, and 5 amperes full-scale, with direct panel meter

readout. As such, it's useful from a milliampere, up to 5 amperes, over the range 1-30 MHz.

The PCM-1 is \$125 from Palomar Engineers, P.O. Box 462222, Escondido, CA 92045 (619-747-3343).

**Jade Products Update.** In May 1994 we profiled the Jade Products Twin-Lead Marconi. This was a complete, ready-to-install, end-fed HF antenna kit for 80 or 160 meters that includes all hardware, wire, twin-lead, connectors, and support rope. Later, in March 1995, we surveyed the firm's product lines, which have expanded to include several new antennas. For HF there's a ladderline multi-band dipole, an off-centered Windom, and a centered G5RV antenna. Jade also offers several twinlead ladderline portable J-pole indoor antennas that you can hang from any convenient support.

Comparable PVC "Jade Poles" also are available for fixed station use; these are for outdoor installation (see photo). They include a heavy-duty PVC enclosure that protects the antenna from weather and UV deterioration and also provides a convenient wall-mounting system. Since we profiled the firm last year, Jade has improved and expanded its product line to include a 440 MHz UHF version. The portable J-poles are priced from \$10.95 to \$20.95, while the fixed station versions are \$31.95 to \$46.95.

Incidentally, whenever I come across an unusual name for a company or a product, I'm curious about where the name came from. In the case of Jade Products, their name doesn't refer to the esteemed ornamental stone, as I had originally thought. Rather, it comes from merging the names of its cofounders, JAne (KA1FUN) and DEnnis (K1YPP) Blanchard.

in the series. One was *Windows 95 for Busy People*, by Ron Mansfield (308 pages); the other was *The Internet for Busy People*, by Christian Crumlish (275 pages). Both 1996 titles are \$22.95 and are profusely and color-

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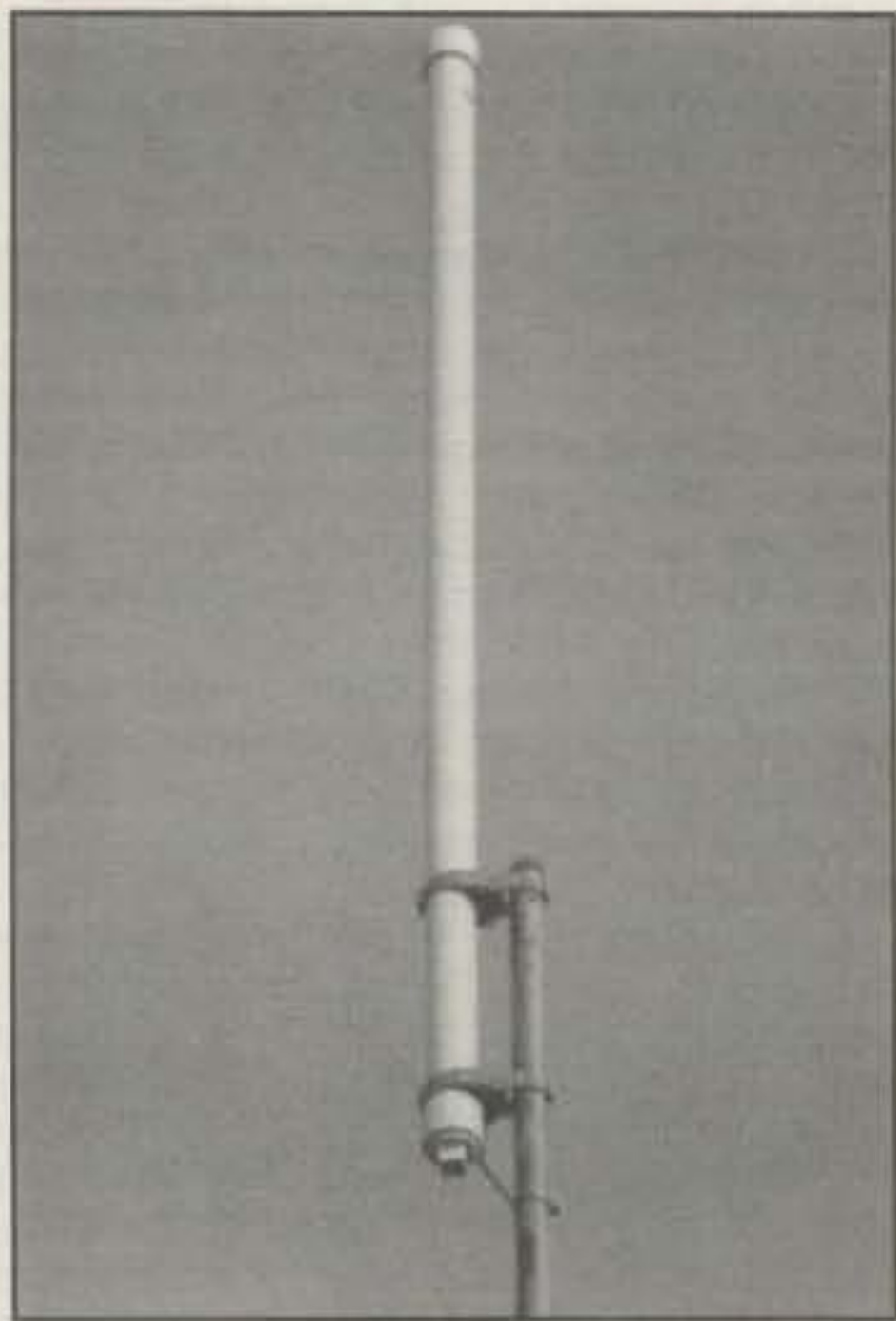
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Jade Products offers several twinlead ladder-line portable J-pole indoor antennas that you can hang from any convenient support. Comparable PVC "Jade Poles" also are available for fixed station use, as shown here; these are for outdoor installation. They include a heavy-duty PVC enclosure that protects the antenna from weather and UV deterioration. Jade recently has improved and expanded the Jade Pole line to include a 440 MHz UHF version. (Photo courtesy Jade Products, Inc.)

Interestingly, their 1993 founding goal was to "put the amateur back into radio" by providing easy and fun-to-assemble, well-documented kits, both traditional "FUN-KITS" and antenna "FUN-KITS."

A flyer is free from Jade Products, Inc., P.O. Box 368, East Hampstead, NH 03826-0368 (603-329-6995).

**ACE Communications Catalog.** The ACE Communications Catalog has expanded considerably since we last highlighted it in the December 1993 column. ACE Communications is well known for its Trident and several other lines of hand-held, mobile, and base-station scanners, spectrum analyzers, and a variety of HF, VHF, and UHF radios. Their frequently-issued catalog increasingly includes various accessories of interest to readers of this column, especially scanner buffs looking for a good antenna.

Some of the scanner antennas ACE offers include the MA300 wideband omnidirectional, Discone-style base antenna, which also can be used to transmit in the 50, 144, 430, 900, and 1300 MHz ranges; the Scanmaster DA301 "super wideband" fiberglass vertical receiving antenna; and several mobile and portable antennas.

For a free catalog, contact ACE Communications, 6975 Hillside Ct., Indianapolis, IN 46250 (1-800-445-7717).

### Looking Back Five

**Five Years Ago in Antennas and Accessories.** Okay, so now you know what the column looks like for June 1996. But what were the hot topics in June 1991? That column was entitled "Antenna Potpourri."

We started out with antennas, noting the Mini

Delta mag-mount antenna for 144 and 220 MHz and Mini Delta antennas for 40 meters through 220 MHz, from Mac McGrew, K6RL, at Delta Antenna Products; the Palomar Engineers Model SB-4 High SWR Balun for 1.8-30 MHz; the Heath IntelliRotor for rotor control (which turned out to be one of Heath's last major amateur radio products); several new items from C.A.T.S. Rotor Repair Service; Grove Enterprises antennas for SWLs and scanner monitors; Jim Thompson, W4THU's Radio Works Catalog of baluns and wire antennas; the Antenna Specialists amateur product line, covering 2 meters through 23 cm; and sobering thoughts on tower safety.

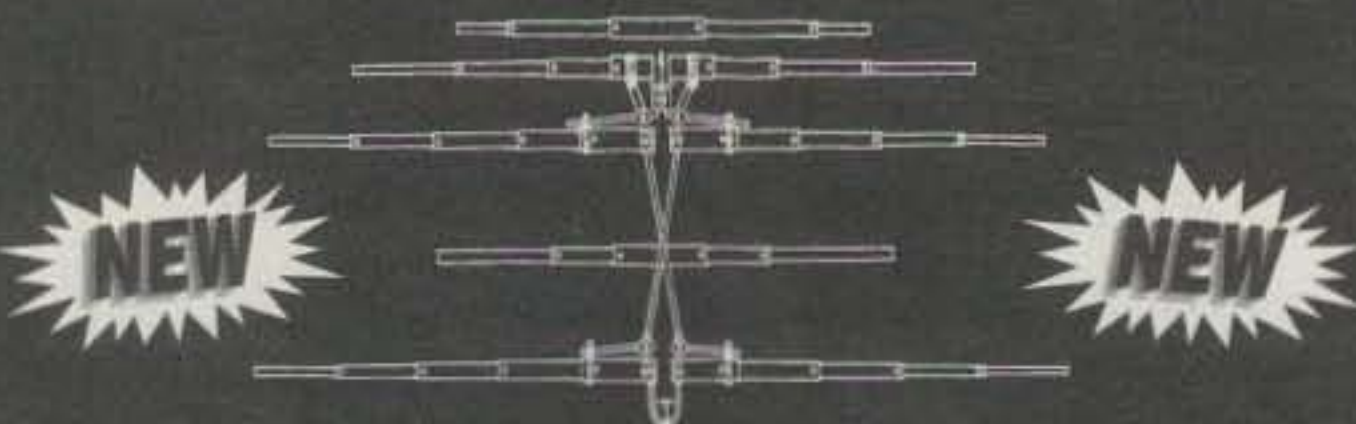
Turning next to software, we examined DXLOG, DX tracking and recordkeeping software from Drew Smith, K3PA, and Susan Smith, K3YL, of PAYL Software (another case where the proprietors' callsigns or names have been merged to form a company name); Zihua Morse 2.0, for code instruction on the Apple Macintosh, from ZCo Corporation; PC QSL'ing, a database that stores SWL verification reports, from Ross & Associates; and Mirror III V2.0, a PC communications terminal from SoftKlone. We also discussed various problems with pirated AMSAT software, presented thoughts on computer viruses, and offered several techniques to speed up your PC.

### Wrap-Up

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

*Overheard:* Some of the all-time greatest contributions to literature are from those who *threatened* to write a book—but just never got around to actually *doing* it. 73, Karl, W8FX

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LDF4-50A 1/2" ANDREWS HELIX 1.5dB @ 450MHz	25FT&UP		2.10/FT		
FSJ-50 1/4" ANDREWS SUPERFLEX 2.23dB @ 150MHz	25FT&UP		1.50/FT		
COAX (50 OHM "HF" GROUP)		100FT/UP	500FT		
RG213/U MIL-SPEC DIRECT BURIAL JACKET 1.5dB @ 50MHz		36/FT	34/FT		
RG8/U FOAM 95% BRD UV RESISTANT JACKET 1.2dB @ 50MHz		32/FT	30/FT		
RG8 MINI (X) 95% BRD BLK UV RES JKT (GRY, CLR, or WHT JKT TOO)		15/FT	13/FT		
RG58/U SOLID CENTER COND 95% BRAID		15/FT	13/FT		
RG58A/U STRD CENTER COND 95% TC BRAID		17/FT	15/FT		
450 OHM SOLID 18GA CW LADDER LINE		12/FT	10/FT		
450 OHM STRD 18GA CW LADDER LINE		18/FT	17/FT		
24GA SOLID 4/PAIR UNSHLD LAN CABLE "LEVEL 5" PVC JACKET		16/FT	14/FT		
RG214/U DBL SILVER SHLD MIL-SPEC	25FT&UP		1.75/FT		
RG142/U DBL SILVER SHLD MIL-SPEC "TEFLON"	25FT&UP		1.25/FT		
ROTOR & CONTROL CABLES		100FT/UP	500FT		
5971 8/COND (2/18 6/22) BLK UV RES JKT. Recommended up to 125ft.		20/FT	18/FT		
4090 8/COND (2/16 6/22) BLK UV RES JKT. Recommended up to 200ft.		35/FT	34/FT		
1418 8/COND (2/14 6/18) BLK UV RES JKT. Recommended up to 300 ft.		47/FT	45/FT		
18GA STRD 4/COND PVC JKT		20/FT	18/FT		
18GA STRD 5/COND PVC JKT		22/FT	20/FT		
18GA STRD 6/COND PVC JKT		23/FT	21/FT		
18GA STRD 7/COND PVC JKT		25/FT	23/FT		
ANTENNA WIRE (UNINSULATED BARE COPPER)		100FT/UP	500FT		
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14GA 7 STRD "HARD DRAWN" (perfect for permanent Dipoles etc.)		08/FT	07/FT		
14GA SOLID "COPPERWELD" (for very long spans etc.)		08/FT	07/FT		
14GA SOLID "SOFT DRAWN" (for ground radials etc.)		08/FT	07/FT		
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100FT RG213/U MIL-SPEC DIRECT BURIAL JKT 1.5dB @ 50MHz			\$45.00/EA		
50FT RG213/U MIL-SPEC DIRECT BURIAL JKT 1.5dB @ 50MHz			\$25.00/EA		
100FT RG8/U FOAM 95% BRD UV RESISTANT JKT 1.2dB @ 50MHz			\$40.00/EA		
50FT RG8/U FOAM 95% BRD UV RESISTANT JKT 1.2dB @ 50MHz			\$22.50/EA		
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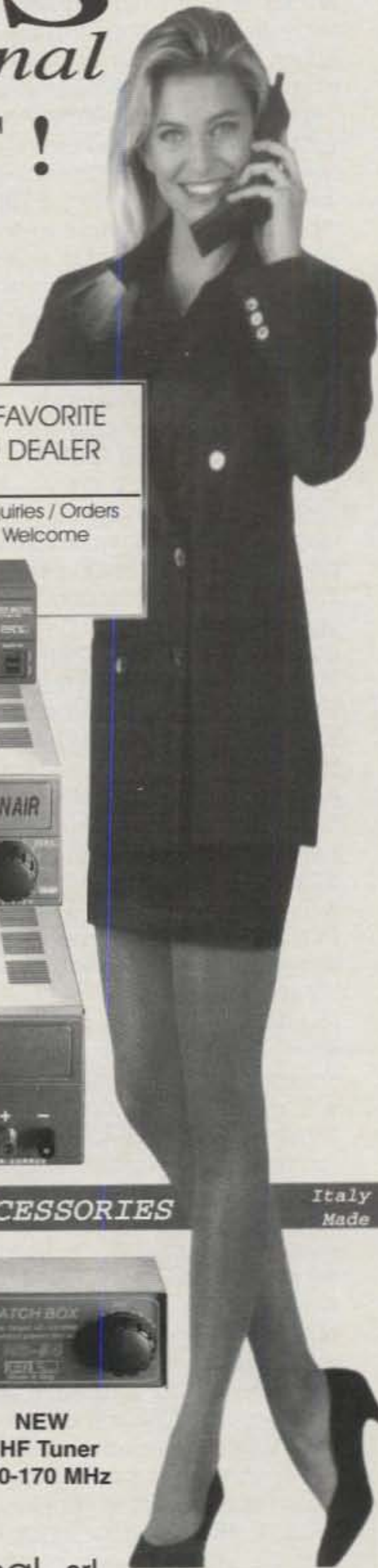
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## WHAT'S NEW AND HOW TO USE IT

### A New Breed of Low Dropout Regulators

Anyone who is an experimenter is familiar with the 7800 series of three-terminal regulators and certainly has used one or more in various applications. These devices are simple to apply and provide output voltages that are essentially independent of both input voltage variations and output load variation up to their maximum ratings. In fact, the only drawback with the 7800 series is their relatively high input-to-output differential rating. This value is typically 2.5 volts, which means that the input must be at least 2.5 volts higher than the output. In battery-operated equipment this can be a problem.

Consider the circuit in fig. 1. This is a common power supply that contains a diode for reverse polarity protection (CR1). If a 12-volt battery is the source, you must first consider that it can drop as low as 11 volts or so while still being capable of supplying some power. Subtract 0.7 volts for the protection diode drop and you are left with only 10.3 volts for the regulator. This means that if you "push things," maybe a selected 7808 can be used and maybe the Vcc in your circuit will be regulated, but regardless, you will be limited to 8 volts. If you use any chips that must operate above this level, you simply are out of luck. Furthermore, if you need to draw significant current, say three-quarters of an amp, the regulator will dissipate  $2.5 \times 0.75$ , or 1.875 watts. In a battery-powered application, this is totally wasted unless you need a heater.

Now let's look at a fairly new family of regulators provided by National Semiconductor. This is the LM2940-X series, where X is the available output voltage, which can be 5, 8, 9, 10, 12, or 15 volts. The input-to-output differential for these regulators is typically only 0.5 volts at 1 amp of output load current (and less at lower currents), which means that in our circuit of fig. 1, the power dissipated will drop to  $0.5 \times 0.75$ , or 0.375 watts. At half an amp, by the way, the input-to-output differential drops to less than 0.3 volts, which results in the dissipation dropping to only 0.15 watts or so—quite a difference! Now almost all of the battery power is available for the load.

As an added bonus, the LM2940-X series is also reverse polarity protected for up to 15 volts at the input. This means that the series protection diode of fig. 1 is not necessary, allowing still lower input

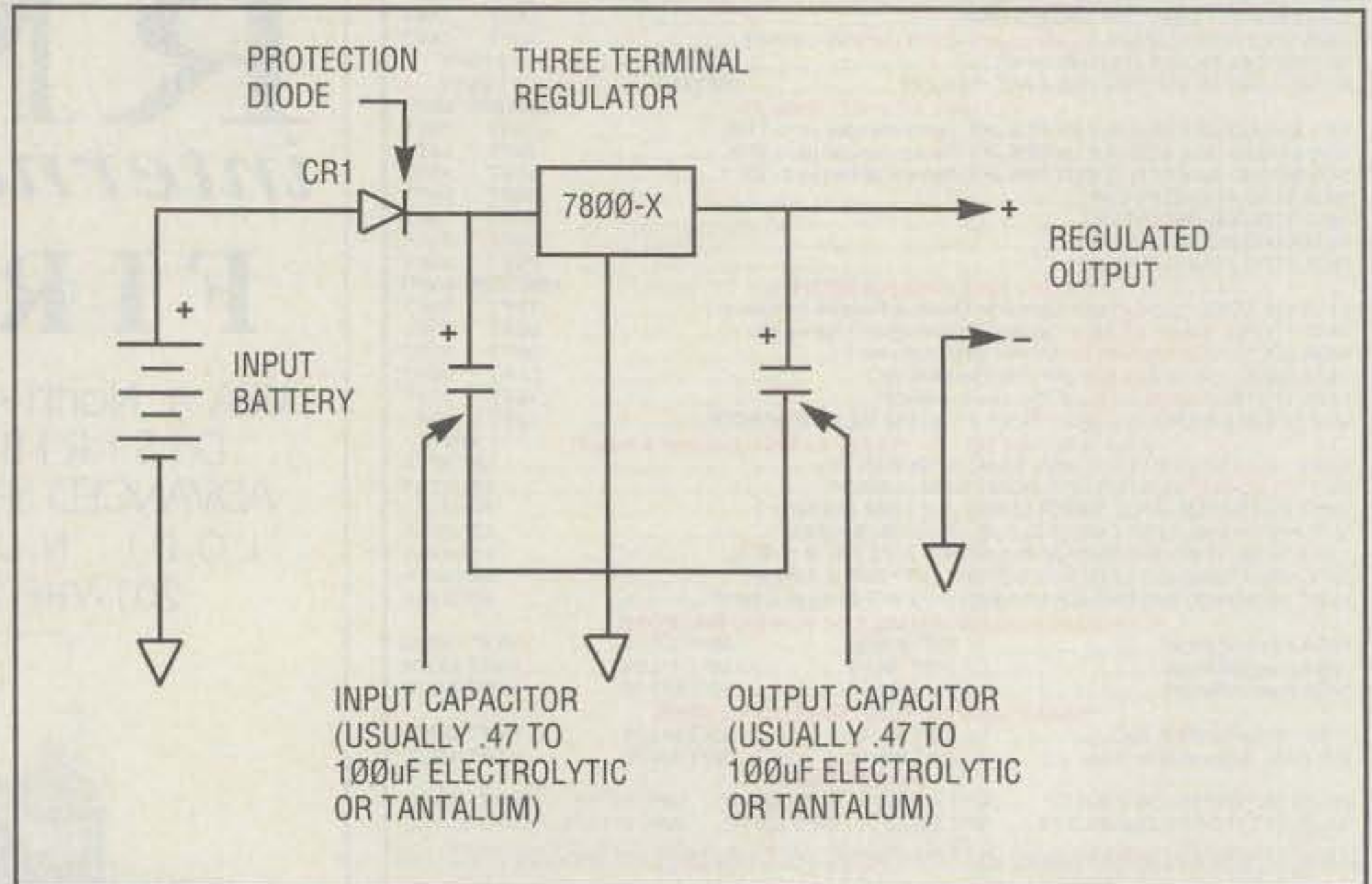


Fig. 1—A typical 7800-based regulated power supply.

voltages. As long as the battery input does not exceed 15 volts, you can reverse it to your heart's content without damage. To take advantage of this feature, however, the input capacitors must be non-polarized. If you take all of this into

account, you will see that you easily can build a 0.5 amp 10 volt supply which will operate from a 12 volt battery and allow it to drop to less than 11 volts while still providing regulated output power. Fig. 2 shows such a supply.

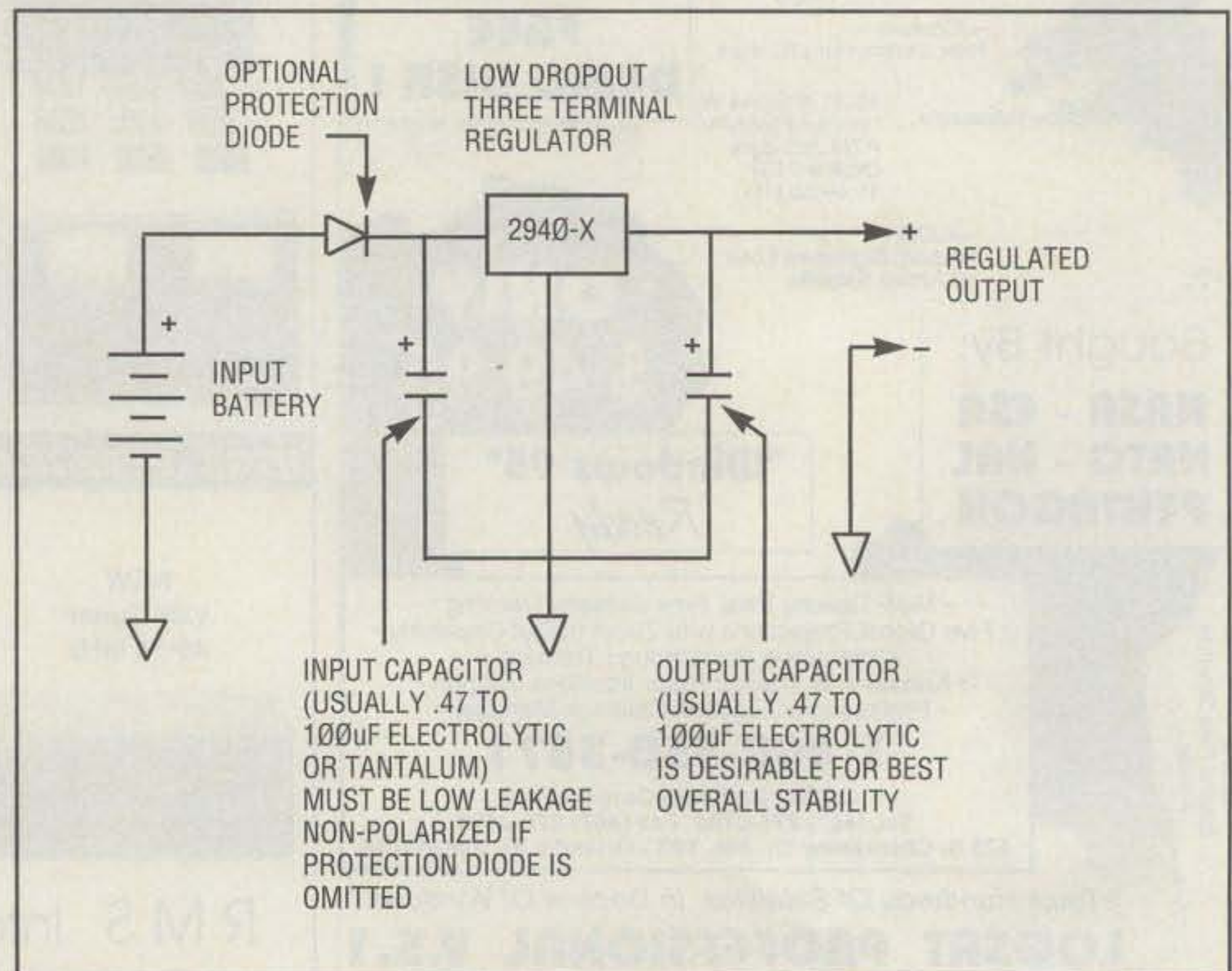


Fig. 2—Low drop-out regulated power supply.



The LM2940 series comes packaged in the familiar TO-220 outline and is available for operation from 0 to 125 degrees C (commercial) or -40 to 125 degrees C (industrial). It is also, fortunately, a drop-in pin-for-pin replacement for the 7800 series. Other 7800 features such as short-circuit protection and thermal overload shut-down are also provided.

For further information, contact National Semiconductor at 1111 West Bardin Road, Mail Stop A2300, Austin, TX 76017. You can also request additional data on the Internet at <http://www.nsc.com>.

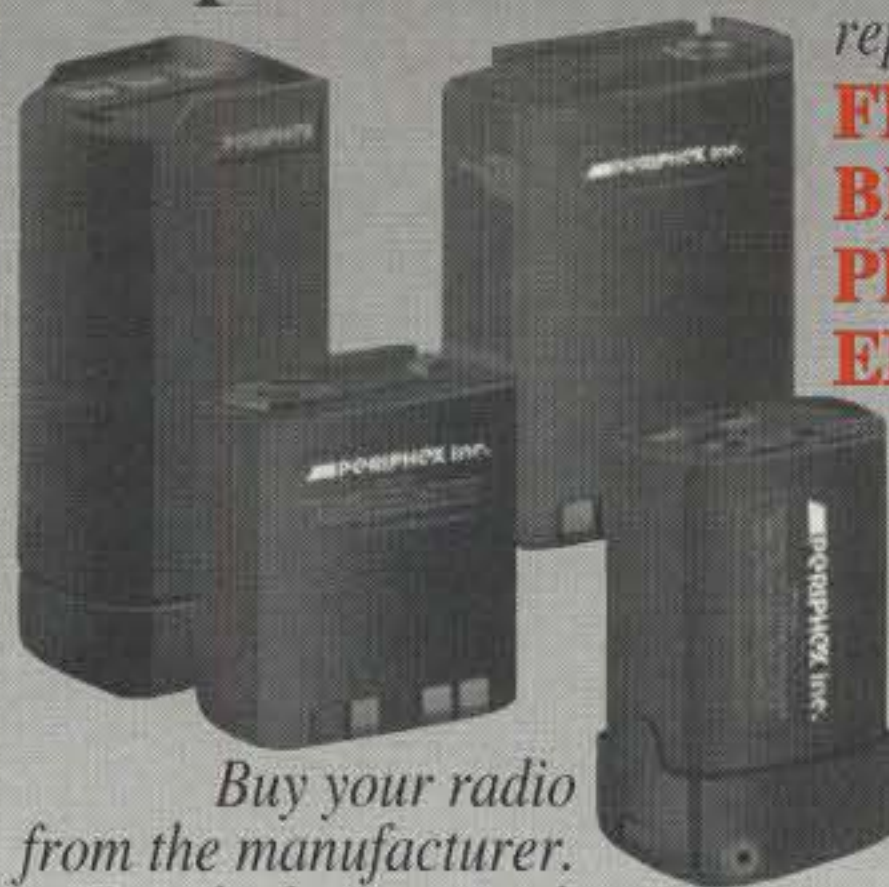
While we have featured National Semiconductor this month, low drop-out regulators are available from many other semiconductor manufacturers as well. If you do have the specific needs mentioned above for these devices, be certain to check around to see what is currently available.

### March Column Correction

Our March column featured a companion receiver for our 6 meter FM transmitter. The transmitter was covered in the December 1995 issue, and not the March 1996 issue as stated. Also, the ceramic filters on the right in fig. 1 are Toko LFC 455F/1 (or Murata CFU455D/E /F may be used). 73, Irwin, WA2NDM

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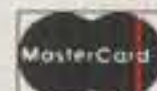
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# BILL'S BASICS

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## The MFJ-9420 20 Meter SSB Travel Radio

I am accustomed to using low-power transmissions and I am "at home" with the MFJ-9420. I found it provides good SSB voice communications. With the MFJ-415 Morse code adapter installed in the MFJ-9420, it becomes a very suitable low-power code rig. Naturally, most of the contacts are with North American amateurs, but occasional DX contacts occur during code operation. When operating from my shack and using AC house power, I use a Carolina-Windom wire antenna. When running mobile, the antenna is an old Master Mobile whip. The factory-set offset between the code transmit and receive frequencies is about 700 Hertz, which I like. If desired, it can be changed by a knowledgeable person. You can also adjust sidetone volume and keying delay by using potentiometers on the adapter board; however, you must remove the transceiver's top cover to gain access to these adjustments.

If you are one of the many amateurs who cannot operate a station at your home, you should consider acquiring one of these little rigs to operate from your vehicle. Even if you have a good home station, this rig can also provide an easy and convenient way to operate from temporary locations such as motels, hotels, and vacation homes. If you are a true QRP operator, you will be glad to know that the output power can easily be adjusted down to a suitable QRP level.

**General Factors.** This transceiver is part of a very small package which can easily be carried in a briefcase or suitcase, but it still provides excellent communications performance. Rugged construction assures owners of a long service life. The normal frequency range of this radio is 14,150–14,350 kHz. If you decide you want to use this rig to operate Morse code, you can obtain and install an MFJ-415 code adapter (\$39.95). The manual includes alignment procedures, antenna advice, DX operating techniques, equipment operating instructions, parts list, parts locations, schematic, station installation, theory of operation, and trouble-shooting guidelines. As always, MFJ repairs or replaces gear (their choice) for a full year, regardless of the problem.

**Receiver Factors.** The single-conversion receiver features a quiet double-balanced mixer front end with good gain and one watt audio output to a rugged 3-inch loudspeaker. The calibrated analog S-meter enables you to determine slight differences between received signals, making it easy to accurately aim a beam antenna to a desired direction. Eight poles of close intermediate frequency filters minimize chatter from any adjacent signals. The unit draws 50–100 milliamperes in the receive mode.

**Transmitter Factors.** The constant current speech processor sounds like a much more



The MFJ 20 meter SSB transceiver, the Model MFJ-9420.

powerful transmitter to receiving operators. Set up is quick and easy. The S-meter enables you to monitor speech-processing levels when transmitting. Variable frequency oscillator (VFO) tuning is smooth thanks to a custom-built reduction-drive ball-bearing VFO capacitor. The bullet-proof power amplifier transistor runs cool; it easily tolerates a 3 to 1 voltage standing-wave ratio (VSWR), plus any accidental short or open in your feedline. The maximum output power is 12 watts PEP. The rig draws 2.2 amperes peak current from a 13.8 VDC power supply during the transmit mode. The eight poles of filtering focus transmitter power where it is most needed. Its size is 6.5" x 6.0" x 2.5". Price is \$229.95, minus the microphone.

**Microphone Factors.** The MFJ-290 Microphone is included with the MFJ-9420 20 Meter SSB Travel Radio at \$239.95, or it can be purchased separately at \$29.95.

**MFJ-415 Code Adapter.** This adapter can be installed in the MFJ-9420 Transceiver to enable you to operate on the 20 meter code segment with just the push of a button. Installation requires care and patience. It requires a 3.5 millimeter mini-plug and it functions with almost any key or keyer. Output power is 5 to 8 watts PEP and semi-break-in keying is provided. This is a very basic adapter; it does not offer receiver incremental tuning (RIT), full QSK, or code bandwidth receiver filtering. However, it does enable you to operate both voice and code with a conveniently small rig.

**MFJ-971 QRP Portable Antenna Tuner.** This unit can be used to tune coaxial and balanced feedlines and random-wire antennas. It handles 1.8–30 MHz radio frequency energy. It has a cross-needle combination wattmeter and standing-wave-ratio meter. The forward and reflected maximum power ranges are 300 and 60 watts, respectively, when the high-power setting has been selected. These ranges are 30 and 6 watts in the low-power setting. A 6

watt (QRP) forward and 1.2 watt reflected power selection is also incorporated into this tuner. The tuner's size is 6.0" x 6.5" x 2.5", which matches it to the size of the MFJ-9420 20 Meter Travel Radio and/or the MFJ-4114 Portable Battery/AC Power Pack. The MFJ-27 handle is available for attachment to this equipment package. The MFJ-971 and MFJ-27 are priced at \$89.95 and \$4.95, respectively.

**MFJ-4114 Portable Power Pack.** This unit can be used to power MFJ-9015, MFJ-9017, MFJ-9020, MFJ-9030, and MFJ-9040 Morse code transceivers, as well as the MFJ-9420 SSB Travel Radio and other low-power rigs. Alkaline, nickel-cadmium, or regular D-cell batteries can be installed to power equipment, and a nickel-cadmium charging circuit is built into this power pack. Batteries are not supplied with this unit. The pack can be powered from a 115 VAC power line, as when operating from house power or an electric generator. The dimensions of this power package are 6.0" x 6.5" x 3.5". It can be attached to the MFJ-9420 20 Meter SSB Travel Radio and/or the MFJ-971 Portable Antenna Tuner by using the supplied mounting plates and hardware. The MFJ-4112 is a similar power pack priced at \$49.95, but minus the charging circuit. The MFJ-4112 holds 8 D-cell batteries.

**MFJ Code-Only Transceivers.** These are monoband rigs and they are available for use on the 15, 17, 20, 30, and 40 meter bands. Equipment designations are simple. As examples, the MFJ-9015 and MFJ-9040 rigs are the 15 and 40 meter transceivers, respectively, and each one is priced at \$189.95. A tight code bandwidth crystal ladder filter minimizes QRM (man made) and QRN (natural) interferences to desired signals.

The receiver incremental tuning (RIT) control has a centered detent which makes it easy to tune in stations answering above or below your transmit frequency. The sidetone frequency is

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700 Hertz. QSK is adjustable and full QSK is available. The MFJ-726 (\$29.95) narrow audio filter enables you to switch in four poles of active audio filtering to dramatically improve single signal reception chances. The MFJ-412 (\$39.95) Curtis chip iambic keyer module can be added to allow the use of any desired paddle. Neither the MFJ-412 nor the MFJ-726 installation requires soldering or equipment modification; both modules install quickly and easily. These code transceivers share many of the desirable MFJ-9420 features, including low-power requirement, loudspeaker, VFO stability, small size, and easy installation.

## First Callsigns Available By Telephone

If you want to determine your call sign before your first amateur radio license arrives in the mail, you can get it from the ARRL or the FCC. The ARRL's toll-free telephone number is 800-326-3942. The FCC's number is 800-322-1117. Calls should be made between 8 AM and 4 PM Eastern Time. Naturally, you should not call before allowing enough time for an application to be processed.

## Mail-Order Catalog and Resource Directory

The 1996 issue is the fifth edition of this publication. John Hart, NØOCF, produced the first four issues, and David L. Thompson, K4JRB, is still the editor. It is now an ARRL publication. This book contains almost 2000 listings in 220 categories. I have used this resource frequently during the past four years. This publication is useful to all amateurs and it is particularly helpful to new amateurs. It is a bargain at its \$15.95 cover price. The table of contents has 270 headings. The catalog index includes about 1200 listings. The glossary is 7 pages long, enabling amateurs to quickly determine the meanings of terms and abbreviations common to amateur radio. Catalogs are a valuable resource, and this manual lists 174 of the free ones. In addition, 66 catalogs which involve fees are listed, but their fee can be as minor as a self-addressed, stamped envelope.

The 1996 5th Edition *Amateur Radio Mail Order Catalog and Resource Directory* should be available from distributors of ARRL publications. It is also available from the American Radio Relay League, Inc., 225 Main Street, Newington, CT 06111-1494 (order No. 5242).

## Nikola Tesla Information

If you are interested in the accomplishments of Nikola Tesla, you can request a copy of the 1996 Resource Guide. This 128-page catalog has a cover price of \$2.95. It is available from the International Tesla Society, P.O. Box 5636, Colorado Springs, CO 80931. This guide includes 12 articles and introductions to 30 associated books.

## Licensing Guides

Tiare Publications is offering licensing guides written by Larry R. Luchi, W7KZE. Each manual is in a plastic comb binder which allows it to lie flat while open, making each easier to use than manuals that have fixed bindings. Each guide covers every question and answer that can appear in the associated FCC written examinations. Exact questions and answers are

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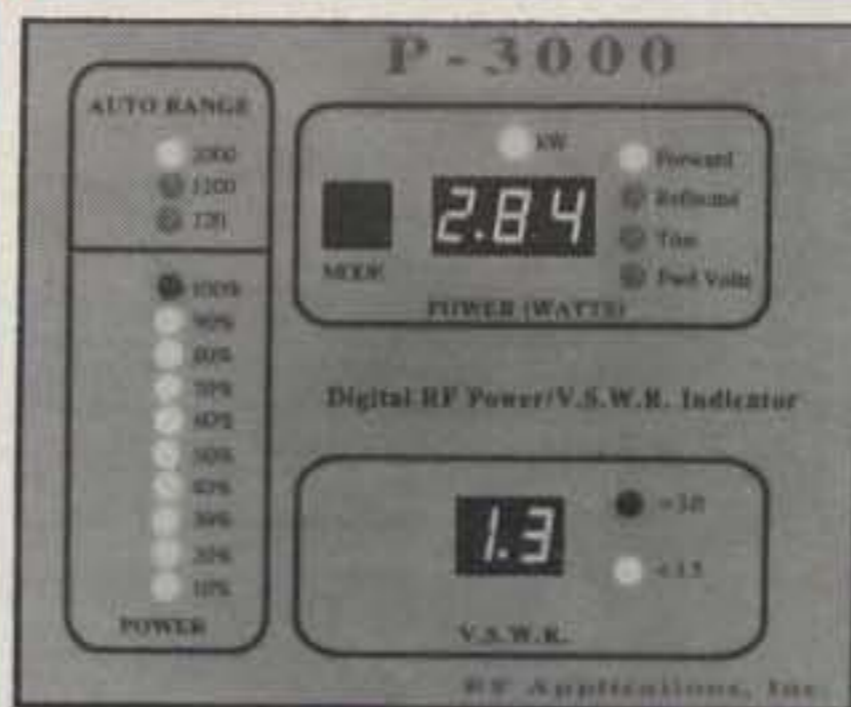
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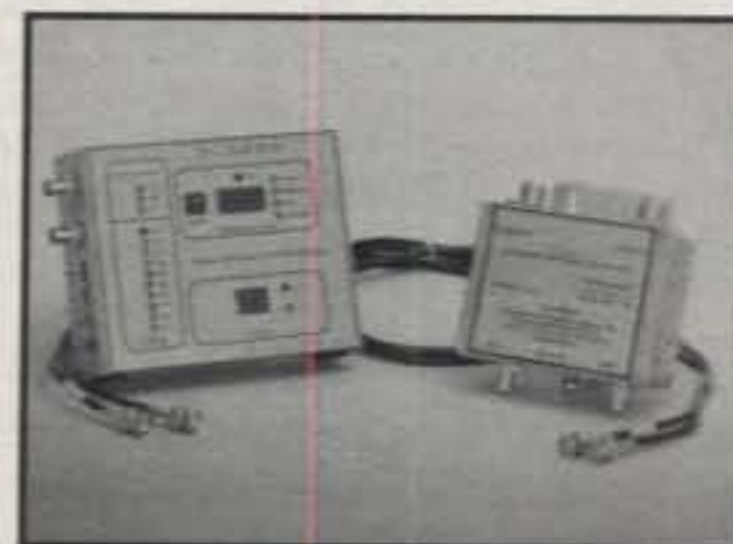
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Harry Wolf, W6NKT, does not like to go through a hassle getting amateur radio call sign automobile license plates each time he moves to a different state. As the photograph shows, he solved the problem by attaching his call sign to his car's rear bumper using transfers.

given, along with a list of the correct answers. Except for the Advanced guide, each one includes a page which can be used to acquire familiarization with metric conversions. These guides are separately available from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Shipping cost is \$3.00 for one book, with a \$2.00 charge for each additional guide.

*The Novice guide* (\$19.95) consists of 105 text pages, including 35 supporting illustrations. It covers the FCC Element 2 Novice written test material.

*The Code-Free Technician guide* (\$22.95) contains 160 pages with 38 supplemental drawings. It covers the FCC Element 2 (Novice) and Element 3A (Technician) written examination material.

*The General guide* (\$19.95) has 115 text

pages with 17 illustrations. It covers the FCC Element 3B General written test material.

*The Advanced guide* (\$22.95) contains 186 text pages with 46 supporting illustrations. It covers the FCC Element 4A Advanced written examination material.

### RadioShack Catalog

RadioShack's 1996 catalog is available at the cover price of \$2.95. It includes a coupon that is good for \$3.00 towards any future purchase. This 75th anniversary catalog is 218 pages and can be purchased in the 6600 RadioShacks and participating dealers throughout our country. Four services are highlighted in this catalog. "RadioShack Unlimited" provides convenient access to more than 100,000 hard-to-find



Wayne Hutsul, VA3LOG, converted a pistol-type cigarette lighter into a code key. He is shown holding his innovation in the above picture. I guess he is a big gun in Ontario, Canada. Wayne is a member of the Lakehead Amateur Radio Club and he has been an amateur since July of 1995.

items. "RadioShack Gift Express" enables you to easily send electronic gifts to others. "The Repair Shop at RadioShack" provides repair service for out-of-warranty items. RadioShack's toll-free phone number is 1-800-THE-SHACK; it can be used to gain direct access to RadioShack programs and to determine the address of the nearest RadioShack outlet.

## Fleet Radio Unit Pacific Amateur Radio Operators' Net

The FRUPac amateur radio operators' net has been in operation since 1973, and it now includes 975 former shipmates, of which 810 are amateurs. Net members are current and former Naval security group personnel. Their regularly scheduled nets provide past and present cryptologic personnel opportunities to contact each other. FRUPac is a part of the U.S. Naval Cryptologic Veterans Association (NCVA). Additional data can be obtained by calling 1-800-USA-NCVA, or by writing to Ken Mann, N3GKE, 13317 Oriental Street, Rockville, MD 20853.

## Ten-Tec Kits

If you are low on funds and interested in building kits to ease the strain on your wallet, I advise you to request a copy of Ten-Tec's catalog A-95. This catalog details the features and prices of about 25 kits, plus several enclosures and module boards. Their address is 1185 Dolly Parton Parkway, Sevierville, TN 37862-3710. Their voice and fax telephone numbers are 1-615-453-7172 and 1-615-428-4483, respectively. Their kit line includes the following: Active antenna for receivers; "Any band" direct conversion code/SSB receiver; Budget electronic keyer; Communications desk microphone; Compact RF ground counterpoise; Electronic selector switch module; Foxhunt FM band "beep-beep" transmitter; G5RV antenna; High-sensitivity detector-amplifier with experiments; Microphone speech processor; Mobile/handheld microphone; "Smart squelch" band opening alert; Transmatch tuning bridge; Universal BFO for SWL receivers; Universal low-noise broadband RF preamplifier; Utility audio amplifier; 2 meter FM transceiver; 2 meter HT RF power amplifier; 4-band SWL regenerative receiver; 6 meter code/FM/SSB transceiver; 6 to 10 meter receiver converter; 9-band shortwave receiver; 20/200 watt HF/VHF SWR bridge/RF wattmeter; 40-500 pF 3.5 KV air variable capacitor; 50 ohm 300 watt RF dummy load.

## Communications Catalog

Universal Radio is offering its 106-page 1996 catalog at no charge to readers who request one. This publication covers a wide selection of accessories and equipment used by amateurs, shortwave listeners, and scanner enthusiasts. Some of the amateur radio items in this catalog are amplifiers, antennas, antenna rotators/switches/tuners, books, cable/wire, clocks, code accessories/keys, computer accessories/interfaces, equipment owner/service manuals, filters, frequency counters, handie-talkies, headsets, HF transceivers, license manuals, logs, multi-mode decoders/readers, power supplies, preamplifiers, receivers, SWR/power meters, and VHF/UHF transceivers. An equipment data comparison table is

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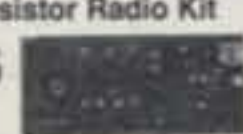
#### Model AR-2N6K

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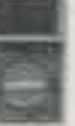
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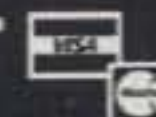
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included in this catalog, along with introductions to amateur radio and shortwave listening. The address is Universal Radio, Inc., 6830 Americana Pky., Reynoldsburg, OH 43068-4113. Enclose \$1.00 with your request if you prefer first-class mail delivery.

### Edison Wall Plaque

Here is a chance to obtain a replica of a wall plaque which was used when electric lighting was being introduced to the public. This plaque is 5 inches high and 7 inches wide. It has a satin brass-look finish and corner mounting holes. The wording on the plaque states "This room is equipped with Edison electric light. Do not attempt to light with match. Simply turn key on wall by the door. The use of electricity for lighting is in no way harmful to health, nor does it affect the soundness of sleep." Edison and Smithsonian Institution archives were researched, but they failed to provide information about this plaque. The plaque costs \$6.95 with no additional shipping fee. The ordering address is Grove Enterprises, Inc., P.O. Box 98, 300 South Highway 64 West, Brass-town, NC 28902-0098.



*This replica Edison wall plaque is available from Grove Enterprises, Inc. (see text).*

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73, Bill, W6DDB

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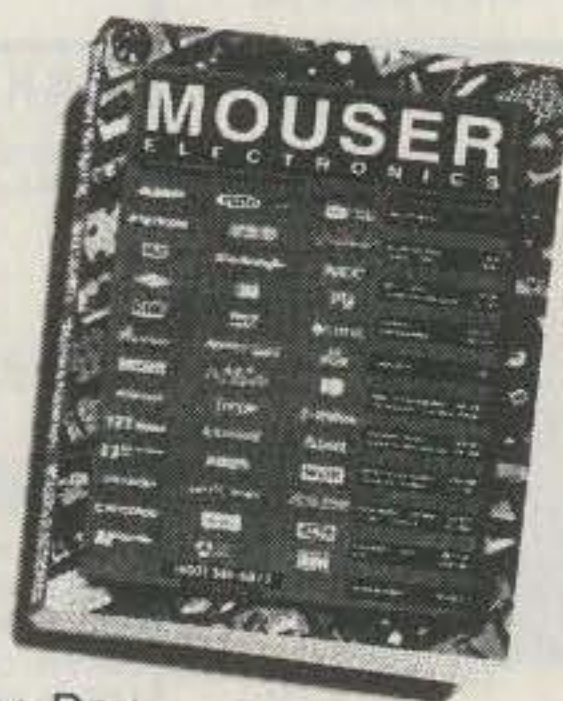
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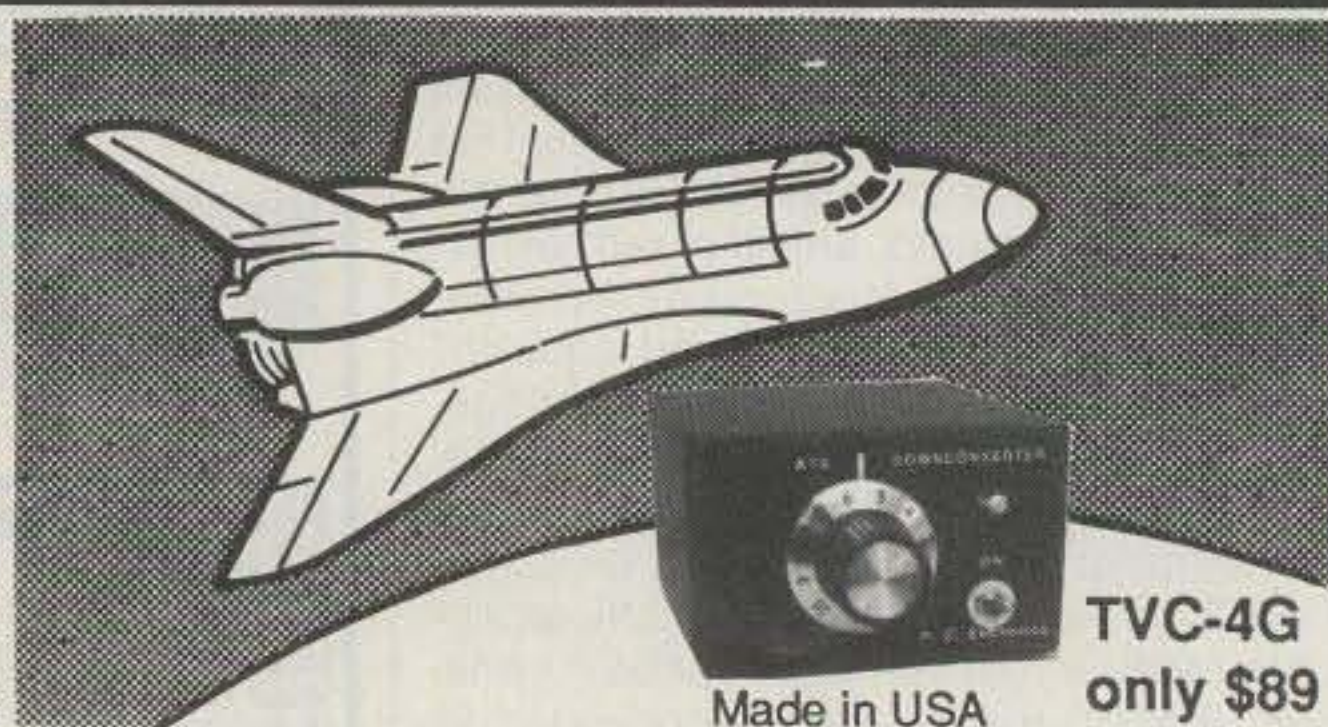
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# CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

## Should The Status Quo in Contesting Be Preserved?

### June's Contest Tip of the Month

Take a standard mouse pad and punch or drill holes in the pad to correspond with the three feet of your keyer's paddle. The paddle feet are now touching the tabletop, so the height of the plastic your fingers touch is correct. However, you now have a giant surface area of rubber designed not to slide, holding the paddle in place. (Tnx, K1VR)

There are so many traditions in contesting that it's probably impossible to list them all. Here are just a few that quickly came to mind when I started thinking about it.

- Most contest exchanges must have a signal report.
- Never change the rules; the records will be compromised.
- The CQ World-Wide CW Contest must be on Thanksgiving weekend (note that this year is an exception).
- A 10-minute rule is a requirement for multi-single operations.
- 48-hour contests must remain 48-hour contests.

The question to ponder this month is: Are our traditions a strength or weakness of contesting? Like so many things in life the answer has to be yes and no, depending on the tradition being considered. Let's examine a few of them in more detail.

### Contest Exchanges

Have you ever started operating the ARRL DX Contest only to be reminded that this is the contest in which you actually have to copy something other than the other guy's callsign? Many contests, including the almighty CQ WW, are really nothing more than callsign copying events; the exchange is essentially meaningless. It's a tradition, however, that has stayed the course of time.

When unpacking this area a little more, it seems that most people focus on the signal report portion of the exchange. When you think about it, there really is nothing sillier than saying you're 5905 during a long-path QSO with a 9V1 on 75 meters at 2200Z. When it comes right down to it, the signal report is nothing more than window-dressing. I think the time has come to add "value" to some contest exchanges by requiring more information that you really have to copy (i.e., serial numbers, power categories/levels, etc.). Don't worry. I'm not proposing a merger of the CQ WW and ARRL SS exchanges, but maybe we should think a little further than "you're 59 . . . really!"

c/o CQ magazine  
Internet: p00259@psilink.com  
CompuServe ID: 71301,424

### Calendar of Events

<b>May 25-26</b>	<b>CQ WW WPX CW Contest</b>
June 1-2	RSGB CW National Field Day
June 8	Portugal Day Contest
June 8-9	South American CW Contest
June 8-10	ARRL June VHF QSO Party
June 15-16	All Asian CW Contest
June 15-16	West Virginia QSO Party
June 22-23	ARRL Field Day
June 22-23	RSGB 160M CW Contest
July 1	RAC Canada Day Contest
July 13-14	IARU HF World Championship/WRTC 96
July 14	QRP ARCI Summer Sprint
July 20-21	NAQP RTTY Contest
July 27-28	RSGB IOTA Contest
Aug. 3-4	YO DX Contest
Aug. 3-4	ARRL UHF Contest
Aug. 10-11	Maryland-DC QSO Party

### Contest Records

This is an area of contesting that is close to many, but in reality is a very small minority of the overall participating population. When you break a category record in a contest, it's sort of a crowning achievement. You have done something that no one else has ever done in that contest. For that reason, records have been one of our most protected territories, especially in the CQ WW.

Rule-change proposals such as the scoring structure, operating times, and other such ideas often have been rejected because of the sanctity of the highest scores. I think the time may be here, especially in light of the upcoming solar cycle, to rethink this area. While it's true that the old adage "if it ain't broken, don't fix it" applies here, it should not be an all-encompassing concept. Some rule changes may make sense when a view is taken to all of contesting's participants, not just the record holders. The fact is nearly all of the current records will be history within the next five to seven years anyway. What could be better timing than to be more open-minded now from a rule-making perspective?

### 48-Hour Contesting

This is one tradition that I believe needs to stay. I can already feel the heat from some of you while I'm typing this.

To be honest, I've found myself recently falling into the trap of believing that the 48-hour contest has seen its day. But then I say, we're at the bottom of the solar cycle. This would be drudgery even if it were a 30-hour contest. Although I'm a little older (and maybe slower) than I used to be, why should that be a younger person's problem? The arguments go on.

After really thinking through all the issues (and benefits) that come from a 48-hour contest, I'm left feeling that while it's tiring, incon-

venient, and overly demanding at times, it's part of what makes the challenge of contesting work for me. Rather than reduce the number of hours for serious competitors, we should begin to better recognize, in some way, those who choose to operate less.

### Finally . . .

I have to admit that while I'm a traditionalist at heart, I've become more open to change when thinking about some of contesting's rituals. No matter how we look at changing contesting, it has to be viewed in the context of actions that result in substantial improvement for the majority. The 48-year history of the CQ WW has yielded essentially the same contest that existed in its infancy. This is strong evidence for something that is clearly working. However, the ARRL DX Contest has many more years under its belt and has experienced numerous changes and experiments, some of which worked while others were outright disasters. The bottom line, though, is it's still an extremely popular contest. Few remember the bumps along the road.

"If it ain't broken, don't fix it" thinking is a good basic tenet of contesting. Let's just be careful not to let that be the only guiding factor in our thinking for the future.

### Check Out The Site!

If you haven't heard or taken the time, you have to go visit the CQ Contest magazine Website developed by Steve Affens, K3SA. Not only does it provide a hint of the current and future editions of CQ Contest magazine (with photography), it also has one of the best sets of links to other Websites of interest to testers that can be found anywhere. This is truly a terrific piece of work by Steve. The site address: <<http://www.access.digex.net/~cqmag/cqtes.html>>. Write down this address, because you'll want to keep it handy.

### WRTC '96 Update

The upcoming World Radio Team Championship event may well become the most incredible event in the history of contesting. The WRTC committee has announced the final selection of the 104 team members who will compete in the World Radiosport Team Championship competition scheduled for July 13 and 14, 1996. As you may know, WRTC competitors will enter the IARU HF World Championship contest as 52 two-person multi-operator, single-transmitter entries. All 52 teams will be located near San Francisco Bay on flat terrain in relatively close physical proximity so as to minimize propagation differences, running 100 watts output to nearly identical antenna systems. By eliminating many of the station and propagation variables normally associated with radio contesting, the WRTC strives to present a meaningful head-to-head competition in which the winners rightfully can claim to be "the best of the best."



# YAESU HF/VHF/UHF Equipment Handhelds • Rotators



**FT-1000 HF Transceiver** • tx: 160-10m rx: 100kHz-30MHz • 200W • 100 memories • cross-band dual receive • built-in antenna tuner • built-in AC power supply • 6" h x 16" w x 15" d, 58 lbs. .. **\$3299<sup>95</sup>**  
**FT-1000D Deluxe** • dual bandpass filter • temperature compensated crystal oscillator • 2.4kHz & 2kHz SSB filters, 500Hz CW crystal filter ..... **\$4199<sup>95</sup>**  
**FT-1000MP** • Advanced features • EDSP • Collins mechanical filter ..... **\$2999<sup>95</sup>**  
**FT-1000MP/DC** DC only ..... **\$2799<sup>95</sup>**



**FT-990 HF Transceiver** • tx: 160-10m rx: 100kHz-30MHz • 100W • 90 memories • SCAF • FSP • DDS • built-in antenna tuner w/memory • built-in AC power • 12" w x 4" h x 11" d, 30 lbs. **\$1999<sup>95</sup>**  
**FT-990DC** • DC only ..... **\$1669<sup>95</sup>**



**FREE YSK-900 Remote Kit!**  
 FT-900/AT  
 FT-900/CAT  
 Limited Time

**FT-900/AT HF Transceiver** • transmit: 160-10m • rx: 100kHz-30MHz • 100 memories • 100W • built-in antenna tuner • CTCSS encode • repeater offset • twin stacking VFOs • detachable front sub-panel • 13.8VDC @ 20A • 9" w x 3" h x 10" d, 11 lbs. • ..... **\$1269<sup>95</sup>**  
**FT-900/CAT** Collins mech. filter. **\$1399<sup>95</sup>**



**FT-840 HF Transceiver** • tx: 160-10m • rx: 100kHz-30MHz • 100 memories • 100W • twin band stacking VFOs • optional FM mode • repeater offset • CTCSS encode • 13.8V DC @ 20A • 9" w x 3" h x 9" d, 18 lbs. .... **\$799<sup>95</sup>**

**All ACCESSORIES for items on this page are in stock.**  
 When calling, be sure to ask your Salesperson about them!



**Multi-Mode VHF/UHF Base**

**FT-736R** • 2m: 144-148MHz; 70cm: 430-450MHz • optional modules for 50, 220MHz & 1.2 GHz • 100 memories • full duplex crossband • inverted tracking • 25W: 144, 220/440MHz; 10W: 50/1.2GHz • built-in AC supply or 13.5V DC • 5" h x 14" w x 11" d, 19.8 lbs. .... **\$1969<sup>95</sup>**



**Dual Band FM Mobiles**

**Similar looks & features:** 32 memories • CTCSS encode • dual receive • built-in duplexer • crossband repeat • remote capability • 5" w x 1" h x 6" d, 2 lbs  
**FT-5200** 2M/440MHz, 50/35W ..... **\$549<sup>95</sup>**  
**CLOSE OUT with coupon until gone**

**FT-5100** Similar to FT-5200 but without remote capability ..... **\$609<sup>95</sup>**



**FT-8500 Dual Band FM Mobile** • 2m 144-148MHz tx, 110-180MHz rx; 70cm 430-450MHz tx, 420-470MHz rx • 110 memories • 50/35W • Spectra-Analyzer • Smart Controller mic • 10-memory auto-dialer • 5" w x 1" h x 6" d, 2 1/2 lbs. .... **\$679<sup>95</sup>**  
**FT-8500/MH-39** w/std. TTP mic. .... **\$639<sup>95</sup>**



**Single Band FM Mobiles**

**Similar looks and features:** 50 memories • DTMF page/coded squelch • backlit DTMF mic • 5" w x 1" h x 6" d, 2.8 lbs.  
**FT-2200** (2m) 144-148MHz tx; 110-180MHz rx, 50/25/5W ..... **Closeout \$259<sup>95</sup>**  
**with coupon until gone**

**FT-7200** (70cm) 430-450MHz transmit and receive, 35/15/5W ..... **\$529<sup>95</sup>**



**FT-3000M 2M FM Mobile** • 70 WATTS! • 144-148MHz tx, 110-180MHz, 300-520 & 800-999MHz rx (cellular blocked) • 81 memories • 1200/9600b Packet compatible • 5" w x 1" h x 6" d, 2 1/2 lbs. .... **\$489<sup>95</sup>**



**Single Band FM Mobiles**

**Similar looks & features:** • 31 memories, odd splits on any • alpha-numeric display • CTCSS encode • 5 scanning functions • advanced track tuning • backlit DTMF microphone • 6" w x 1" h x 7" d.

**FT-2500M** (2m) 144-148MHz transmit, 140-174MHz rcv, 50/10/5W ..... **\$339<sup>95</sup>**  
**FT-7400H** (70cm) 430-450MHz transmit and receive, 35/15/5W ..... **\$519<sup>95</sup>**



**VHF/UHF Multi-Purpose Mobile/Portable**

FM/SSB/CW • 25W • 2W portable power with 12VDC @ 1.1A or optional battery case • dual VFOs • LCD display • 10 memories • DTMF mic w/up-down tune • scanning • 2 1/2" h x 6 1/4" w x 7 1/2" d, 2 1/2 lbs.

**FT-290RMkII** 144-148MHz tx/rx. .... **\$629<sup>95</sup>**  
**FT-690RMkII** 50-54MHz, 10W ..... **\$739<sup>95</sup>**  
**FT-790RMkII** 430-450MHz tx/rx. .... **\$719<sup>95</sup>**



**VHF/UHF Repeaters**

25W • 8 channels • PLL synthesized • fully programmable functions • CTCSS encode and decode • time out and hang timers • wall or rack mount • 13.8V DC @ 6A • 14" w x 1" h x 4" d, 25 1/2 lbs  
**VXR5000VADC** 135-175MHz. .... **\$1199<sup>95</sup>**  
**VXR5000UCDC** 400-512MHz. .... **\$1199<sup>95</sup>**



**Antenna Rotators**

Light, Medium, Heavy & Extra Heavy-Duty models, plus Elevation & Azimuth/Elevation.

**G-450XL** Lt/medium, 10 sq. ft. .... **\$239<sup>95</sup>**  
**G-800S** Medium, 17 sq. ft. .... **\$314<sup>95</sup>**  
**G-800SDX** Same, w/presets ..... **\$404<sup>95</sup>**  
**G-1000SDX** Heavy, 23 sq. ft. .... **\$494<sup>95</sup>**  
**G-2800SDX** Extra HD, 23 sq. ft. .... **\$1114<sup>95</sup>**  
**G-5400B** Azimuth/elev. 11 sq ft. .... **\$539<sup>95</sup>**  
**G-500A** Elevation, 12 sq. ft. .... **\$279<sup>95</sup>**

## YAESU HF TRADE UP DAYS PROMOTION

Trade-in one of the following old YAESU HF Radios and receive a Special Coupon worth \$150<sup>00</sup> towards the purchase of any New YAESU HF transceiver: FT-101/B/E/F/EE/EX/FE; FTDX-400; FT-401B; FT-560; FT-570; FT-200/TEMPO-1; FL-101 **CALL!**



**Handhelds**

**FT-10** 2 1/2w 2m HT (several models) **CALL**  
**FT-11R** 1.5w 2M HT ..... **\$284<sup>95</sup>**  
**FT-11R/HP** 5w 2M HT ..... **\$304<sup>95</sup>**  
**FT-33R** 5w 220 MHz FM HT ..... **\$299<sup>95</sup>**  
**FT-40** 440MHz HT (several models) **CALL**  
**FT-41R** 440MHz HT ..... **\$349<sup>95</sup>**  
**FT-50R/40B** 2w 2m/440 HT ..... **\$329<sup>95</sup>**  
**FT-50R/41B** 5w 2m/440 HT ..... **\$339<sup>95</sup>**  
**FT-51R** 2w 2m/440 HT ..... **\$479<sup>95</sup>**  
**FT-51R/HP** 5w 2m/440 ..... **\$499<sup>95</sup>**  
**FT-411E** 2.5w 2 meter FM HT ..... **\$289<sup>95</sup>**  
**FT-911** 1w 1.2GHz HT ..... **\$469<sup>95</sup>**

**FREE RH-1 Rubber Case Protector with FT-10 or FT-40 purchase (limited)**  
**FT-811** 440 MHz HT **CLOSEOUT** ..... **\$199<sup>95</sup>**



**FRG-100B Communications Receiver** 50kHz-30MHz • SSB/CW/ AM modes, FM option • 50 memories • 12 & 24-hour clocks • Selectable bandwidths • alarm/timer functions • dual antenna jacks • 9" w x 3" h x 9" d ..... **\$594<sup>95</sup>**

## YAESU COUPONS

Good thru 5/31/96

Prices shown in this ad already have these Coupon Amounts deducted

**FT-1000, FT-1000D** .. **\$200 Off**  
**FT-990, FT-990DC** .. **\$200 Off**  
**FT-900, FT-900/AT, FT-900/C, FT-900/CAT** ..... **\$100 Off**  
**FT-840** ..... **\$100 Off**  
**FT-2500M, FT-8500, FT-8500/MH-39** ..... **\$30 Off**  
**FT-5100** ..... **\$40 Off**  
**FT-10 (all types)** ..... **\$45 Off**  
**FT-11R, FT-11R/HP, FT-51R, FT-51R/HP, FT-41R** .. **\$30 Off**  
**G-800S, G-800SDX, G-1000SDX, G-2800SDX** ..... **\$25 Off**  
**FRG-100B** ..... **\$25 Off**

All Prices, Coupons & Specials are as of 5/1/96 and are subject to change without notice

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# It's Awesome!

You know who you are. You drive farther, use your mobile rig longer, and buy the most dependable radio products you can get. The FT-3000M is the *only* amateur 2-m FM mobile radio with 70 full watts of TX power! Reassuring, when you're driving a lonely stretch of highway!

Like the 50-Watt FT-2500M, the FT-3000M is rated MIL-STD 810. And, both let you take the back roads with confidence. Built to resist jolts, bumps and the corrosive affects of dust, mist, and rain, the new FT-3000M, and popular FT-2500M take abuse and perform like

champs. Plus, the FT-3000M is a great base, too.

The new FT-3000M comes equipped with some sensational exclusive features!

- **WIDE BAND RECEIVE!** From 110-180 MHz, VHF, and 300-520 MHz UHF to 800-999 MHz\*. And, AM aircraft receive!
- **TWIN COOLING FANS!** Unique, twin fans keep the FT-3000M running cool without a problem! So, don't worry about long transmission keydowns.
- **SELECTABLE POWER OUTPUT!** An awesome 70 watts, plus 50, 25, and 10 Watts.
- **TRUE FM!** Voice clarity has never been better.

• **INTERACTIVE PROGRAMMING!**

Continual scrolling menu guides you through 50 settings—and won't let you forget the next step!

- **SIMPLIFIED FRONT PANEL!** New Quick-Touch™ dual-concentric knob controls menu programming and adjustments.
- **PC PROGRAMMABLE!** Optional ADMS-2B Windows™ Programming Software programs your FT-3000M in seconds!

The FT-3000M is feature-rich just like the FT-2500M, 50-Watt mobile, and built to the tough performance standards you've come to expect from Yaesu. We think you should have at least one, don't you?

"This is true Wide Band receive! VHF, UHF, and 800-999 MHz!"

"Digital Code Squelch gives me more privacy than CTCSS."



"Smart-Search™ scans and stores active channels for quick access."

"Yaesu did it again!"



## Features

- Frequency Coverage
- Wide Band Receive
- RX: 110-180 MHz, 300-520 MHz, 800-999 MHz\*
- TX: 144-148 MHz
- AM Aircraft Receive
- MIL-STD 810 Rating
- Interactive Programming
- High Power Output: 70 Watts, plus 50, 25 and 10 Watts
- Quick-Touch™ Dual Concentric Control Knob
- Twin Cooling Fans
- ADMS-2B Windows™ Programmable
- Digital Coded Squelch (DCS)
- 81 Memory Channels
- Auto Range Transpond System™ (ARTS™)
- 1200/9600 Baud Packet Compatible
- Smart-Search™
- Alphanumeric Display
- Dual Watch
- Full line of accessories



*Output Power*

**YAESU**

Performance without compromise.™

\* Cellular Blocked

EDSP  
RX/TX

# All-Mode HF Transceiver FT-1000MP



The year was 1956. Electronic communication throughout the world was on the threshold of significant and remarkable change. Intrigued by the development of single-sideband radio theory, a young engineer and amateur radio experimenter painstakingly assembled an SSB transmitter. Word of his successful efforts spread quickly among his friends, and soon radio amateurs from all over the country were requesting transmitters just like it. Thus was born the first invention of JA1MP founder of Yaesu. Though his key is now silent, in tribute to his leadership and exceptional contributions to the radio art, the FT-1000MP carries the memory of his call sign.

## An HF Masterpiece, Combining the Best of Digital and RF design technology. The FT-1000MP.



### Specifications

- EDSP (Enhanced Digital Signal Processing)
- Shuttle-jog Rapid Tuning Enhancement
- Directional Tuning Scale for CW/Digital mode and clarifier offset display
- Dual In-Band Receive w/ Separate S-Meters
- Selectable Antenna Jacks
- Collins SSB Mechanical Filter built-in, 500 Hz CW Collins filter plug-in, optional
- Selectable Cascaded Crystal and Mechanical IF Filtering (2nd and 3rd IF Filters)
- User-programmable Tuning Steps w/0.625 Hz High Resolution Low-Noise DDS Circuit
- Custom Feature Set-up via New Menu System
- Adjustable TX Output Power: 5-100W (5-25W AM)
- True Base Station: Both 100-117 or 200-234± VAC 10%, 50/60 Hz and 13.5 VDC Power Inputs

Blending digital and RF technology, the FT-1000MP features a Yaesu exclusive: Enhanced Digital Signal Processing (EDSP). Beginning on the receive side with Yaesu's industry-standard high-intercept front end design, the RF signal is then fed to the IF stages, where an impressive array of 8.2 MHz and 455 kHz IF filters (including a built-in Collins SSB Mechanical Filter) establish the tight shape factor so important in obtaining high dynamic range and low noise figure. Finally, the EDSP system provides specially-designed filter selections and response contours for maximum intelligence recovery.

Only with this combination of EDSP, independently selectable 8.2 MHz and 455 kHz IF filters, and a low-noise DDS local oscillator system can receiver performance without compromise be obtained. You can customize your FT-1000MP by choosing from 20 kHz, 500 Hz, and 250 Hz optional, cascaded IF filters, then zero in on weak signals using Yaesu's exclusive Shuttle-jog Rapid Tuning Enhancement and high-resolution (0.625 Hz) DDS VFO. Without question, the FT-1000MP is the most technologically advanced HF rig today.

**EDSP** operates in both transmit and receive modes. On receive, the EDSP produces enhanced signal-to-noise ratio and significantly improved intelligence recovery during difficult situations involving noise and/or interference. The result of hundreds of hours of laboratory and real-world experimentation, EDSP's 4 preset random noise reduction protocols and 4 digital filtering selections are controlled by easy-to-use concentric controls on the front panel of the transceiver. High, low, and mid-range cuts for voice work are teamed with razor-sharp CW bandpass filters and an automatic notch filter which identifies and attenuates undesired carriers or heterodynes. Also operational in the transmit mode, EDSP provides 4 performance-enhancement pattern selections for different operating circumstances, ensuring best readability of your signal on the other end of the path.

Once again, Yaesu's engineers have reaffirmed the vision and dedication of JA1MP which began nearly 40 years ago. See the incomparable FT-1000MP today.

FT-1000/D  
Legendary 200W  
All Mode HF Transceiver  
"The Dream Station"



## YAESU

Choice of the World's top DX'ers

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(310) 404-2700

The WRTC competition will begin at 1200 UTC on Saturday, July 13 and run until 0600 UTC on Sunday, July 14. The WRTC teams will operate both CW and SSB on 40, 20, 15, and 10 meters and may be contacted once on each band-mode (i.e., 8 contacts are possible with each WRTC station). WRTC stations will be easy to identify because they will be using distinctive "1x1" callsigns recently approved by the FCC for the competition. Those callsigns will be W6A through W6Z and K6A through K6Z. In addition to the regular IARU HF Championship awards, there will be a whole group of separate achievement awards available to those who work the requisite numbers of WRTC stations.

Twenty-two teams operated in the first WRTC competition, which was held in Seattle, Washington in 1990. Eleven competitors in this year's event are veterans of WRTC-90. Their callsigns are noted with an asterisk in the competitor listing.

1. Defending Champs K1AR\* + K1DG\*
2. Team Argentina LU6ETB + LW9EUJ
3. Team Australia VK5GN + VK2AYD
4. Team Belgium ON6TT + ON4WW
5. Team Brazil PY5CC + PY0FF
6. Team Bulgaria LZ1SA + LZ2PO\*
7. Team Canada #1 VE3EJ + VE3IY
8. Team Canada #2 VE7NTT + VE7CC\*
9. Team Czech Rep. OK1CF + OK2PAY
10. Team Finland OH2IW + OH1JT
11. Team France F6FGZ + F5MUX
12. Team Germany #1 DK3GI + DL1IAO
13. Team Germany #2 DL5XX\* + DL1VJ

14. Team Hungary
15. Team Italy #1
16. Team Italy #2
17. Team Japan #1
18. Team Japan #2
19. Team Japan #3
20. Team Japan #4
21. Team Lithuania
22. Team Poland #1
23. Team Poland #2
24. Team Russia #1
25. Team Russia #2
26. Team Slovenia
27. Team Spain #1
28. Team Spain #2
29. Team Sweden
30. Team UK
31. Team Ukraine
32. Team USA #1
33. Team USA #2
34. Team USA #3
35. Team USA #4
36. Team USA #5
37. Team USA #6
38. Team USA #7
39. Team USA #8
40. Team USA #9
41. Team USA #10
42. Team Yugoslavia
43. Wildcard #1
44. Wildcard #2
45. Wildcard #3
46. Wildcard #4
47. Wildcard #5
48. Wildcard #6
49. Wildcard #7

- HA0DU + HA0MM\*  
 IN3QBR + IT9TQH  
 IT9BLB + IT9VDO  
 JE1JKL\* + JH7WKQ  
 JH4NMT + JE3MAS  
 JH4RHF + JA8RWU  
 JH7PKU + JO1BMV  
 LY2IJ + LY1DS  
 SP6AZT + SP9FKQ  
 SP9IJU + SP9HWN  
 RV1AW + RW1AC  
 UA3DPX + RZ9UA  
 S59A + S56A  
 EA4KR + EA1AK  
 EA7TL + EA9KB  
 SM3DMP + SM3CER  
 G3OZF + GI0NWG  
 UT4UZ + UT1IA\*  
 K1KI + K3UA  
 K3LR + WA8YVR  
 K4BAI + KM9P  
 K6LL + N2IC  
 K8CC + K5GO  
 KF3P + KR2J  
 KR0Y\* + K1TO  
 N6TV + K7SS  
 W2GD + W0UA  
 WX3N + K5ZD  
 YU1RL\* + YT1AD  
 5B4ADA + S53R  
 9A9A + 9A3GW  
 DJ6QT\* + DJ2YA  
 I2VXJ + I4UFH  
 K4UEE + N6IG  
 NP4Z + WC4E  
 RU3AA + RV3AJ

50. Wildcard #8 UN2L + UN4L  
 51. Wildcard #9 WN4KKN + N6TR  
 52. Wildcard #10 ZS6EZ + ZS6NW

For additional information about WRTC-96, contact Rusty Epps, W6OAT, at 651 Handley Trail, Redwood City, CA 94062 USA or via e-mail at <epps@netcom.com>. You also may access the WRTC-96 Worldwide Website at <http://ourworld.compuserve.com/homepages/n6ip>.

### Final Comments

As I'm typing, I can't help thinking about the 70 bags of concrete sitting in my driveway that KC1XX and I will be mixing with water this weekend. The good news is I should have arms the size of Alaska by Sunday night. The bad news is I won't be able to lift them until after the WRTC contest. More will follow on this adventure in future columns.

On another note, someone recently posted the following anagram on Internet. It seemed all too appropriate for the contest community:

**CONTESTER = NO REST, ETC.**

As always, please remember to provide any submissions for the September contest calendar to me by July 1st.

73, John, K1AR

### Portugal Day Contest

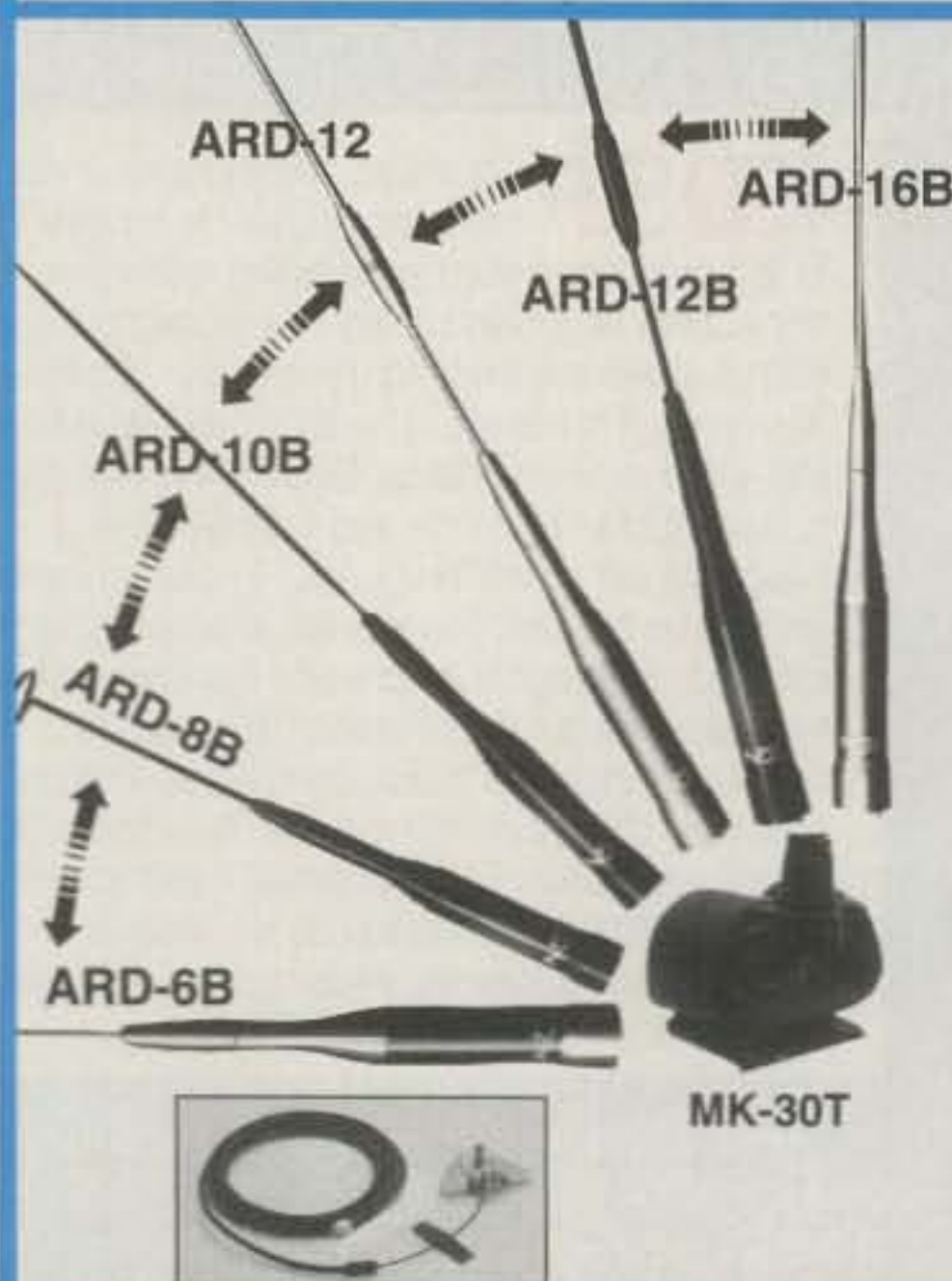
0000-2400Z Sat., June 8

This is the sixth running of the Portugal Day

# Maldol

## Ready for Spring?

✓ ANTENNA ✓ COAX ✓ MOUNT



### IS YOUR SYSTEM READY TO GO? CHOOSE PERFORMANCE PLUS.

The middle of a rainstorm is no time to "fix" your mobile antenna system. Meet the hottest new line of dualband mobile antennas on the road today. Maldol's ARD Series. They are world-famous for style and performance and extend the range of any mobile rig new or old. ARDs are pretuned, broadbanded, weatherproof, available in chrome or black finish, and truly make the going first class!

Model	Height	Elements	Power(max)
ARD5B	19.3"	2m: 1/4 λ / 70cm: 5/8 λ	120w
ARD6/6B	26.5"	2m: 1/2 λ / 70cm: 2-5/8 λ	100w
ARD10/10B	34.4"	2m: 1/2 λ / 70cm: 2-5/8 λ	120w
ARD12/12B	48.2"	2m: 5/8 λ / 70cm: 2-5/8 λ	150w
ARD16/16B	64.8"	2m: 5/8 λ / 70cm: 3-5/8 λ	150w

Selection Guide: Taller models give max range, shorter models are good choices for use in cities and parking decks. Models with /B are black finish.

### MK-30 MOTORIZED TILT-OVER MOUNT

The mobileer's dream! Ideal mate for ARDs, but also works great with other antennas up to 56" tall. Neat motorized unit quick-installs on trunk lid. Remote up/down switch fits under dash. Permits one-touch tilting for low overhangs. **NOTHING ELSE LIKE IT.** MK-30T/Trunk lid, R/Roof gutter, B/Hatchback, K/Auto Rack. Also available AM-01B manual tilt-over mount.

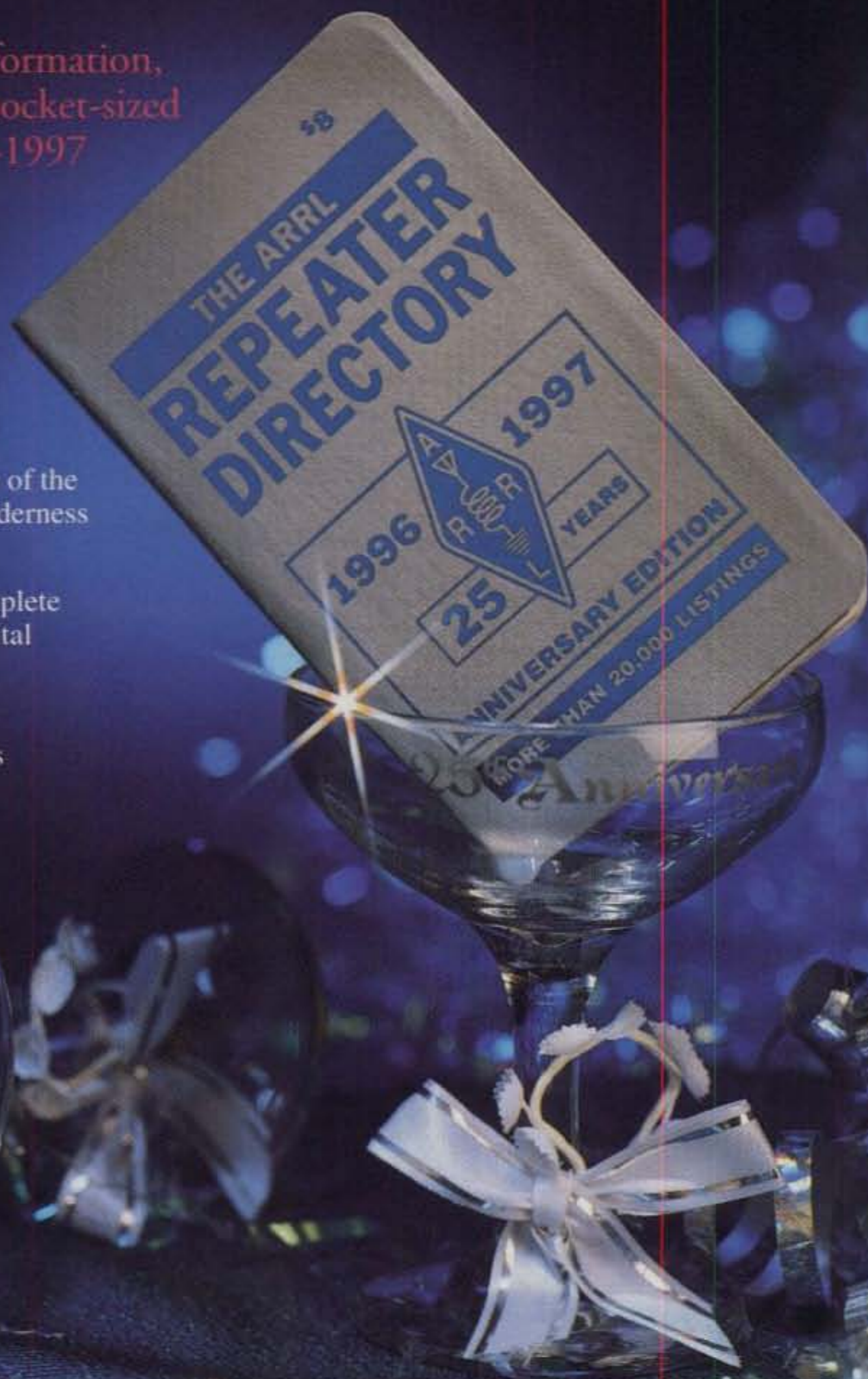


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**AT DEALERS COAST TO COAST.**

# *It's the 25th Anniversary of* **The ARRL Repeater Directory** *and we're celebrating in style!*

Completely updated with the latest information, here's some of what you'll find in the pocket-sized 25th Anniversary Edition of the 1996-1997 *ARRL Repeater Directory*.

- **Expanded listings** for US and foreign repeaters as well as greatly expanded propagation beacon listings.
- **Many handy hints** on repeater operation and interference tracking. Also featured is an overview of the use of the LiTZ (Long-Tone Zero) system and Wilderness Protocol.
- **Compact and easy access** to ARRL Officers (complete with e-mail addresses), Spectrum Committee, Digital Committee and Future Systems Committee, also with names and addresses.
- **Names and addresses** for Frequency Coordinators
- **ARRL Bandplans** for all VHF and UHF spectrum allocations.
- **Complete listing** of ARRL Special Service Clubs, with their meeting times and locations.



You'll find all the repeater information you want in the 1996-1997 *ARRL Repeater Directory*. Pick up your collector's copy today. ARRL Order No. 5609 Retail \$8

**American Radio Relay League**

225 Main Street • Newington, CT 06111-1494 tel: 860-594-0200 fax: 860-594-0303 e-mail: ltardette@arrl.org World Wide Web: <http://www.arrl.org/>

Contest sponsored by Rede dos Emissores Portugueses. It is on SSB only on 80-10 meters (no WARC bands) with recommended operation limited to the IARU's Region 1 band plan.

**Classes:** Single Operator, All Band, SSB.

**Exchange:** Portuguese stations send signal report and their District/Region. All others use signal report and sequential number.

**Scoring:** QSOs with non-Portuguese stations are worth 3 points. Contacts with Portuguese stations are worth 6 points. You may QSO the same station on different bands.

**Multipliers:** You may take multiplier credit for each Portuguese District and DXCC country you work. Contacts within your own DXCC country only count for multiplier credit. Final score is total QSO points from all bands times the sum of all multipliers.

**Awards:** Plaques will be awarded to the top five world-high scorers. Certificates are also available, including a participation award to any station working 25 or more Portuguese and/or EA stations.

Logs must be postmarked no later than July

31st and should be sent to: REP Award/Contest Manager, P.O. Box 2483, 1112 Lisboa Codex, Portugal.

### WW South American CW Contest

1200-1800Z Sat. to Sun., June 8-9

First run in 1982, the WWSA CW Contest is sponsored by *Antenna-Electronica Popular* magazine. It is a superb opportunity to work valuable stations, prefixes, and countries for many international CW awards.

**Classes:** Single op, all band or single band; multi-single; and QRP.

**Exchange:** RST and continent.

**Scoring:** Stations may be worked once per band (80-10 meters).

For S.A. stations: credit 2 points for all QSOs with other SA stations (including same country). QSOs with other continents are worth 10 points. Credit 2 multipliers for each prefix worked with other stations.

For non-S.A. stations: Credit 10 points for S.A. QSOs and 2 points for all others. Credit 2 multipliers for each S.A. prefix worked.

Band score is determined by multiplying total QSO points times multiplier. Final score is the sum of all valid band scores.

Logs must be received no later than October 30th and should be sent to: WWSA Contest Committee, P.O. Box 282, Rio de Janeiro, RJ, Brazil 20001-970.

### ARRL VHF Contest

1800-0300Z Sat. to Mon., June 8-10

Action will be found on the 50, 144, 220, and 420 MHz bands, and even higher up in the spectrum.

The scoring varies with the different bands used and there are certain requirements and restrictions in the rules. Complete rules can be found in the May issue of *QST*. I recommend that you write to ARRL Headquarters for official forms. Include an SASE with your request to: ARRL VHF Contest, 225 Main Street, Newington, CT 06111.

### All Asian DX Contest

CW: June 15-16 Phone: Sept. 7-8  
0000Z Sat., to 2400Z Sun.

This is the 37th year of this activity sponsored by the JARL. The exchange is between Asian countries and the rest of the world.

**Classes:** Single operator, both single- and multi-band. Multi-operator, both single- and multi-transmitter, all band only (one signal per band only).

Club stations are classified as multi-operator and each operator will give his age in the exchange.

**Exchange:** For OMs—RS(T) plus age of operator. For YLs—RS(T) and 00.

**Scoring:** 3 points for contacts on 160; 2 points for contacts on 80; 1 point on all other bands.

**Multiplier:** Asians credit one multiplier for each different DXCC country worked per band. Non-Asians use the number of Asian prefixes worked on each band (CQ WPX list).

**Final Score:** Total QSO points from all bands

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times the total number of multipliers worked.

Note: JD1 stations on Ogasawara are in Asia, and JD1 stations on Minamitori Shima are in Oceania.

**Awards:** Certificates to the top scorers, both phone and CW in each country and U.S. call area. In each class, both single band and all band, up to the fifth rank, depending on the number of log returns. Medals will be awarded to the all-band continental leaders both single and multi-operator.

**Logs:** Keep all times in GMT. Use a separate column for the country or prefix multiplier, and fill in only the first time it is worked. Use a separate log for each band. Include a summary sheet showing the scoring and other information, and a signed declaration that all rules and regulations have been observed.

There is a strict disqualification clause for taking credit for duplicate contacts in excess of 2% of the total on each band, as well as other infractions.

Logs must be received no later than Sept. 30th for the phone section, and July 30th for CW. They go to: JARL, Contest Committee, P.O. Box 377, Tokyo Central, Japan.

**Asian Country List:** A4, A5, A6, A7, A9, AP, BV, BY, CR9, EP, HL/HM, HS, HZ/7Z, JA-JS, JD1, JT, JY, OD, S2, TA, All C.I.S. DXCC Countries, VS6/VR2, VU, VU4, VU7, XU, XV/3W, XW, XZ, YA, YI, YK, ZC4/5B4, 1S, 4S, 4X/4Z, 70, 8Q, 9K, 9M2, 9N, 9V.

### West Virginia QSO Party

1800-1800 Sat. to Sun., June 15-16

This event has been reinstated in celebration of the 35th state to join the Union on June 20, 1863.

**Exchange:** RS(T) and QTH (WV county, state, province, or DXCC country).

**Frequencies:** CW—1810 and 35 kHz above the lower band edge. Phone—1860, 3860, 7260, 14260, 21360, 28360 kHz. Novices use 25 kHz above the lower Novice band edge.

**Scoring:** Score one point for phone QSOs and two points for CW contacts. Credit 25 bonus points for working W8WVA, the official WV ARC station. Final score is QSO points time total WV counties worked. Add bonus points after all other calculations.

Mail log entries by July 16th to: WV QSO Party, Dave Ellis, K8MBH, 610 Hillsdale Drive, Charleston, WV 25302. Include an SASE for certificate and results.

### ARRL Field Day

1800-2100 Sat. to Sun., June 22-23

Without a doubt this activity generates more stateside participation in manpower than any other amateur radio activity. It is mostly a club-organized event and requires that the coordinator be knowledgeable about all the various operating/technical requirements.

Entries are separated into many classes. Rules and requirements are quite extensive and will be found in the May issue of QST. It is advisable that you read them thoroughly.

In the absence of computer logging, official log forms are a must. Direct your request with a large SASE to the ARRL, ARRL Field Day, 225 Main Street, Newington, CT 06111.

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#CAV-154-3-1	25-500pF @ 2kv (.045")	\$55	(3-12)\$52
#CAV-32-65	45-1000pF @ 1200v (.032")	\$69	(3-12)\$65

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# AWARDS

## NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we feature our newest USA-CA All Counties recipient Len Parsons, W5AL (age 70, licensed since 1941, Extra class since 1954). Len will receive his award certificate and plaque from Bill Nash, WØOWY, at the MARAC Convention in Phoenix, Arizona.

W5AL has been on the air continuously since 1941 except for the World War II years, when he served in the Marines in the Pacific. Len's early radio passion was DX, earning DXCC in 1948, reaching the Honor Roll in 1957, and achieving 5 Band DXCC in 1982. His interest next turned to satellites, where he holds DXCC and VUCC. In the 1980s Len became interested in weak-signal VHF and UHF, and he began to pursue grid squares, states, counties, and countries on the upper bands. Len has worked all states and continents on 50 MHz and 42 states on 144 MHz, and has VUCC on 50, 144, 222, 432, and 1296 MHz.



Lou Parsons, W5AL, USA-CA All Counties #897, March 22, 1996.

Len is the custodian of the SWOT (Side Winders on Two) VHF-UHF County award known as VUCA (VHF-UHF County Award). This led to the pursuit of USA-CA, for he already had more than 600 counties confirmed on the VHF/UHF bands. Len began county hunting on the HF bands late in 1993, started going HF mobile in 1994, and has had a great time county hunting. Last year he went to the National

Box 76, Pleasant Mount, PA 18453-0076

### SPECIAL HONOR ROLL

Paul Ridley, KB5DQ  
USA-CA All Counties #896  
March 10, 1996

Len Parsons, W5AL  
USA-CA All Counties #897  
March 22, 1996

MARAC convention in Hamburg, New York and met many of the MARAC members who had given him numerous counties.

Len retired in 1989 after 36 years with Sandia National Laboratories, where he supervised electronics quality testing. He also taught electronics at Amarillo College at night, and taught license classes for all grades at the local radio club. In 1978 he was honored as Amateur Operator of the Year by the Panhandle Radio Club for this effort. Len's earlier calls include W5LGG and W7AIR, KX6CD (Eniwetok), and V31EP, the first satellite DXpedition to Belize.

Len is planning to attend the MARAC National in Arizona, where he hopes to be able to personally thank the many generous county hunters who went to such great lengths to help him achieve USA-CA. He is now busily pursuing "bingo" and plans to continue to be active in county hunting.

### Awards Issued

**USA-CA 500:** Paul Ridley, KB5DQ, #2907; Klaus Minker, DL5ZXQ, #2908; Andrei Stchilenok, RC2AR, #2909; Maurizio Galliani, IK2ILH, #2910; John McColly, WA5TOS, #2911; Jean V. Giesler, W4TYU, #2912; Wermer Barth, DL2SUB, #2913; Len Parsons, W5AL, #2914.

**USA-CA 1000:** Paul Ridley, KB5DQ, #1403; John McColly, WA5TOS, #1404; Len Parsons, W5AL, #1405.

**USA-CA 1500:** Paul Ridley, KB5DQ, #1171; John McColly, WA5TOS, #1172; Len Parsons, W5AL, #1173.

**USA-CA 2000:** Paul Ridley, KB5DQ, #1076; John McColly, WA5TOS, #1077; Len Parsons, W5AL, #1078; Loyd S. Smith, N1OAZ, #1079.

**USA-CA 2500:** Paul Ridley, KB5DQ, #1005; John McColly, WA5TOS, #1006; Len Parsons, W5AL, #1007; Loyd S. Smith, N1OAZ, #1008.

**USA-CA 3000:** Paul Ridley, KB5DQ, #913; Len Parsons, W5AL, #914.

**Endorsements:** E. H. Bill Irwin, WA3ZMY, All 20 Meter SSB, Mobile (with no relays).

### Awards Available

**Diploma de Portugal Award.** Continuing the sequence started with the Diploma de Portugal (Portugal Award) presented in 1995, and always creating new pursuits for DXers, the Clube CB Costa Verde's Ruling Committee for DX Activities has devised a new award for all radio amateurs since 1996—the Diploma Luis de Camoes. Luis Vaz de Camoes was a great Portuguese writer and poet and also a major character of the European Renaissance. His

### HONOR ROLL

500	2000
KB5DQ .....2907	KB5DQ .....1076
DL6ZXQ .....2908	WA5TOS .....1077
RC2AR .....2909	W5AL .....1078
IK2ILH .....2910	N1OAZ .....1079
WA5TOS .....2911	
W4TYU .....2912	
DL2SUB .....2913	
	2500
	KB5DQ .....1005
	WA5TOS .....1006
	W5AL .....1007
	N1OAZ .....1008
	3000
	KB5DQ .....913
	W5AL .....914

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.

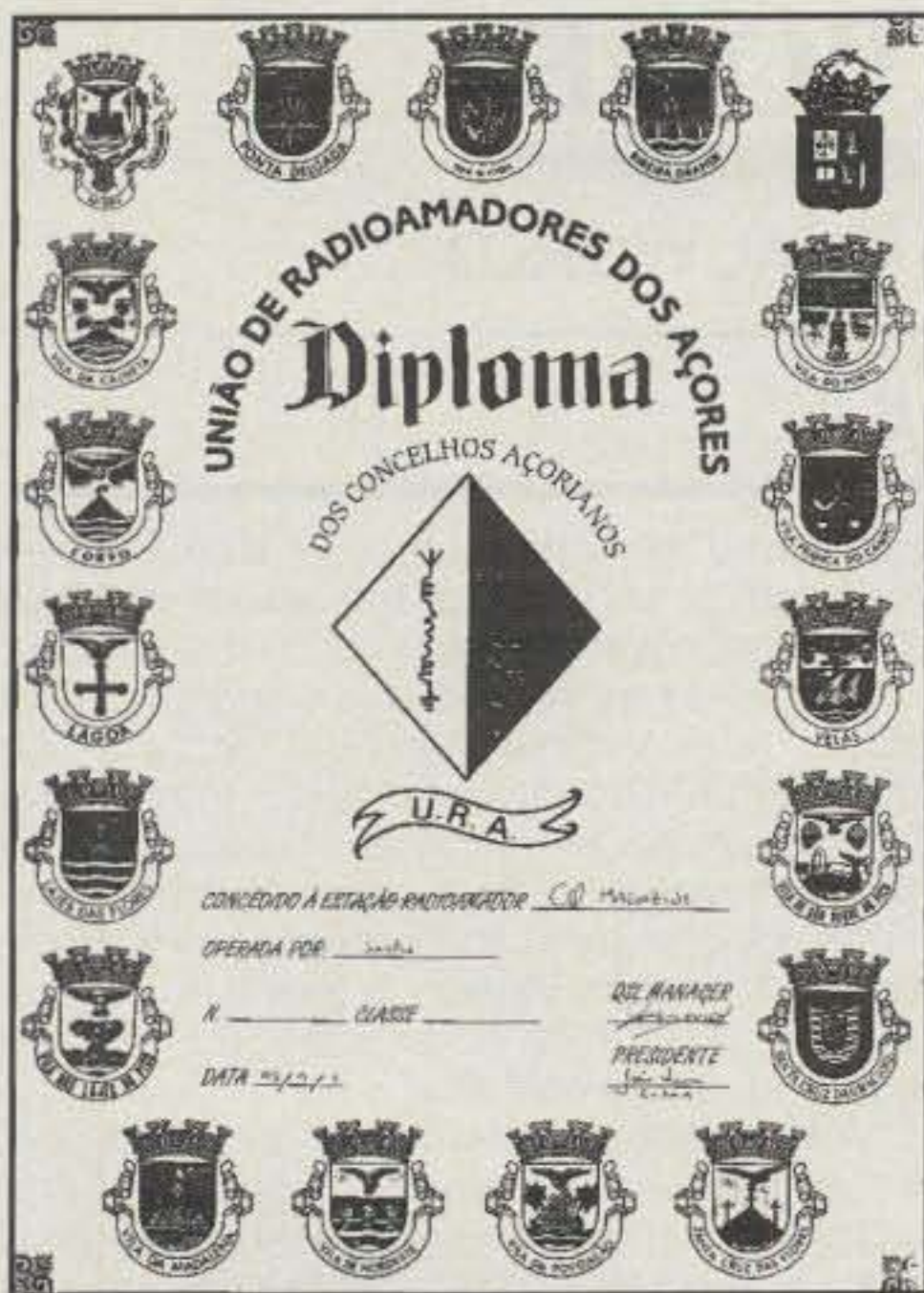
masterpiece "Os Lusíadas," in which he depicts Vasco da Gama's discovery of the sea route to India, marked an era and underlined the epic of the Portuguese discoveries. This work is a tribute to the Portuguese culture.

To obtain the award, each applicant must



The Diploma Luis de Camoes Award available from the Clube CB Costa Verde.





The Azorean Counties Award sponsored by the Uniao de Radioamadores dos Azores.

present evidence of contacts/reception with all DXCC countries of the official Portuguese language. To obtain the award for the CB category, only evidence of six of these countries is necessary.

The award is available, for each applicant, in each one of six categories: CB (11 meters)—HF (10, 12, 15, 17, 20, 30, 40, 80, and 160 meters); CW (telegraphy, all bands); Digital (RTTY, AMTOR, PACTOR, and packet, all bands); Satellite (all modes); and SWL (all bands, all modes).

Station log photocopies or QSL cards are accepted as evidence of contacts, as long as they correctly mention date, frequency, and mode. Only for CB contacts is QSL presentation mandatory. In this case, QSLs must be personalized with indication of the sender's address and clear mention of the recipient.

DXCC countries accepted for this award are (country followed by ITU prefix/CV suffix): Portugal CT; Madeira Isl. CT3; Azores Isl. CU; Mozambique C9; Angola D2; Cape Verde D44; Guinea-Bissau J5; St. Tome & Principe S9;



Ron Egon, 4X4RE is an Israeli County Hunter.

Brazil PY; Fernando de Noronha Isl. PY0/F; St. Peter & St. Paul Rocks PY0/T; Trinidad & Martim Vaz Isl. PY0/T; Macao XX9.

Requests must be addressed to: Clube CB Costa Verde, Ruling Committee for DX Activity, P.O. Box 4403-4007, Porto, Portugal. Send a letter stating name and address of applicant, category(ies) of award, and necessary proof of contacts. Award cost is USD \$4.00 for Clube CB Costa Verde Members and USD \$5.00 for nonmembers. Applicants in the CB category who present valid evidence of contacting all above countries will receive it free of charge.

**Azorean Counties Award.** U.R.A., Uniao de Radioamadores dos Azores, issues the Azorean Counties Award for all amateurs and SWLs in the following categories: (a) Gold ribbon (19 counties); Silver ribbon (17 counties); and Bronze ribbon (15 counties). The 19 Azorean counties are:

- CU1—Island of Santa Maria, Vila do Porto
  - CU2—Island of Sao Miguel Ponta Delgada, Ribeira Grande, Vila Franca do Campo Lagoa, Nordeste, Povoacao
  - CU3—Terceira Island, Angra do Hero~smo, Praia da Vitoria
  - CU4—Graciosa Island, Santa Cruz da Graciosa
  - CU5—Island of Sao Jorge, Velas, Calheta
  - CU6—Island of Pico, Madalena, Lajes, Sao Roque
  - CU7—Island of Faial, Horta
  - CU8—Island of Flores, Santa Cruz, Lages
  - CU9—Island of Corvo, Vila Nova do Corvo
- All HF, VHF, and UHF bands are eligible, as well as all modes (SSB, CW, FM, RTTY, packet, etc). Contacts made May 28, 1986 and thereafter are valid. QSL cards or xerox copies are necessary to prove contacts.

The award is free to U.R.A. members; \$10.00 for nonmembers in Portugal, Azores, and Madeira; and 10 IRCs or \$5.00 US for all others. The award is an A3 certificate with all 19 color coats of arms. The award manager's address is: U.R.A., P.O. Box 140, 9702 Angra Codex, Azores, Portugal.

### On A Personal Note

The winter of 1995-96 has been a terror for us here in the Endless Mountains of Pennsylvania. Here it is the 10th of April and it is snowing. We have had at least four and half months of winter. Easter was as white as Christmas. Health-wise I'm doing better. The doctors at the VA have reduced my diabetic medication, which is a good sign, they say.

One of the nice things about being USA-CA custodian is that I receive mail from all over the world. Sometimes folks enclose pictures. Pictured this month is Ron Egon, 4X4RE, an Israeli County Hunter. It's nice to give our worldwide county hunters some recognition.

For those county hunters who have access to the Internet, Don Flynn, K3IMC, has developed a County Hunter Home Page. The URL is <<http://www.delve.com/ch/>>. Other sites on the Web of interest to county hunters are:

- <<http://www.lib.utexas.edu/lib/PCL/map.collection/county.html>>
- <<http://www.switchboard.com>>
- <<http://www.mapquest.com>>

Use only what appears within the <> and be sure to observe upper or lower case.

73, Norm, WA3RTY

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ELNEC is a MININEC-based program with nearly all the features of EZNEC except transmission line models and a limitation of about 127 segments (6-8 total wavelengths of wire). Not recommended for quads, long Yagis, or antennas with horizontal wires lower than 0.2 wavelength; excellent results with other types. Runs on any PC-compatible with 640k RAM, CGA/EGA/VGA/Hercules graphics. Specify coprocessor or non-coprocessor type.

Both programs support Epson-compatible dot-matrix, and HP-compatible laser and ink jet printers.

Prices - U.S. & Canada - EZNEC \$89, ELNEC \$49, postpaid. Other countries, add \$3. VISA AND MASTERCARD ACCEPTED.

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# PACKET USER'S NOTEBOOK

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## Good Things Are Happening!

It seems that good things are always happening in the world of packet radio. Finally, 9600 baud has taken off and many users are beginning to enjoy the treat that we've been talking about for several years. This is not to say that this is the final plateau for packet speed, but it does offer a much improved method of packet communications and with much improved throughput.

There are good indicators for us to look at, because last year Alinco, Azden, Kenwood, ICOM, Yaesu, and Standard began shipping "9600 ready" radios.

### 9600 Baud Modems For Packet Radio

Many of my articles, columns, and books have references to how we can modify various transceivers, both amateur and commercial two-way types, for use at 9600 baud packet. I suppose it's time that I stop and bring the readers of this column up to date on the type of TNC and modem we use.

The leading 9600 baud modems now in use by most of the packet manufacturers are the G3RUH modem and some new TAPR designs. Among the improvements provided by the newer designs is full-duplex capability. Although full-duplex is not often used on the air, this is a great convenience for performing loop-back testing of the modem.

Having mentioned the G3RUH modem, I suppose I should include the vendor(s) for these add-ons. The G3RUH modem is available in several models from several sources:

**PacComm MC-NB96** internal modem card (\$115)—attaches to the disconnect header of most TNC2s and clones.

**PacComm EM-NB96** external modem (\$149)—standalone version of above.

**Kantronics DE9600** modem card—designed to attach to the modem header in the Kantronics Data Engine.

**MFJ MFJ-9600** 9600 baud modem card (\$110)—attaches to the disconnect header of most TNC2's and clones.

**The TAPR 9600 baud modem kit** (\$80).

I've used the new design that MFJ is using in their 9600 baud TNCs and it is truly "an improvement" over the original G3RUH modem. I noticed on the printed label on the EPROMs in the MFJ-9600 modem that the dialog has changed. To be sure you have this new modem type look for the new EPROM description label, which has the words "GATED" Tx and "GATED" Rx. Whatever this is supposed to mean, it sure makes a difference.

These new ones have all of the features of the G3RUH, plus a few enhancements. This is particularly useful for repeater use, since it includes provision on the modem board for bit regeneration and buffering. The first revision I used had a few problems, such as low audio drive and sluggish receive response. All these

problems are overcome in the new version 1.4 and above.

### Data Interfaces for 9600 Baud

The customary interface for 9600 baud is a TNC. Just remember that the TNC with a faster TNC clock rate is better. The old standby of 4.9 MHz should be at the low end of the ladder. Another noteworthy item is to make sure the RS232 port of the TNC is fully capable of at least 9600 baud. Higher data port speeds are a plus. Anything less can slow data transfer between nodes in a node stack.

For the beginner, this is one of the issues you will deal with later as you begin to improve your packet skills. It also will come up as you begin to wonder why the text from a connected station appears to slowly scroll onto the screen rather than "appear" on the CRT. This is an indication that the computer comport and the TNC comport are set too slow. For all practical uses and purposes, and where possible, set the TNC and computer comports to 9600 baud or higher.

### Radios for 9600 BPS

For our 9600 baud packet transceiver we select a narrow-band, frequency-modulated (NBFM) radio. To interface to the modem, the radio must have a direct FSK modulator (see my February and March columns for an example of direct FSK modulation and the techniques used to interface the modulated stage[s]).

Three ideal qualities in a transceiver suitable for 9600 baud operation are IF with sufficient bandwidth and reasonable phase characteristics, fast T/R switching, and the receive audio is taken from the discriminator output.

Some radios are usable with just a few modifications to bring out the required signals. Others may need more extensive modifications, such as adding a varactor FM modulator, and still others may require that component crystal filters be removed and replaced with a "gimmick" or 500 pF caps to widen the IF.

It is good to use a transceiver that has fast transmit/receive switching (TXD 5, 10, 15, or even 20). Don't let the purveyors of the "a TXD of 25 or 30 will be no better than 1200 baud" syndrome get to you. Even if the TXD is 25, remember that the data transfer at 9600 baud is still eight times faster than 1200 baud. Well, actually it's about 7.3 times faster, since each packet must handle the address, routing, and checksum header.

Somewhere along the line someone made a big issue out of the fast TXDelay notion. Then there came the TXDelay wars. I remember one manufacturer telling me they had their transmitter TXDelay down to a TXD of 3. A TXDelay of 3 is good, and in this case they were proud of what they had done. The TXD of 3 meant that their radio would be making full power in less than 30 milliseconds. That was great—except for one tiny oversight: Their radio was running full power at 2 watts.

For the record, we have radios running 60 and 70 watts on our SEDAN 9600 baud back-

bone, and they are operating with a TXDelay between 14 and 18. Let me assure you, this TXD is not noticed by anyone on the network.

There was a time when we made a connect from central Virginia to central Georgia (500 miles) at 1200 baud and the "ping" turn-around was anywhere between 2 and 5 minutes. Now that we have the 9600 baud backbone in place, I can "ping" Atlanta and central Georgia from here in Evington, Virginia in less than 10 seconds. The distance never changed, only the baud rate and frequency.

A large number of amateur VHF and UHF transceivers have been used successfully for 9600 baud work. Many commercial (see February and March columns) FM radios are also suitable. Typically, the IF filters in some of these radios have crystal-type filters that are very sharp, thus leading to inferior performance at 9600 baud.

To circumvent this problem, I remove any of these crystal filters (typically 10.7 MHz) that are in the second IF and replace them with ceramic (NPO) or milar caps of between 500 and 1000 pF. This will broadband the IF stages of most receivers where these filters are used.

There are several sources of information on radio interfacing and other topics related to 9600 baud. There is a chapter in my book *The Packet Radio Operator's Manual* (1990, available from CQ Communications) that is dedicated to interfacing radios for use at 9600 baud. Another 9600 baud interface reference is a handbook by Mike Curtis, WD6EHR. Hard copies are distributed with the TAPR modem.

### About Having Fun

Here in the southeast there are 8 states enjoying the burst of 9600 baud packet activity. The beauty of this system is realized when the user discovers that he or she really doesn't need 9600 baud to access the fast lane of amateur packet radio communications.

We have developed a large system of 9600 baud nodes on 6 meters that are backed (RS232 interfaced) up to the 1200 baud nodes on the SEDAN access frequencies. Because the 1200 baud access nodes are routed into the 9600 baud system, the operator at 1200 baud never realizes he or she has traversed the 500 or 1000 miles at 9600 baud. The backbone becomes transparent to the user, since all routes are directed into the backbone from the 1200 baud entry nodes. The user is aware of one reality, and that is the trek is much faster now than it was not so long ago.

### Amateur Paging

Okay, let's open our minds for a few minutes. This is for real, not a joke, and if you think the Internet has connected us to the world and undermined the post office, and that deregulation of the airwaves by Congress and the FCC has given us more freedom to access the airwaves, take a look at the following text I received from Phil Anderson, WØXI, who is the CEO of Kantronics.

## 17th Anniversary of Packet Radio (May 31, 1995)

By Burt Lang, VE2BMQ

The following is excerpted from the "MTL/WQC Packet User's Resource Manual" by Burt Lang, VE2BMQ.

At around 9 PM on May 31, 1978 the first transmissions of packet over Amateur Radio were sent. The place was the upstairs banquet hall of Bill Wong's Restaurant on Decarie Blvd. in Montreal, Quebec, Canada. The event was a special meeting of the Montreal Amateur Radio Club (MARC) called to discuss and debate proposed changes to the Canadian amateur frequency allocations that were being contemplated by the Dept. of Communications. In attendance were several DOC officials from Ottawa, including the Director General - Regulations, Dr. John deMercado. Dr. deMarcado is considered by some to be the "father" of amateur packet radio due to his persistent pressure to open up an exclusive portion of the amateur band to experiment with the new mode and due to his early experience on the Aloha project in Hawaii. Others take a less charitable view of his role in the matter.

The first packet message was reported to have been "From John deMercado to the Montreal group—Bravo, well done!" or something like that. As is common with many historical events, the participants did not bother to record the particulars and memory is now less than perfect. The Montreal Packet Net group consisted of Bob Rouleau, VE2PY; Norm Pearl, VE2BQS; Fred Baserman, VE2BQF; Bram Frank, VE2BFH; Jacques Orsali, VE2EPH; Ted Baleshta, VE3CAF; Ian Hodgson, VE2BEN; and others not mentioned.

A detailed description of the Montreal Protocol and hardware used in the experiments is given in the TAB book (#1345) *Packet Radio* by Bob Rouleau and Ian Hodgson published in 1981. An interesting note is that the Montreal Modem design used the Exar XR-2206/2211 chip set. I am told that a sample of the Montreal Modem was sent to the Vancouver group (VADCG) in the fall of 1978 and it is probably no coincidence that the same chip set appeared in the TAPR TNC modem of which Doug Lockhart of VADCG had a hand in designing.

It is ironic that none of the original Montreal Packet Net group are presently in Amateur Packet Radio. After an initial spurt of activity in amateur packet, Bob Rouleau and several others in the group turned to commercial applications for packet. The resulting company, DataRadio Inc., today is building and marketing commercial packet radio systems around the world. A recent application is the Canadian Weather Radio packet service introduced several years ago using DataRadio 9600 bps equipment.

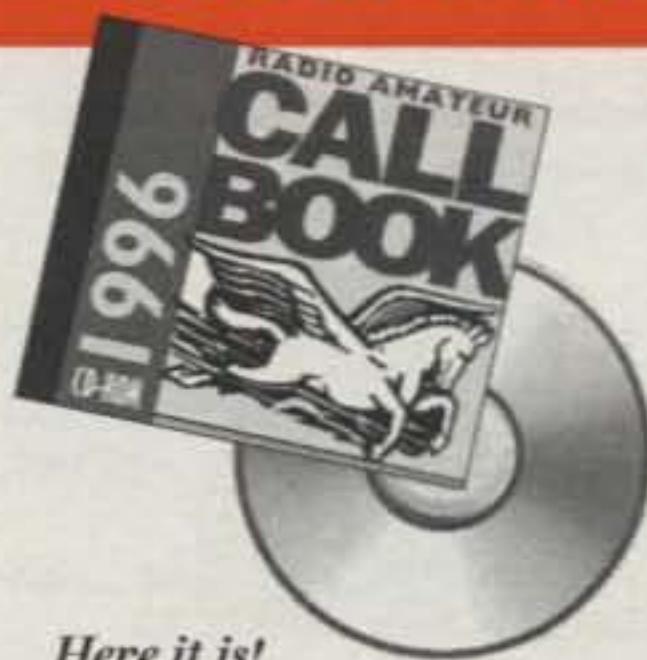
We should congratulate these early pioneers in amateur packet radio for the work they did in getting the hobby started. It is through their early efforts that today's worldwide packet system has grown, often chaotic, seldom planned but with a continuous forward progress due to the efforts of countless others in the intervening years to advance and refine the technology. In the words of the first packet message, "BRAVO, well done!"

"If you're interested in emergency communications (as we are here in the Southeastern Emergency Digital Association Networks, SEDAN), remote control of equipment, or notification of important events, then digital paging for amateur radio just might be for you!

"It's likely you or your fellow club members already have most of the equipment required for digital paging. The system requires a computer (or terminal), a KPC-9612 with paging firmware, a 9600 'data ready' transceiver, an antenna, and a few numeric or alphanumeric POCSAG pagers. If you're already 9600 active, all you'll need is the version 7.0 firmware for your KPC-9612, and pagers recrystallized for 2 meters or 70 cm.

"Kantronics' firmware upgrade v7.0 for the KPC-9612 supports the transmission and reception of Radio paging Code No.1 (also known as POCSAG). This code is the defacto standard used by radio common carriers (commercial paging companies) supporting numeric and alphanumeric pagers. The upgrade supports all three paging rates—512, 1200, and 2400—and includes a packet paging server™. With the server, amateurs may connect by packet radio to the KPC-9612 directly or to the K-Net node and send a page to one of the network users or inquire about pages already sent. An addendum to the KPC-9612 manual included with the upgrade describes amateur paging and the keyboard

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and paging server commands that are now part of the KPC-9612 (add-on) firmware. Associated with the upgrade, Kantronics is offering for sale pagers that are recrystallized for 2 meters and 70 cm at \$109.95 each.

"A *Pager Handbook for the Radio Amateur*, by WØXI, with eight chapters and five appendices, includes details of transmission and reception requirements for paging, and instructions for recrystallizing pagers for the 2 meter and 70 cm amateur bands. The handbook will be available in spiral-bound format April 15th and in paperback format (perfect binding) about May 15th.

"Initially Kantronics is offering refurbished pagers crystallized for only one of two frequencies: 145.73 MHz and 446.15 MHz. As frequencies become established, Kantronics will stock crystals for these frequencies as well, and will offer a service for crystallizing and programming pagers at the factory. Please keep in mind that the low prices you see for commercial pagers also carry a monthly access fee. Amateur digital paging carries no such fee.

"Some of the 'data ready' transceivers sold today for 9600 baud packet operation are suitable paging transceivers. For example, the Alinco DR150 and DR610; the Kenwood TM-251, TM-451, and TM-733; and the ICOM IC-281 do a nice job of sending and receiving 1200 baud paging.

"Quality reception of paging signals requires a receiver with 'discriminator' audio. You'll get marginal results with typical speaker audio; the audio amplifier must be bypassed for quality paging reception.

"Careful reading of Part 97 [sections 97.3(a)(10), 97.111(b)(2), 97.305(c), and 97.307(f)(5)] makes it clear that digital paging is allowed for VHF and UHF operations. One-way transmissions are made every day by amateurs to establish communication with other amateurs, even using one mode to establish a link in another mode. Paging simply creates another way of establishing communications. The rules also state that unspecified protocols/codes may be used for communications on 50 MHz and above. Let's page!

"In summary, the KPC-9612 v7.0 firmware upgrade supports the transmission and reception of 512, 1200, and 2400 baud numeric and alphanumeric POCSAG paging, and contains a packet paging server, page directory (pairs of callsigns and pager IDs [capcode]), a paging transmission log, and optional sysop-controlled password operation. All features in v6.0 are retained.

"Version 7.0 adds nine keyboard commands: MYPAGE, PAGE, PAGECWID, PAGEDIR, PAGEMON, PAGELOG, PAGEPRIV, PAGEPSWD, and PAGETEXT. The unique features of the KPC-9612 integrated circuit modem make amateur paging possible. Discrete 'RUH modems cannot support paging. Paging firmware will not be supported in the KPC-3 or KAM Plus.

"Items for sale and their suggested retail prices follow: KPC-9612 v7.0 EPROM upgrade, \$39.95 (adds paging functions to the 9612 (release 3-25); KPC-9612 v7.0N EPROM upgrade, \$39.95 (adds paging to K-Net firmware [release 3-25]); and *Pager Handbook for the Radio Amateur*, \$14.95 (spiral bound, available about April 15th). For more details, write, fax, or e-mail Kantronics at 1202 E 23rd Street, Lawrence, KS 66046; phone 913-842-7745, fax 913-842-2031."

For this month, that's all the fun I can stand!  
73, Buck4abt@usa.pipeline.com

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# DOUG'S DESK

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

## A Minimum-Space Wire Vertical for 75/160 Meters

The February 1996 column focused on mini antennas that urban dwellers could build for use on 160 meters. That article has generated some letters and phone calls, which brought to my attention an oversight on my part when I wrote the piece. Therefore, I will address that matter at the start of this article, since the principle in question applies to this antenna as well.

Several readers duplicated the half-size, inductively loaded 160 meter dipole described in the earlier article. When they erected it and checked the SWR, they had readings as high as 6:1. I failed to mention in the article that any inductively loaded antenna, including a mobile antenna, is affected by surrounding conductive objects such as power lines, phone lines, houses with metal siding, and such. Furthermore, the antenna height and configuration (straight dipole, inverted V or sloper) affects the impedance and resonance of the system. Trimming for resonance is always necessary after the antenna is erected. This is true also for many full-size dipoles without loading coils. In other words, we can't simply wind the coils, cut the wire sections to the prescribed length, and then assume the SWR will be 1:1.

Normally, the outer wires above or beyond the loading coils must be adjusted for antenna resonance at the preferred operating frequency. There will be situations where the number of coil turns may require adjustment. Resonance is indicated when the antenna feed point is entirely resistive. This coincides with the lowest SWR obtainable, even though it may not be 1:1. A dip meter is useful for trimming a loaded antenna for resonance. The feed line is attached to the feed point, and the station end of the coaxial cable is terminated with a small two- or three-turn link. The dipper probe is inserted in the link, and the instrument is adjusted for a pronounced dip in meter reading. This indicates the resonant frequency of the system. If the frequency is too low, remove wire from the outer ends of the antenna. If it is too high, add wire to the outer conductors.

### A Short Wire Vertical

Some readers reported insufficient space for the reduced-size antennas described

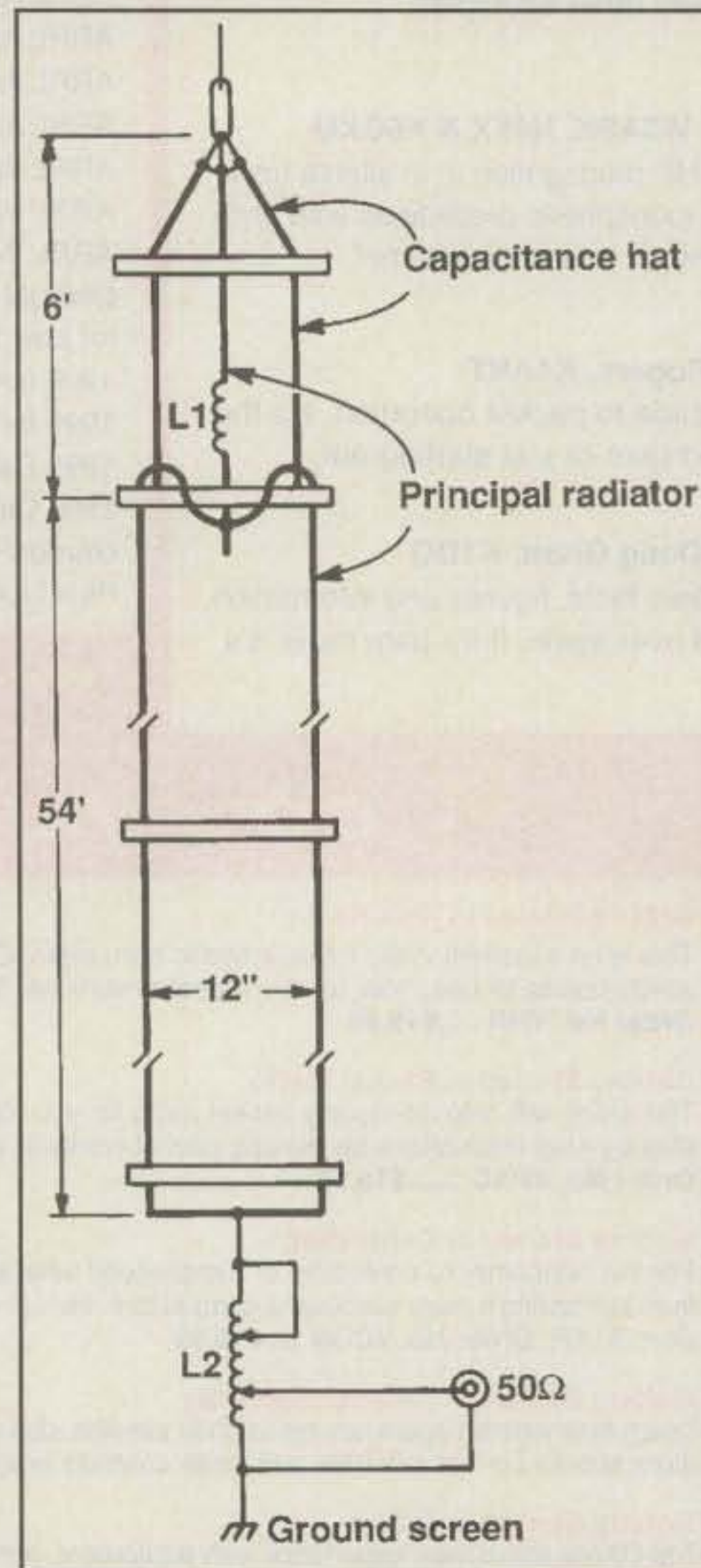


Fig. 1— Conceptual illustration of a half-size, inductively loaded wire vertical for 160 meters.

in my February column. I have always maintained "If you can't go out with your antenna, go up." Vertical antennas have been a practical option for some "cliff dwellers" since the beginnings of radio. Vertical antennas are the salvation of a vast number of amateurs today.

A quality, rugged, commercial vertical antenna can be expensive. However, a homemade vertical that uses wire can be inexpensive and effective. This month I will describe such a radiator.

Fig. 1 shows a basic design for a half-size, 60 foot, two-wire vertical antenna for 1.8 MHz. It can be sloped from a tree, tower, or mast. The second wire increases the bandwidth of the antenna. A top-loading inductor, L1, is used to provide

system resonance. L2, at the antenna feed point, is used for fine adjustment of resonance, while providing an impedance match to 50 or 75 ohm coaxial cable. The taps on L2 are chosen experimentally to obtain resonance at the desired operating frequency and to provide an SWR of 1:1. The top section of wire, which is insulated from the principal lower conductors, functions as a capacitance hat to minimize the amount of inductance required for L1. This increases the antenna efficiency.

As is the situation with any quarter-wave antenna, a ground screen is needed to minimize losses. A group of 60 foot on-ground or buried radial wires (16 to 32 of them) will provide acceptable performance for DXing and local communications.<sup>1</sup> Longer and more numerous radials will improve the performance somewhat. Those who lack the space for radials can use a 120 foot counterpoise wire for the ground system. However, the antenna may not perform as well as when radials are used. It is important to recognize that one or more copper rods driven into the earth at the feed point will not work like a true ground screen. At best, ground rods serve only as a DC ground while providing a reference point of sorts for the grounded conductor of the feed line, L2 and L3 of fig. 2. Antenna efficiency will be extremely poor if only ground rods are used.

### A Practical, Two-Band Wire Vertical

If you like to operate on 75 and 160 meters but have limited antenna space, you may wish to construct the system in fig. 2. L1 and L2 provide resonance and impedance matching on 160 meters. L3 performs that function on 75 or 80 meters. A top-loading coil is not required for 75 meter use. An extra set of wires has been added to the fig. 1 example for use on 75 meters. The overall length of these wires is less than  $\frac{1}{4}$  wavelength in order to establish resonance by means of L3.

Remote band switching is accomplished by K1. This relay and coils L2 and L3 are contained in a weatherproof box at the antenna feed point. Manual band changing can be done with a ceramic rotary switch that will accommodate the RF current and voltage present at the antenna feed point.

K1 is "floated" at RF by mounting it on

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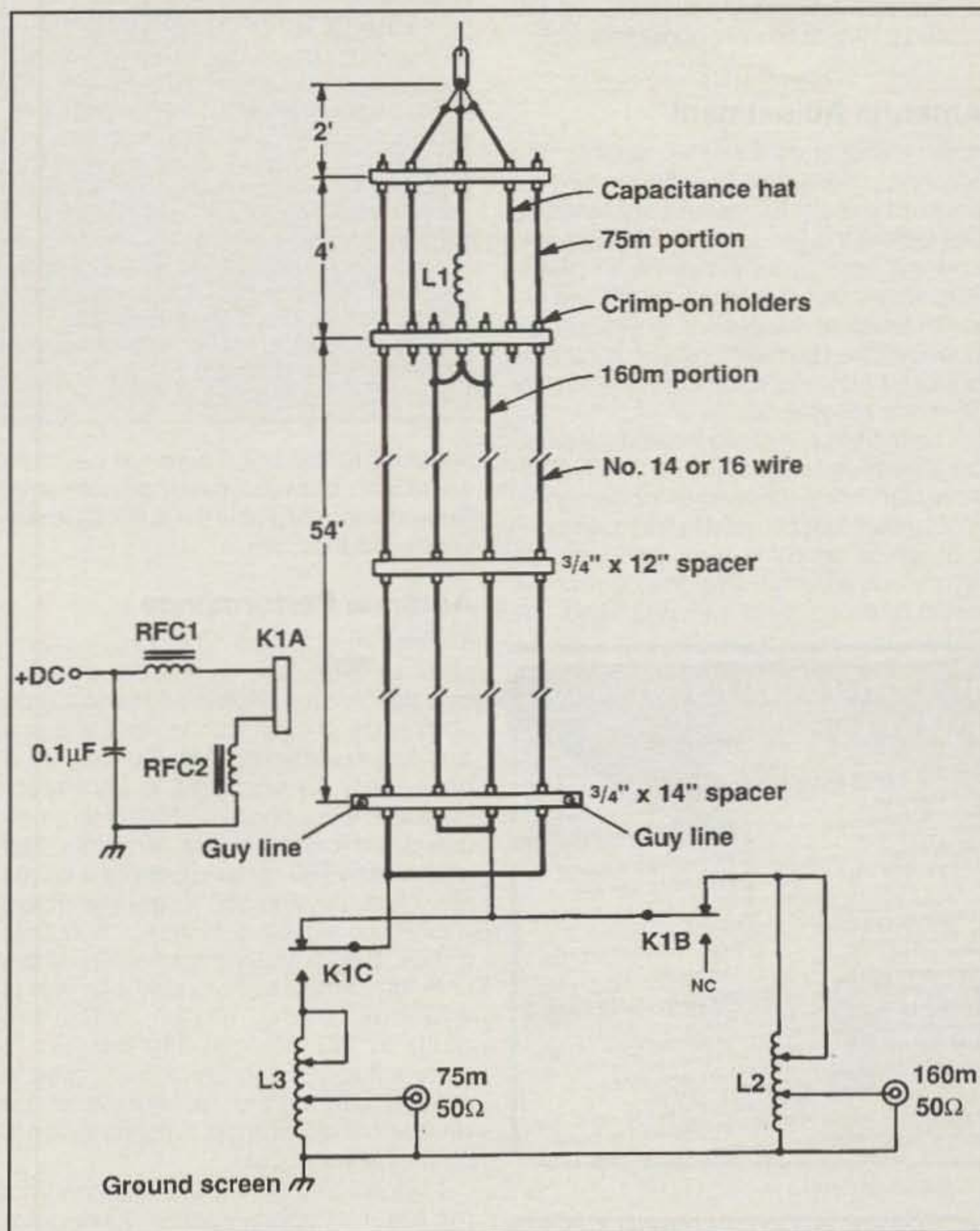


Fig. 2—Diagram of a two-band wire vertical for use on 75 and 160 meters. L1 is an 80  $\mu$ H inductor with 4 inches of close-wound No. 14 enamel wire on a 2 inch OD form such as high-impact polystyrene tubing (see footnote 2).  $Q_u = 110$ . L2 is a 36  $\mu$ H inductor. Use 42 close-wound turns of No. 14 enamel wire on a 2 inch OD coil form (same material as L1). Tap at approximately 8 turns above the grounded end (see text). L3 has 20 turns of No. 14 enamel wire on a 2 inch OD form. Tap at approximately 3 turns above ground. K1 is a two-pole, double-throw, 12 or 24 VDC relay with 4 ampere or greater contacts. RFC1 and RFC2 have 16 turns of No. 26 enamel wire on Amidon Assoc. FT-37-43 ferrite toroid cores.

insulating material, such as Plexiglass. The K1 field coil is RF-isolated from the control wires to help keep the entire relay above RF ground. These measures prevent arcing between the relay and ground. The RF chokes and bypass capacitor prevent unwanted RF energy from entering the station via the control wires. If a rotary switch is used for band changing, it should also be kept above RF ground.

### Construction Tips

If you are interested in minimizing the cost of your wire vertical, you can use bamboo

for the spreaders. The bamboo sections should be treated with two coatings of marine spar varnish or exterior polyurethane varnish to prevent undue weathering and moisture absorption. An excellent lightweight spreader material is 3/4 inch OD high-impact polystyrene tubing. I have purchased this material from an Ohio plastics dealer.<sup>2</sup> PVC tubing may be used at the expense of creating a relatively heavy antenna. Wooden dowel rod, boiled in canning wax, is another option to consider.

Stranded No. 14 copperweld antenna wire will ensure the longevity of the anten-

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June 1996 • CQ • 73

na, but ordinary No. 14 stranded copper wire is less costly. I have used vinyl-covered, stranded No. 18 speaker wire. It is a simple task to separate the twin conductors to obtain twice as much antenna wire. This lowers the cost. Furthermore, the vinyl covering strengthens the antenna and prevents the conductors from corroding in the presence of air-borne pollutants.

The spreaders may be locked in place by crimping 1/4 inch pieces of copper or brass tubing on the wires, immediately above and below each spreader. Crimp-on electrical splicers or thin-wall metal spacers work nicely, too. This crimping technique is useful also when you make your own open-wire feeders.

The antenna can be stabilized after erection by driving two stakes in the ground, left and right of the bottom spreader, and guying that spreader to the stakes with nylon cord. This will prevent

unwanted twisting and possible short-circuiting of the antenna conductors.

## Antenna Adjustment

A dip meter is useful when establishing antenna resonance. The dipper may be coupled directly to the loading/matching coil before the feed line is attached to it, and with the ground system in place. Adjust the coil turns until a significant dip is observed at the desired operating frequency. The 160 meter section should be adjusted first. Repeat this procedure for 75 meter resonance.

The next step is to tap the coaxial cable on the matching coil. An MFJ SWR Analyzer, noise bridge, or conventional SWR meter may be used to find a tap point that yields an SWR of 1. Recheck the antenna resonance after the correct tap point is found, and with the feed line

## January Column Corrections

The W1FB 25 watt solid-state linear amplifier article in the January 1996 issue of *CQ* has a part number error. T1 requires an Amidon BLN-202-43 balun core rather than the BLN-2402-43 listed. The latter core is too small for the wire size specified. In addition, there is an error in the parts-placement overlay drawing on page 61. R2 and R3 are shown correctly in fig. 1, but are not grounded when connected as shown in the parts-placement drawing of fig. 4. R2 and R3 can be routed to circuit ground by rotating them 180 degrees on the PC board.

attached to the coil. There will be some interaction between these adjustments. Repeat each step until the antenna is resonant and the SWR is 1:1.

## Antenna Performance

It is important to understand that no compromise antenna is as efficient as a full-size counterpart. However, the low radiation angle of even a short vertical over a quality ground screen provides plenty of opportunity for working DX. My experience with this antenna on 160 meters indicated that it was a better performer than my full-size 160 meter dipole at a height of 60 feet, beyond 500 miles. The dipole was more effective within a 500 mile radius. The 75 meter performance of this antenna compares favorably with that of a full-size vertical. The 2:1 SWR bandwidth on 160 meters is 110 kHz. On 75 meters it is 250 kHz. An inferior ground system can create an illusion of far greater bandwidth, but antenna efficiency will be very poor.

I sloped this dual-band antenna from my tower at approximately 30 degrees when the tests were made. Slope angles up to 45 degrees are satisfactory. Maximum directivity occurs in the direction of the slope if a metal structure is used to support the antenna. Radiation off the back side of the tower was down by roughly 3 dB when I made my field-strength measurements.

This antenna concept can be applied for multiband operation from 7 MHz and higher when space is limited. An additional wire may be added to the antenna in fig. 2 to permit 40 meter operation. This modification would complicate the band-switching circuit, however. A second relay would be required for three-band operation.

## Footnotes

1. Brown, Lewis, and Epstein, "Ground Systems as a Factor in Antenna Efficiency," *IRE Proceedings*, Vol. 25, No. 6, June 1937.

2. United States Plastic Corp., 1390 Neubrecht Rd., Lima, OH 45801 (419-228-2242).

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<p><b>LINEAR AMPLIFIERS</b></p> <p><b>HF Amplifiers</b> PC board and complete parts list for HF amplifiers described in the Motorola Application Notes and Engineering Bulletins:</p> <table style="width: 100%;"> <tr><td>AN779H (20W)</td><td>AN 758 (300W)</td></tr> <tr><td>AN779L (20W)</td><td>AR313 (300W)</td></tr> <tr><td>AN 762 (140W)</td><td>EB27A (300W)</td></tr> <tr><td>EB63 (140W)</td><td>EB104 (600W)</td></tr> <tr><td>AR305 (300W)</td><td>AR347 (1000W)</td></tr> </table> <p><b>2 Meter Amplifiers</b> (144-148 MHz) (Kit or Wired and Tested)</p> <p>35W - Model 335A, \$79.95/\$109.95 75W - Model 875A, \$119.95/\$159.95</p> <p><b>440-450 MHz Amplifiers</b> (SSB-FM-ATU) 100W - Model KEB 67, \$159.95</p>	AN779H (20W)	AN 758 (300W)	AN779L (20W)	AR313 (300W)	AN 762 (140W)	EB27A (300W)	EB63 (140W)	EB104 (600W)	AR305 (300W)	AR347 (1000W)	<p><b>HARD TO FIND PARTS</b></p> <ul style="list-style-type: none"> <li>• RF Power Transistors</li> <li>• Broadband HF Transformers</li> <li>• Chip Caps - Kemet/ATC</li> <li>• Metalclad Mica Caps - Unelco/Semco</li> <li>• ARCO/SPRAGUE Trimmer Capacitors</li> </ul> <p>We can get you virtually any RF transistor! Call us for "strange" hard to find parts!</p> <p><b>DIGITAL FREQUENCY READOUT</b> For older analog transceivers TK-1 (Wired and Tested) \$149.95</p>	<p><b>ATU Down Converters</b> (Kit or Wired and Tested)</p> <p>Model ATV-3 (420-450) (Ga AS - FET) \$49.95/\$69.95 Model ATV-4 (902-926) (GaAS - FET) \$59.95/\$79.95</p>
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# VHF PLUS

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## "It was a Dark and Stormy Night. . . ."

**W**e ne'er-do-well writers love to emulate the "Peanuts" character Snoopy, following his example as he attempts to write "The Great American Novel." Snoopy faithfully begins his efforts with the headline of this month's column. Those of us who want to follow Snoopy's lead long for the day when we can use that opening phrase. With this month's column I get my chance to do so.

It really was "a dark and stormy night" on Saturday, 13 April in Mooreland, Oklahoma. It was just after the weather spotter seminar, which was part of the Mooreland Hamfest. A group of amateurs had talked about launching a balloon, but noting the signs in the weather earlier in the evening, they had just about talked themselves out of doing so. Even so, there was one among them who had driven all the way up from Dallas, Texas (your crazy editor, driving over 350 miles) to witness the launch and to be a part of the chase. So as not to disappoint this guy, they began reconsidering their previous negative decision.

As encouragement, I told them about all the publicity they would receive in my column, to which one of the participants responded, "I didn't know that you were still doing that." So much for my loyal readership!

Nevertheless, as if to eke them along toward a positive decision, the wind started to decrease. Slowly the group began to change its mind. A call was placed to the National Weather Service. The caller found out that the ominous storm would possibly turn north and not pass directly overhead. With that information in hand, a decision was made to launch.

One bit of information that we had learned in the weather seminar is how the wind works in a storm. With the storm seeming to move away from our location, the wind seemed to travel in the direction of the departing storm. This one factor would weigh heavily in tracking the balloon after its launch.

This evening's launch would be the 11th in the Reach for Space program sponsored by Jerome, K5IS, and Bobette, N5UDJ, Doerrie. It would be a cooperative venture with faculty and students from Mooreland High School, and faculty from Perryton, Texas, High School, along with members of the Northwest Oklahoma Amateur Radio Club participating. What would be unique about this launch was that it would be their first at night. Because of this, one feature would be added to the payload—a RadioShack portable strobe light. RadioShack advertises that the light is visible upwards of one mile away. This night would prove that claim, and then some.

After the decision to launch was made, preparations intensified. A final check of the 2 meter beacon part of the payload was made.

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### VHF PLUS CALENDAR

June 1	First Full Moon.
June 2	Very Poor EME conditions.
June 7	<i>Arietids</i> Meteor Shower predicted peak.
June 8	Last quarter moon.
June 8-10	ARRL VHF QSO Party
June 9	Good EME conditions. <i>Zeta Perseids</i> Meteor Shower predicted peak.
June 15-16	SMIRK 6-Meter Contest.
June 16	Highest Moon declination and New Moon. Very poor EME conditions.
June 18	CY0AA startup date (see text for details).
June 20	Moon Apogee.
June 22-23	ARRL Field Day.
June 23	Moderate EME conditions.
June 24	First quarter Moon.
June 28	<i>Delta Aquarids S</i> Meteor Shower predicted peak.
June 29	<i>Beta Taurids</i> Meteor Shower predicted peak.
June 30	Lowest Moon declination and second Full Moon.

\*EME conditions courtesy W5LUU.

It was then switched on and the Styrofoam box housing was taped shut around it. Then the string that would be attached to the balloon was affixed to the Styrofoam.

Next the beacon light was located. At first it didn't want to work, but a bit of jiggling and bending of contacts brought it to life. It was then attached to the string.

Next the balloon was to be filled with helium. All went well for most of the filling. However, just before the balloon was fully inflated, the wind caught it and spun it around in the hands of the one who was holding it. In so doing, it pinched off the in-flow of the helium right at the nozzle. With the helium continuing to flow, that part of the nozzle rapidly inflated until it burst, causing some momentary deafness for those nearby and some anxiousness for everyone else. The remainder of the nozzle was inspected and it was determined that enough of the base was left in order to attach the payload. Therefore, the inflation continued.

When the balloon was fully inflated, the payload was attached. After a look at everything and a check of the receivers for the beacon signal, the balloon was released at 9:14 PM.

Following the strobe light was fairly easy. It did live up to its advertisement. With the beacon light in sight, the first team took off after it in the direction of the storm. The higher the balloon rose, the more quickly it seemed to get to the storm. In just a few minutes the balloon was into the clouds. The strobe was visible for only a short time after entering the clouds. It was then up to the radios to follow the signal.

The transmitter was very simple—a 48 MHz clock running on its third harmonic (producing about 3 milliwatts output power), an NE 555 timer, and a thermistor. With the increase in altitude would come a lowering in temperature. This would increase the thermistor's resistance, which would change the voltage on the timer, which would affect the pulse duration coming from the timer, which would pulse the clock. This arrangement would cause the sig-

nal, which was a chirping downward-shifting tone, to take longer as it cycled through its downward shift. It was a crude altimeter, but it worked satisfactorily for the purpose of this night launch.

As predicted, the clock-timer-thermistor combination did its job. As the balloon rose, the tone became longer and the frequency shift became slower.

When we had everything at the launch site secured and packed away in Jerome's car, we took off in the reported direction of the travel of the balloon. We were headed for Freedom, Oklahoma. When we got there, we would check with the other teams that had gone on before us. As we drove, we noticed a great deal of sky lightning in the direction we were headed. Occasionally, one of the lightning bolts made it to the ground. We weren't particularly alarmed about the lightning, because we had been told earlier in the weather seminar a safe place to be located, and we were well away from the storm.

As I stated earlier, the balloon was headed toward the storm. As we drove, I listened to the signal on my IC-706. As expected, the tone kept getting longer. Suddenly, the tone became very short, just as it was before the launch. Then there was one more similar cycle, but with a weaker tone. And then, silence.

Just outside the town of Freedom we pulled off the road. From there we started comparing notes, both among ourselves and with the other trackers north of Freedom. We found that we all had lost the signal at the same time. Two theories emerged as to why the signal was lost. The first theory was that the balloon was either hit by lightning or a static charge built up around the balloon, causing the electronics to fail. The second theory, the one to which I subscribe, was that the balloon got caught in a microburst of downward wind and was slammed out of the sky into the ground. I support the latter theory, because of my observation of how the signal quit. With the evidence

being a long tone being followed by two short tones, with the second tone being weaker, and then silence, I surmised that the balloon had rapidly lost altitude, which would explain the downward microburst of wind.

These microbursts of air are dreaded by pilots. It is just such a wind sheer that took down a plane at the Dallas-Ft. Worth airport a few years ago, with the cost of several dozen lives. The work of meteorologists and others is helping those in the aviation industry understand more about wind sheer and how to avoid flying into it.

Even though we amateur radio operators pretty much had determined that the flight was over, we still did not completely give up the hunt. Our convoy drove to a nearby mountain, where we were met by a sheriff's deputy who wondered if we had seen any fires started by the lightning. We replied in the negative. However, with that bit of news added to our information, we decided to call it a night—a "dark and stormy night"—with a mysterious ending.

In spite of it being a mysterious "dark and stormy night," it was educational and fun. On the education side, we saw some practical application of the information we had received from the weather seminar. On the fun side, we enjoyed the chase, although it ended nowhere.

Among those who participated in the balloon launch were Dustin, KC5HGZ; Delmar Bish, KC5HHB; Mike, KC5HHC; Jerome Doerrie, K5IS; Debbie White, N5LPF; Dave White, WN5LUI; DeWayne Henderson, KC5NID; Clay Wyatt, KC5NZB; Bart Lawson, NZ5T; Bobette Doerrie, N5UDJ; Joel, KK5XS; Gerald Bowman, WG5Z; and Bill Wyatt, KØSJR.

## Launching Your Own Balloon

What if your organization is interested in ballooning? How would you go about putting together the necessary information and finding the resources? Jerome and Bobette Doerrie have written an excellent introductory article which was published in the *Proceedings of the ARRL 1995 National Educational Workshop*, which was held on July 28, 1995 at the Manchester, New Hampshire hamfest. Copies of the *Proceedings* may be purchased from the ARRL for \$12.00 plus shipping. With the permission of Jerome and Bobette and with our thanks, following are some excerpts from their article, "Ballooning 101."

"Weather balloon launches can be a real addition to your hands-on activities at any level. At high school, we use the launches in a variety of ways. In chemistry, they are a real example of gas laws in action, density differences and calculations of lift. The changes in volume with different pressures and temperatures encountered as the balloon rises to the edge of space can make these ordinary calculations have practical applications. In physics, the launches lend themselves to 'design challenges' that require students to design and build parts of the payload. Students also learn engineering, problem-solving skills, and cooperative group interactions. Weather studies are a natural application, as the students watch the balloon rise into different air currents and change direction and speed. Direction finding and tracking show the strange effects of height and terrain on radio signals and computer applications allow us to predict landing location.

"Why do you want to fly a weather balloon? Is this to be a one time project, or one in a series of projects? Will this be used to hold a wire antenna aloft for a contest? Maybe the purpose is for remote imaging such as carrying a camera aloft, taking pictures, then reeling the package back to ground level. Careful statement of the goals for the project helps to keep the participants focused upon the activities needed for a successful flight.

"It is better to do two or three small flights with simple payloads rather than start out with a bigger balloon and more complex payload; the time needed to prepare payload items quickly slips away and all will not be ready by flight time. Also, if for some reason the payload is not rapidly recovered, it will be much easier to sleep that night if it is an inexpensive payload that is lost. Simple and successful is better than complex and frustrating!

"As a part of the process in preparing for a launch, contact should be made with the FAA center for your area. Ask about Part 101, subchapter F, Air Traffic and General Operating Rules, of Title 14 of the Code of Federal Regulations. Basically, payloads up to four pounds are exempt from regulatory control. One can go up to six pounds by careful choice of package size. Since the balloon may travel through "controlled" air space, the nearest air traffic controller would appreciate being warned of your proposed balloon flight. Ground-controlled cut-down devices and more paper work are involved if the payload weighs more than six pounds. The regulations call for using string that has a 50 pound or less tensile strength.

"Buying surplus balloons may be a false

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*Not shown: G-800S, G-800SDX, G-1000SDX.*

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economy. The Kaysam balloon has an initial thickness of 0.0035 inch. At burst altitude, it will be approximately 0.0001 inch. This is extremely fragile material. If the age of the balloon is past the date code, the surface material may have lost 'elasticity,' and it can burst whenever or wherever it chooses. It is much better to work with 'fresh' balloons. Be careful to avoid directly touching the balloon with bare skin, because the body oil from the skin attacks the balloon material. Soft brown cotton work gloves or surgical gloves are a good choice to wear while working with the balloon. Balloons come in a variety of sizes, starting with as little as 30 grams up to huge ones that require 12 bottles of helium to fill.

"The common size for helium containers, called bottles, is a volume of 200 to 220 cubic feet. It is wise to have a backup supply of helium on hand; things happen, and you suddenly have a great desire to try filling a second balloon! A backup for everything would be great. Anything that can go wrong sooner or later will happen to challenge the launch team. The small 100 gram balloon takes a 3/8 inch diameter fill hose and needs 40 to 50 cubic feet of helium. This balloon will look like a large beach ball about 40 inches in diameter. A 1200 gram balloon will take on an elongated shape with a 4 to 6 foot diameter.

"If the payload package needs to be waterproof, we use a plastic food container; otherwise, we use a cardboard mailing box that has the fold-around front and tabs that insert into the sides. Inside the container, a Styrofoam block is cut out so that each item has its own space and is shielded by Styrofoam on all

sides. Power leads for each subsystem are brought outside and polarized plugs are used instead of switches. Switches have a habit of accidentally becoming 'on' or 'off' at the wrong times, while plugs have to be physically handled, and from a distance we can see if the plugs are disconnected.

"The strings are a different consideration. The lines for attaching the payload are made of #18 multi-strand nylon string. Knobs on chair backs make a convenient spot to hold loops, but people work fine. Leave a large loop on the end to be attached to the balloon, and make an overhand knot near each end. Separate the balloon from the parachute by a distance that is longer than that of parachute to the payload. We use 6-8 feet as a standard distance. Tie one end of the string bundle to a swivel that is attached to the top of the parachute by passing it through the eye of the swivel as the loop is made. The other end will be attached to the neck of the balloon. Hot glue all knots.

"All our antennas are now vertically polarized wire dipoles, since we experienced deep fading signals from the rotation of the packages using antennas with horizontal polarization. We decided that a soldering pencil produces too many fumes when melting holes in the plastic, so an ice pick is used to punch holes in the sides of the containers and wires are passed through them. The dipole antenna wire is then taped to the strings that connect parachute to payload and payload to radar reflector. The radar reflector is a 12 to 15 foot long piece of aluminum foil, with duct tape around the edges, taped on top to the cardboard tube, which the string passes through.

A pulsating audio beeper is included in the package. Reward information cards are placed on the inside and on the outside of the container.

"Every place that a wire goes through a side is dabbed with hot melt glue, and all string knots are also glued. Cardboard boxes have all corner surfaces duct taped, and everything is coated with clear acrylic spray. It takes a lot of time to do all of this, so do not wait until the night before and expect to get it all done!

"One method of controlled launch is to use two tethers; it takes a crew of four people to hold the ends. Take an 18 inch length of cord with a metal ring (like those found on key chains) on each end, then tie this string tightly around the neck of the balloon. The metal rings can be used as a handle, or tether lines can be passed through the rings. After a string is passed through the ring, a person holds onto each end of the string. One person then lets out more string to let the balloon rise higher. The two people who let out the string need to release at the same rate. When sufficient height is reached, the ones holding the first end will let go of their ends to release the balloon, while the second pair hold on. This string slips through the loops and falls to the ground.

"If it is windy, and you don't use a tethered launch, assign a person to each part of the payload string. Be sure the balloon is the first item upwind, then the parachute, then the payload box, then the radar reflector. With the wind to their backs, and on command, the release is begun. The balloon is released, and to prevent jerking the components, each person should be moving downwind as they release their part of the items to be launched. The ideal is to have

# turn your head!

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a smooth release, with no jerks. This is easier said than done, and it is not so easily said! Jerking has caused cameras to shift and take pictures of the inside of the package, and caused beacons to fail. *Caution:* Keep everything far away from electric power lines.

"As the payload is carried higher and higher into the atmosphere, it will encounter an increasingly hostile environment. The temperature can range from +50 to -50 degrees Celsius. The surfaces that are in sunlight can become very hot, and the other surfaces can become very cold. Heat distribution in the payload can be a problem area. For more heat, a toe warmer packet can be included next to the sensitive area. The problem with this is that you have to open and quickly close the package right before launch in order to activate the warmer packet. Another useful idea is to fly a hot, plastic-wrapped baked potato.

"With altitude, the atmospheric pressure decreases. Above 100,000 feet the pressure range will be approaching zero. Will the components be able to withstand this stress? Then what happens when pressure is again applied? At differing altitudes, the humidity levels may cause condensation to the extent that everything becomes soaking wet! Will the batteries provide a constant current and voltage? *Warning:* Most batteries will freeze and drop to zero output. There is a lithium battery that is about the size of a D cell that is rated as 3 volts at 7.5 amp/hour.

"Everything works against the payload designer. Transmitter power means more battery weight. Adding another frequency means more weight. It is not as bad as it sounds,

because low levels of transmitter power produce really strong signals. In fact, two watts on 2 meters is way too much power, as the signals overload the tracking antenna and appear to come from every direction! Three-hundred milliwatts is a good high power that will give some distance when at ground level. Experiments with the 28.322 MHz clock oscillator unit show that the 40 milliwatt signal on 10 meters is strong, and the 5th harmonic on 141.610 MHz can readily be copied on a handheld with a rubber-duck antenna. By using an NE 555 timer circuit with a thermistor temperature detector, it is possible to have an inexpensive payload.

"Will the components survive the shock of returning to the ground and possibly being dragged along by the parachute and the wind? It is a great thrill (and relief) to have your payload meet all these challenges successfully!

"Parachutes are made of a rip-stop nylon, which costs about \$5.00 a yard; the most visible fabrics are 'wild yellow' and 'incredible orange.' A yard can make a number of small parachutes for payloads of 4 pounds or under."

## National Balloon Symposium

If you are intrigued with launching and chasing balloons, you might be interested in attending the National Balloon Symposium, which is scheduled for 19-21 July in Ames, Iowa. Sponsored by the Iowa Space Grant Consortium, and Chaired by Ralph Wallio, WØRPK, the symposium will feature both professional and amateur balloon launch seminars. The purpose of the symposium is to encourage the exchange of ideas related to

this activity. According to the brochure, there will be ample time provided for the demonstration of hardware.

The registration fee is \$30 prior to 1 July. After that date it is \$35. As with any conference, there are extra-curricular activities planned. There are plenty of hotels available in the Ames area. For more info, you can e-mail Ralph at wallio@dsmnet.com, or send a packet message to WØRPK@WØAK.IA. Home page is <http://www.public.iastate.edu/~isgc>. You can also call the Space Grant consortium's toll-free telephone number, which is 800-854-1667.

## CYØAA Operation

The following is a press release issued 6 April by the gang running the CYØAA operation.

"The expedition continues to evolve. We have decided to try a two-pronged attack on Sable Island. Our plans will allow us to lengthen the window of operation on the island to 15 days from the original 7 days. We have had to commit about \$2000 additional, but feel the time and effort will be well worth the costs involved.

"Mike, VE9AA, will be the early arrival on the island. The CYØAA operation should begin on June 18th. Operations will be updated daily by communications with W9OEH and WA8JOC. We feel very strongly that any shortcomings or oversights can be corrected before the second 'wave' arrives about five days later. The second group of two operators will then begin additional activity for an additional seven to eight days. Three stations will be on the air from that point to July 2nd.

"We have promised our sponsors—the North California DX Foundation, the UK Six Meter Group, the Six Meter International Radio Club (SMIRK), ICOM North America, Cushcraft, Oklahoma Comm Center, WJ2O QSL's, Heil Sound, EQF Logging Software, and a core of the amateur radio community who sent in donations/equipment—a first-class operation.

"The total operation should last from about June 18th through July 2nd. The band plans still cover 160–2 meters. Look for us around the clock on many modes. Primarily, we'll use as much short path as we can, using long path when it may be needed to get to otherwise unattainable locations around the earth.

"QSLs for 160–10 meters will go to WD8SDL; for any 6/2 meter QSOs, cards should be sent to VE9AA. We ask that all cards go direct, with SASE required. Bureau cards will be handled, but at a lower priority, and will most probably be of a lesser quality than direct QSLs. Turn-around time for bureau cards will try to be kept under a year. We will do our utmost to turn direct cards in a matter of one to two weeks. Please keep in mind that QSLs will not be printed until after we arrive back at our homes. It could be a month or so after the operation is completed before we have any QSLs to send out. We ask also that *no duplicate* QSLs be resubmitted until 6 months after the original submission by stations wanting confirmations. Multi QSO labels will be used, and no duplicate QSOs will be verified via the bureau. This will cut down on the cost to our QSL sponsor, WJ2O QSL's, in all fairness to his generosity.

"We certainly expect duplicate QSOs on

some frequencies, but please keep them to a minimum. We will try to confirm all calls before the end of a QSO, so you know if you're in the log on that band/mode.

"We will be run on no lists, so you know where *not* to look for us. We will try to use standard splits for pile-ups, but the ultimate decision is that of the operator. We will try to conserve frequency spectrum space, and will try to work pile-ups on one frequency first. If the operator feels this is unproductive, then split frequency will be used. *Please listen* for instructions given by the operator.

"In order to conserve the time between transmissions, please keep from signing your call more than once or twice. Use your *complete call* only. This keeps us from having to go back all the time to reconfirm the complete call with the station just worked.

"We will be glad to answer questions or concerns via the address, or e-mail routings. We'll keep you informed of any substantive changes as they occur. Thanks to all for your financial, material, and spiritual support to this point!

"Mike advised me of the following: Expenses are *more* than we first anticipated, with a surcharge for electricity, landing fee, labor, 14% tax on everything. We are way over budget. All of us have doubled our input, with each investing several thousand dollars already. Preliminary studies indicate we are going to be in the hole in the \$12–13,000 range when all is over with. We are still in need of two or three HF amps, plus one 6 meter amp. Any help would be appreciated, and no contribution is too small. Every bit helps! Contributions can be

sent to: Mike Smith, VE9AA, 131 Smith, Geary, NB, E2V 2G3, Canada (or e-mail to: wynder@brunswickmicro.nb.ca or home page: <http://www.cam.org/~dino/sable.html>).

## Current Contests

**ARRL June VHF QSO Party:** The dates for this contest are 8–10 June. Complete rules are in the May issue of *QST*. *Note:* I received a number of announcements for DXpeditions and rare grid operations for this contest. Among them are at least three separate operations (WA4VCC, WZ8D, and possibly N4JQQ) from the Bahamas. For info check the VHF reflector (vhf@w6yx.stanford.edu) on the Internet.

**SMIRK Contest:** The SMIRK QSO Party, sponsored by the Six Meter International Radio Klub, will be held from 0000Z June 15 to 2400Z June 16 (48 hours). This is a 6 meter operation, and all contacts between the 48 contiguous states must be made above 50.125 MHz. Exchange callsign, SMIRK number, and grid square. No crossband or partial contacts allowed. Score 2 points for each contact with a SMIRK member and 1 point for each contact with a non-SMIRK member. Your final score is the total number of points multiplied by the total number of grid squares worked.

Certificates will be issued to the high scorer in each state, province, or foreign geographical division. Non-SMIRK members will receive awards if no entry is received from a SMIRK member in their geographical division.

*Note:* We have deleted the requirement to be a paid-up member to receive an award. If

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Ripple(max.)	3mV	3mV	3mV	3mV	3mV
Regulation	1%	1%	1%	1%	2%
Cooling Fan	NO	NO	NO	YES	NO
Size(inch.)	5x4x9	5x4x9	7x6x9	11x5.5x9	6x3x9
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MH-PB-18 - <b>1200mah</b> 6v	(*Same size as CNB-151!)
MH-PB-32 - <b>900mah</b> 6v	Yaesu
MH-PB-33 - <b>1200mah</b> 6v	MH-FNB-12 - <b>900mah</b> 12v
MH-PB-34 - <b>900mah</b> 9.6v	MH-FNB-27 - <b>900mah</b> 12v
ICom	MH-FNB-38 - <b>650mah</b> 9.6v
MH-BP-7 - <b>900mah</b> 13.8v	MH-FNB-41 - <b>900mah</b> 9.6v
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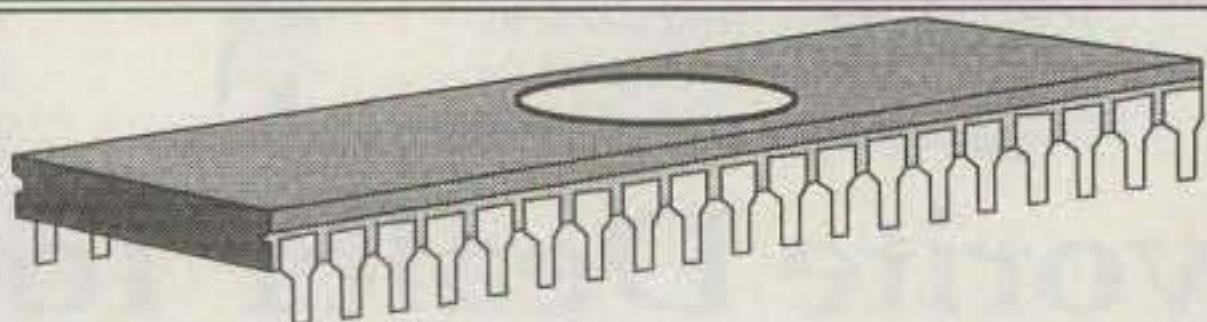
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we insisted on that, there wouldn't be many awards—hi. Besides, the idea is to have a fun contest and encourage everyone to participate and try for an award.

Please send a legal-size SASE for a copy of the log forms. Log requests and logs (post-marked no later than July 17) should be sent to Pat Rose, W5OZI, P.O. Box 393, Junction, TX 76849-0393.

**Field Day:** The ARRL classic, Field Day, will be held on 22-23 June. Rules for this contest can also be found in *QST*. In years past tremendous European openings have occurred on 6 meters during this one.**Current Conferences**

Ham-Com is scheduled for the same weekend as the ARRL VHF QSO Party. Nevertheless, some of the guys from the North Texas Microwave Society will hold their traditional forums during the convention.

For more information, contact Ham-Com, Inc., 6208 Preston Road, Dallas, TX 75205-1655, or call 214-522-5003 (fax 214-521-0016). A number of hotels within easy driving distance are priced between \$30 (Motel 6) and \$110.00 (Marriott) per night.

**Current Meteor Showers**Between 3 and 11 June the *Arietids* Meteor Shower will once again be evident. This is a daytime shower with the peak predicted to occur around 0300 UTC on 7 June. Activity from this shower will be evident for around eight days, centered around the peak. At its peak, you can expect around 60 meteors per hour traveling at a velocity of around 37 km/sec. (23 miles per second).On 9 June the *Zeta Perseids* is expected to peak. At its maximum, it produces around 40 meteors per hour. On 28 June the *Delta Aquarids S* shower is expected to peak.On 29 June the *Beta Taurids* is expected to peak. Because it is a daytime shower, not much is known about the stream of activity. However, according to the book *Meteors* by Neil Bone, this and the *Arietids* are two of the more active *radio* showers of the year. Peak activity for this shower seems to favor a north-south path.**And Finally . . .**

This month is a very busy one, as there are lots of contests and lots of other VHF-related activity. It is a time, however, that can become too busy. For example, with three contests it is probably best that you choose one in which you will plan to do your best. The others you can just play.

If you plan on being on the road, please be careful when you are driving. It is easy to become distracted. It is also easy to become tired. There is a slogan going around my state, one initiated by the governor. It takes from the Don't Drive Drunk theme, but adds its own twist: Don't Drive Drowsy. It's a good idea, unless you want me to report on you becoming a Silent Key.

If you have any other news, please let me hear from you. You know all the sources (see the beginning of this column). As always, I look forward to your reports.

Until next month . . .

73, Joe, N6CL



# The Latest From AOR Products



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**Auto Mode tuning:** Comprehensive band plan has been pre-programmed to simplify the operation. The AR 2700 will automatically select the appropriate mode and channel step.

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**Memory Capacity:** 500 channels total, 10 banks x 50 channels, and 10 search banks.

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Unlike some of the European devices sold today, this unit is smaller, lighter, and makes no power demands on your receiver.

With the extra shielding and smaller size there is less chance of additional interference leaking into your radio.



AR8000 shocks the market. AOR made every effort to incorporate the latest technology in to this new scanner.

## • SPECIFICATIONS •

- Range: .5 - 1900MHz
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- Sensitivity( $\mu$ V): as low as 0.35uV
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.5 - 1900MHz\*



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## NEWS OF COMMUNICATION AROUND THE WORLD

## DXCC 2000

**A**t the ARRL Board of Directors meeting in January the board voted to assign a committee to "review the entire DXCC program and make necessary recommendations in order to encourage broader participation by more amateurs, make the program more equitable, create better understood criteria for DXCC 'countries,' improve the process of reviewing requests for additions and deletions to the ARRL DXCC List, and increase efficiency in the administration of the program." ARRL President Rod Stafford, KB6ZV, has appointed N4MM to chair the committee. Other committee members appointed by President Stafford are: Larry Price, W4RA; Rick Roderick, K5UR; Jim Maxwell, W6CF; Walt Stinson, W0CP; Garth Hamilton, VE3HO; Bob Winn, W5KNE; Wayne Mills, N7NG; Bill Kenamer, K5FUV; and Chuck Hutchinson, K8CH. The goal is to have any changes in place by the year 2000, hence the unofficial name "DXCC 2000." It is anticipated that there will be no restart of the entire DXCC program. Applicable "country" credits for the current DXCC program will continue to count regardless of what other changes may occur.

Since the ARRL is reviewing the entire DXCC program, this appears to be an excellent time to consider some possible improvements. Let's explore possibilities.

The ARRL will be interested especially in the last line of the committee's mandate: increasing the efficiency of administration. This simply means that the ARRL wants to find ways to streamline the processing of applications. One of the obvious possibilities here would be to permit some form of electronic or automatic contact credit. The recent XR0Y Easter Island DXpedition experimented with a couple of features that may become standard soon.

To make automatic country credit work, the individual DXer needs to know for certain that his or her contact is "in the log." This implies some form of rapid feedback after the contact. The XR0Y operation did this by up-loading their logs daily and arranging for distribution to various sites. This allowed DXers to know within 24 hours whether their contact was correctly logged. If it was not, they could then try again the next day.

While this method reduces the need for "insurance contacts" and eliminates the long, suspenseful wait to learn if the contact is valid, it doesn't eliminate the problem of miscopied callsigns. If the DXpedition operator logged the wrong callsign, an operator who didn't work the DXpedition might get DXCC credit. Any method of automatic DXCC credits would have to deal with this problem. One solution might be to wait until individual DXers send in their DXCC applications (in electronic form) before the credit is added to the DXCC record. An amateur whose callsign was inadvertently added to the DXpedition log would be unaware of that and thus not claim the credit.

Another problem that would have to be



YO4DCF operating the YO4KAK club station in Braila City.

solved is outright cheating. A DXer could scan the log for callsigns similar to his or her call and tell the DXpeditioners that his callsign was incorrectly logged. Since DXpeditioners know that all logs contain 1 to 2 percent errors, they would be inclined to make the requested change. Some procedure would have to be established to notify the logged callsign and ask if the contact was valid.

Once the DXpedition returns to civilization, the operators or QSL managers would announce a date for forwarding the files to the ARRL. DXers would have a couple of months

or so to request corrections. Then the corrected logs would be sent to the ARRL and appropriately processed.

This electronic confirmation eliminates two of the biggest problems in the DXCC program: getting QSL cards from DXpeditioners or managers and entering the country credits into individual DXCC records.

DXers would submit their DXCC applications and updates on computer disc to be checked against DXpedition logs and other files. For DXers without computers, DX clubs could provide computers and software on



Ken Miller, K6IR, Ham, BZ1HAM, and Tim Totten, KJ4VH, discuss Scarborough Reef at the Dayton Hamvention '95.

P.O. Box 50, Fulton, CA 95439

## The WPX Program

### SSB

2571.....DL4VBS 2575.....LU6FVK  
2572.....IK7JWX 2576.....KI7AO  
2573.....AL7MU 2577.....HS1NGR  
2574.....CT1CVF 2578.....DL5ARS

### CW

2909.....DL5ARS

### Mixed

1734.....BV5DR 1736.....DL5ARS  
1735.....OE2KWN

Mixed: 450 BV5DR, DL5ARS. 500 BV5DR, DL5ARS. 550 IK2VUE, BV5DR, DL5ARS. 600 IK2VUE, BV5DR, DL5ARS. 650 IK2VUE, DL5ARS. 700 IK2VUE, KB5OHT, DL5ARS. 750 IK2VUE, KB5OHT, DL5ARS. 800 IK2VUE, KB5OHT, DL5ARS. 850 IK2VUE, AA1KS, KB5OHT, DL5ARS. 900 KB5OHT, DL5ARS. 950 DL5ARS. 1000 DL5ARS. 1050 J4PYD, DL5ARS. 1100 DL5ARS. 1150 DL5ARS. 1200 DL5ARS. 1250 DL5ARS. 1300 KD6WW, DL5ARS. 1350 KD6WW, DL5ARS. 1400 AI6Z, KD6WW, DL5ARS. 1450 AI6Z, KD6WW, DL5ARS. 1500 KD6WW, DL5ARS. 1550 KD6WW, DL5ARS. 1600 KD6WW, DL5ARS. 1650 KD6WW, DL5ARS. 1700 KD6WW. 1750 WB3DNA, K9UQN, KD6WW. 1800 WB3DNA, K9UQN, KD6WW. 1850 KD6WW. 1900 KD6WW. 1950 KD6WW. 2000 KD6WW. 2050 KD6WW. 2100 KD6WW. 2150 KD6WW. 2200 KD6WW. 2250 KD6WW. 2300 KD6WW. 2350 KD6WW. 2400 KD6WW. 2450 KD6WW. 2500 KD6WW. 2550 KD6WW. 2600 KD6WW. 2750 WB2YQH. 3050 ZP6JCY. 3100 ZP6JCY. 3150 ZP6JCY. 3200 ZP5JCY.

SSB: 350 IK7JWX, AL7MU, KI7AO, HS1NGR, DL5ARS. 400 IK7JWX, KI7AO, HS1NGR, DL5ARS. 450 IK7JWX, KI7AO, HS1NGR, DL5ARS. 500 IK7JWX, KI7AO, JN6MIC, DL5ARS. 550 IK7JWX, KI7AO, DL5ARS. 600 IK7JWX, KB5OHT, KI7AO, DL5ARS. 650 IK7JWX, KB5OHT, KI7AO, DL5ARS. 700 IK7JWX, KB5OHT, KI7AO, DL5ARS. 750 IK7JWX, KI7AO, DL5ARS. 800 IK7JWX, KI7AO, DL5ARS. 850 JA2OCU, IK7JWX, KI7AO, DL5ARS. 900 JA2OCU, KI7AO, DL5ARS. 950 AI6Z, 1050 KA4GYU, DF7HX, N4PYD, 1150 KD6WW. 1200 KD6WW. 1250 KD6WW. 1300 KD6WW. 1350 KD6WW. 1400 KD6WW. 1450 KD6WW. 1500 KD6WW. 1550 KD6WW. 1600 KD6WW. 1650 KD6WW. 1700 KD6WW. 1750 KD6WW. 1800 KD6WW. 1850 KD6WW. 1900 KD6WW. 1950 KD6WW. 2000 KD6WW. 2050 HK3JJH, KD6WW. 2100 HK3JJH, KD6WW. 2150 HK3JJH, KD6WW. 2200 HK3JJH, KD6WW. 2950 ZP5JCY. 2950 ZP5JCY. 3000 ZP5JCY.

CW: 350 IK2NKI, KB5OHT, DL5ARS. 400 IK2NKI, KW0A, DL5ARS. 450 KU0A, DL5ARS. 500 DL5ARS. 550 DL5ARS. 600 DL5ARS. 650 KD6WW, IK8TPJ, DL5ARS. 700 KD6WW, IK8TPJ, DL5ARS. 750 KD6WW, IK8TPJ, DL5ARS. 800 KD6WW, IK8TPJ, DL5ARS. 850 K2LUJ, KD6WW, DL5ARS. 900 KD6WW, DL5ARS. 950 KD6WW, LU1YU. 1000 KD6WW, LU1YU. 1050 KD6WW, LU1YU. 1100 AI6Z, KD6WW, CT1YH, LU1YU. 1150 KD6WW, CT1YH, LU1YU. 1200 KD6WW, LU1YU. 1250 KD6WW. 1300 W4TYU, ZP5JCY, KD6WW. 1350 ZP5JCY, KD6WW. 1400 K9UQN, ZP5JCY, KD6WW. 1450 K9UQN, ZP5JCY, KD6WW. 1500 ZP6JCY, KD6WW. 1550 KD6WW.

1600 KD6WW. 1650 KD6WW. 1700 KD6WW. 1750 KD6WW. 1800 KD6WW. 1850 KD6WW. 2300 KS3F. 3600 N6JV.

10 Meters: OE9SLH, DL5ARS  
15 Meters: IK2VUE, OE9SLH, JN6MIC, DL5ARS  
20 Meters: IK2VUE, OE9SLH, DL5ARS  
40 Meters: OE9SLH, DL5ARS  
80 Meters: K3WWP, DF2IS, DL5ARS  
160 Meters: K3WWP, DF2IS

Asia: IK2VUE, DL5ARS  
Africa: DL5ARS  
No. Amer.: IK2VUE, DL5ARS  
So. Amer.: W4TYU, DL5ARS  
Europe: IK2VUE, DL4VBS, JN6MIC, DL5ARS  
Oceania: DL5ARS

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**Award of Excellence Plaque Holders with 160 Meter Endorsement:** CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, H18LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM8AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, K80G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QRF, NN4Q, W4UW, NX0I, G4BUE, LU3YLW4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCY, I2MQP, I0RIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB, F6HMJ, HB9DDZ, K9XR, K8JN, ZS6EZ, JA0SU, I5ZJK, I2EOW, KS4S, KA1CLV, K0IFL, K9LJN, WT3W, IN3NJB, S50A, UT5-186-2.

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.

loan, or at club meetings, to prepare the application. An expansion of the card-checking program currently in place would also be useful.

## Country Criteria and Adding New Ones

There has been a great deal of controversy in recent years over the definition of a DXCC country and the complicated process of adding a new country to the DXCC list. There are several ways in which this could be improved.

One possible improvement would be to tighten the definition of a Point 1 (government) country. The current definition is too complicated and subject to various interpretations. One way to tighten this rule and make it easier to administer would be to restrict new countries to those either in the United Nations or

those formally recognized by at least 10 members of the United Nations, while grandfathering in all existing countries. This would close the door to all but "real" countries, and probably freeze the countries list at its present state.

One way to improve the process of adding new countries would be to require a supermajority of both the DX Advisory Committee and the Awards Committee for approval. Requiring a two-thirds or three-quarters majority for approval would eliminate a lot of the more controversial country applications, again leading to an essential freeze of the list.

However, making it much more difficult to add new countries to the DXCC list would tend to reduce DX activity, as 60 percent of all active DXCC participants are on the Honor Roll today. Without new countries to work, many of these DXers would be without goals. Any such

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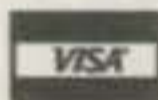
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#### 15 Meter CW

265 ..... 9A3SM

#### 17 Meter CW

17 ..... 4N7ZZ

#### 20 Meter CW

465 ..... LU2YA

#### 30 Meter CW

17 ..... HB9ALO 18 ..... SM4AKT

#### 80 Meter CW

47 ..... NR1R

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624 ..... AC4JO

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88 ..... WB9EEE 89 ..... N2MAU

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84 SM4HCM ..... 40 Zones

85 K3NW ..... 30 Zones

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4319 ..... IK2JWX 4321 ..... DL8MDN

4320 ..... WB9EEE 4322 ..... WA4ZXA

### CW/Phone

7651 ..... KF8EP 7657 ..... S58MU

7652 ..... DL2DSA (CW) 7658 ..... S52QM

7653 ..... K1VUT 7659 ..... K80AUK

7654 ..... DL5ARS (CW) 7660 ..... KG0GX

7655 ..... N3IHS 7661 ..... WA4ZXA

7656 ..... S51NU (CW)

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.

change in DXCC rules would have to be accompanied by a strong incentive to get on the air and work stations on a regular basis.

An idea to keep activity levels high is to require every active DXCC participant to work a certain number of DXCC countries each year. This could be refined in various ways, such as requiring contacts with at least five of the 50 Most Wanted countries, or work at least half of certain designated major DXpeditions. The

50th Anniversary DXCC award sponsored by *The DX Magazine* showed clearly that rare and semi-rare DX is definitely workable in a short time period, even at the very bottom of the sunspot cycle. Some sort of continuing activity incentive would go a long way toward keeping interest levels in the DXCC program high.

I'm not sure what the ARRL Board meant about making the DXCC program more equitable. It seems to me that the program treats



Shown here are RA9USU, UA3GSO, RK3DT, RA3AUU, RV3GW, RA3AUM, UA6XGL, RA3GEO, RU3FM, and UA3GHH at the first Russian IOTA convention.



Manny, ZB2CI, in Gibraltar. (WB2AQC photo)

most DXers fairly, with a level playing field. Little-Pistol DXers have the same DX possibilities as the small number of Big Guns have. It will take the Little Pistol longer to work them all, and it will require more skill, but DXers with very modest stations can make it on the Honor Roll with a few years of conscientious effort.

One way to eliminate one inequity would be to prohibit "assisted" contacts. These are contacts made with the aid of another amateur, such as keeping a frequency clear of QRM or relaying part of a callsign or report. Too many DXers are letting other amateurs do the job for them rather than mastering the skills necessary to work the DX on their own. Eliminating DXCC credit for such contacts would also open up considerable bandwidth to more efficient means of making contacts.

What changes do you think should be made to improve the DXCC program? Send comments, ideas, and suggestions to the DXCC 2000 committee, c/o ARRL Headquarters, Send a copy to me as well at P.O. Box 50, Fulton, CA 95439. I'll share some of these with readers of this column.

In other DXCC news, The ARRL Awards Committee has disqualified Romeo Stepanenko from the DXCC program. "The ARRL Awards Committee met recently to review submitted documentation for the 1992-93 P5RS7 operation submitted by Romeo Stepanenko. After a review of all material available, the Awards Committee voted unanimously to disqualify Romeo Stepanenko from participation in the DXCC program.

"This disqualification is based upon Rule 12, Operations Ethics, and Rule 13. The disqualification means that Stepanenko is not eligible to participate in the DXCC program in any manner. This includes, as provided for under Rule 12, paragraph (b) disallowance of contacts made with any station or DXpedition operated by him from the time of this action."

## June DXpeditions

Mike Smith, VE9AA, Wayne, W9OEH, and Ken, WA8JOC, have been planning a trip to Sable

## 5 Band WAZ

As of February 29, 1996, 435 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

UA3AKO  
KA5W

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)	NN7X, 199 (34)
AA4KT, 199 (26)	DL3ZA, 199 (31)
K7UR, 199 (34)	OE6MKG, 199 (31)
NA8Y, 199 (26)	SM6AHS, 198 (12, 31)
W0PGI, 199 (26)	UA3AGW, 198 (1, 12)
W2YY, 199 (26)	VO1FB, 198 (19, 27)
W9WAQ, 199 (26)	EA5BCK, 198 (27, 39)
W1JR, 199 (23)	KZ4V, 198 (22, 26)
VE7AHA, 199 (34)	K4PI, 198 (23, 26)
W1FZ, 199 (26)	G3KDB, 198 (1, 12)
IK2GNW, 199 (1)	DK2GZ, 198 (1, 24)
W9CH, 199 (26)	KG9N, 198 (18, 22)
AC8M, 199 (34)	KM2P, 198 (22, 26)
IK8BQE, 199 (31)	GM3YOR, 198 (12, 31)
JA2IVK, 199 (34, 40m)	DK8EE, 198 (19, 31)
K1ST, 199 (26)	K8SR, 198 (22, 23)
AB0P, 199 (23)	YO3APJ, 198 (29, 35)
KL7Y, 199 (34)	OH2DW, 198 (1, 31)
UY5XE, 199 (27)	K3NW, 198 (23, 26)

The following have qualified for the basic 5 Band WAZ Award:

WT3W, 172 Zones      UA3AKO, 200 Zones

Endorsements:

OE6MKG, 199 Zones	K7FL, 182 Zones
K8DEQ, 181 Zones	K3NW, 198 Zones
YU1AB, 198 Zones	IK1AOD, 197 Zones
I2WYR, 186 Zones	KA5W, 200 Zones

994 Stations have attained the 150 Zone level as of February 29, 1996.

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.

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## The WPX Honor Roll

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ Master Prefix List. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, file will be made inactive. Lifetime Honor Roll fee is \$4.00 (U.S.) for each mode, with no fee for additions.

### MIXED

4610.....9A2AA	3165.....N4MM	2739.....YU7BCD	2385.....S53EO	2049.....W8UMR	1716.....WB3DNA	1383.....OZ1ACB	1216.....AA7FL	804.....VE6FR
4187.....K2VW	3145.....SM3EVR	2716.....K9BG	2384.....SM6DHU	2007.....WB4RUA	1670.....VE9RJ	1383.....AI6Z	1212.....CT3CU	801.....EA2BNU
3962.....IT9TQH	3101.....I1EEW	2689.....IT9QDS	2380.....S50A	1978.....S58MU	1663.....LU8DY	1346.....WA3HUP	1177.....WT3W	774.....W2EZ
3654.....EA2IA	3078.....ZP5JCY	2658.....YT7DX	2377.....K2POF	1976.....9A4RU	1662.....PY2DBU	1345.....EA3CWK	1137.....YU7FW	679.....W4RTE
3571.....W2FXA	3063.....KA5W	2621.....KF2O	2270.....HA5NK	1969.....KS4S	1655.....I2AOF	1339.....IK1GPG	1123.....IK2PZG	663.....HI8LC
3475.....K6JG	3019.....YU1AB	2607.....N2AC	2252.....S51NU	1967.....W9IL	1563.....CT1YH	1306.....I1-21171	1119.....G4SDJ	
3358.....VE3XN	2981.....UA3FT	2601.....SM7TV	2165.....K5UR	1947.....KB0G	1555.....HA9PP	1305.....W9IAL	1054.....VE6BMX	
3351.....N4NO	2980.....WA8YTM	2601.....I2MOP	2147.....IK2ILH	1899.....G4OBK	1532.....AE5B	1305.....NH6T	1019.....N4PYD	
3345.....N6JV	2903.....9A2NA	2491.....I2EOW	2132.....DK5AD	1858.....WB2ABD	1516.....F5NBX	1269.....W8IZV	1001.....WU1F	
3239.....W1BWS	2885.....PA0SNG	2437.....WB2YQH	2131.....W4UW	1846.....W3KH	1491.....I2EAY	1268.....HP2CWB	977.....WB2PCF	
3198.....N9AF	2884.....W9DWQ	2436.....HA0HW	2075.....N6JM	1834.....SM6CST	1483.....K0IFL	1265.....VE4ACY	906.....KB5OHT	
3184.....I2PJA	2866.....HA0DU	2434.....4N7ZZ	2067.....W6OUL	1729.....HA8QC	1454.....KC6X	1262.....CT1EEB	891.....JR3TOE	
3166.....N4UU	2823.....YU7SF	2416.....K8LJG	2054.....N2AIF	1725.....WB8ZRL	1444.....JH3SAC	1222.....YV7QP	835.....AA1KS	

### SSB

4025.....IBZV	2699.....OZ5EV	2237.....WA4QMQ	1876.....K5UR	1473.....CT1DIZ	1321.....I3ZSX	1107.....EA1KK	915.....WU1F	738.....EA1OT
3948.....IT9TQH	2685.....F2VX	2164.....I2EOW	1851.....IN3QCI	1470.....KB0C	1310.....IK2AEO	1066.....K0IFL	912.....ZS6Y	729.....N3DRO
3552.....K2VW	2618.....N4NO	2157.....YU7BCD	1799.....SM6DHU	1447.....AE5B	1278.....G4OBK	1053.....EA8AG	907.....KF7IO	724.....I2EAY
3514.....VE1YX	2616.....I4CSP	2126.....PY4OY	1754.....K2POF	1447.....K2EEK	1266.....CT1EEB	1040.....DF7HX	889.....W6RQO	709.....SM6CST
3497.....ZL3NS	2565.....KA5W	2087.....CT1AHU	1677.....LU8DY	1441.....W6OUL	1252.....IK1GPG	1037.....EA1IF	887.....SV3AQR	705.....IK4HPU
3234.....K6JG	2525.....PA0SNG	2051.....EA5AT	1638.....N6FX	1439.....WN5MBS	1244.....K8MDU	1036.....IK0JMS	853.....I6KYL	676.....HI8LC
3220.....F6DZU	2447.....I5ZJK	2038.....4X6DK	1636.....IK2DUU	1433.....N2AC	1232.....NG9L	1027.....EA8PP	831.....VE4ACY	650.....VE9RJ
3192.....I2PJA	2420.....HA8XX	2025.....KF7RU	1633.....K8LJG	1428.....CT1BWW	1213.....T30JH	1024.....NH6T	831.....LU3HBO	639.....VE4ROY
2966.....ZP5JCY	2362.....I2MOP	2014.....N4UU	1594.....W5AWT	1419.....WB3CQN	1172.....KC6X	1012.....N4PYD	811.....JR3TOE	626.....VE6BMX
2903.....CT4NH	2350.....WA8YTM	1997.....K5RPC	1581.....YU7SF	1393.....K3IXD	1136.....HP2CWB	976.....WT3W	799.....EA5DCL	609.....JA2OCU
2812.....N4MM	2294.....EA3AQC	1965.....KD9OT	1533.....LU7HJM	1376.....HA5NK	1129.....KB0G	973.....IK2PZG	786.....HA9PP	604.....KZ5ZD
2756.....EA2IA	2287.....9A2NA	1954.....CX6BZ	1532.....OE2EGL	1355.....DK5WQ	1124.....W9IL	965.....IT9JPK	786.....EA7CRL	601.....EA1MK
2754.....EA8AKN	2262.....KF2O	1948.....EA2AOM	1522.....N2AIF	1355.....IK0EIM	1118.....EA5GKE	943.....S51NU	782.....YV7QP	
2708.....I1EEW	2251.....LU8ESU	1933.....W4UW	1501.....KS4S	1349.....WB8ZRL	1107.....WA2FKF	939.....AI6Z	756.....AE4MJ	

### CW

3911.....IT9TQH	2389.....N2AC	1949.....9A2NA	1775.....W5AWT	1633.....VR2UW	1345.....EA6BD	1191.....G4MVA	921.....I2MOP	729.....KF7JF
3601.....K2VW	2317.....W9DWQ	1945.....KAT7	1752.....K5UR	1607.....I7PXV	1342.....EA7TG	1100.....WB8ZRL	914.....YV7QP	701.....VE6BMX
3508.....WA2HZR	2268.....G4UOL	1939.....EA7AZA	1742.....N6FX	1591.....VE9RJ	1320.....I2EAY	1090.....AI6Z	870.....W9IL	679.....K0IFL
3328.....N6JV	2263.....WA8YTM	1933.....JA9CWJ	1741.....W1WAI	1552.....W6OUL	1302.....JN3SAC	1156.....EA6AA	851.....K2LUO	679.....9A3UF
2957.....YU7LS	2224.....LZ1XL	1903.....G3VOD	1730.....SM6CST	1542.....I1EEW	1300.....IK2ECP	1067.....EA2CIN	845.....NH6T	656.....HA9PP
2895.....N4NO	2190.....KA5W	1858.....K8LJG	1686.....OZ5UR	1510.....G4OBK	1288.....EA6AA	1056.....AC5K	844.....YU1TR	640.....WT3W
2792.....N4UU	2184.....YU7BCD	1857.....HA5NK	1684.....IT9VDO	1480.....IK3GER	1266.....9A3SM	1024.....W9IAL	833.....PY4WS	637.....ZS1AFZ
2722.....K6JG	2173.....N4MM	1842.....SM6DHU	1684.....ZS6EZ	1479.....ZP5JCY	1256.....HI8LC	1021.....W4UW	831.....LU3DSI	635.....IK1GPG
2715.....EA2IA	2117.....W8IQ	1818.....KF2O	1679.....N2AIF	1426.....DJ1YH	1241.....9A2HF	988.....4X6DK	796.....I2EOW	602.....VE4ACY
2545.....YU7SF	2085.....S51NR	1809.....TJ4SU	1662.....KB0G	1412.....LU2YA	1231.....EA7AAW	983.....KC6X	782.....KB5DHT	600.....K3WWP
2435.....K9QVB	1998.....S51NU	1798.....K2POF	1650.....S58MU	1411.....KS4S	1228.....KA1CLV	950.....IK5TSS	760.....EA2BNU	

Island CY for the past year. They have lined up all the necessary permits and have a license with the callsign **CY0AA**. They plan an operation of about a week (or more) in late June. They are considering three complete stations, on 160-2 meters, including the new bands. The main problem is one of funding. Mike Smith, VE9AA, estimates the total cost of the trip to be some \$13,000.

Why does it cost \$13,000 to get to an island just 100 miles off the coast of New Brunswick, Canada? Most of it is due to the requirements of the Canadian Coast Guard, who controls access to the island. The Coast Guard strongly prefers visitors to Sable to fly in, landing on the hard-packed sandy beach. Unfortunately, the special charter flight, the only one authorized to land at Sable, costs \$2500 per flight. Thus, getting the three operators on and off the island costs \$5000. Getting all the gear to Sable costs an additional \$1000, especially considering the size and weight of effective low-band antennas. The Coast Guard charges visitors \$90 per person, per day, plus \$0.58 per kilowatt-hour for electricity; this adds another \$3000. There are additional costs associated with returning loaned equipment, QSLs, food, supplies, and so on, which add up to another \$4000.

If they are unable to collect sufficient funds to operate this June, they will try again next year. To donate to the DXpedition, send a contribution to Mike Smith, VE9AA (ex-VE1MQ).

East coast DXers should have no problem working the **CY0AA** DXpedition. They should have propagation on 40 meters all day and on 80 all night. Thirty meters will also provide good openings. On the higher bands, east coast DXers should look for E-skip and back-scatter signals. West coast DXers should try 80 meters around 0600Z, 40 meters at 04-1000Z, and 20 meters around 0400Z. Thirty meters should be available 24 hours a day. The same is true for Europeans on 30 meters. Other openings to Europe will be at 0200Z on 80 meters, 2000-0200Z on 20 meters, and 2200-0600Z on 40 meters. The real test for the **CY0AA** DXpeditioners will be Japan. Sable is 11th on the Asian Most Wanted list. The path between Sable and Japan goes almost directly over the North Pole. Even the slightest geomagnetic disturbance will eliminate this tenuous opening. Japanese DXers should look for **CY0AA** around 10-1200Z on 30 or 20 meters. QSL **CY0AA** to Ken Scheper, WA8JOC, 5875 Cedaridge Drive, Cincinnati, OH 45247.

There is another Sable Island DXpedition set for 1996. The experienced DX team of KW2P,

AA4VK, and WA4DAN has permission and licenses to operate **ICV0** October 1-8. The propagation should be better in October than in June. This team is also soliciting DXpedition funds; you can send a contribution to Murray Adams, WA4DAN, 403 East 14th St., Greenville, NC 27858.

### QSL Notes

The Pennsylvania DX Association has taken over operation of the ARRL Third Call Area Incoming QSL bureau. All envelopes, cards, and SASEs that were on file with C-CARS have been handed over to sorters in the PDXA. Effective immediately, send all correspondence to the bureau at P.O. Box 100, York Haven, PA 17370-0100.

QSL **TJ4SU/5** direct to Bengt Hallden, P.O. Box 9, 4437 Pital de San Carlos, Costa Rica. Bengt is very active on 80 meters.

QSL **N9OQS/T5** to the operator: Dave Brooks, 1001 Patriotic St., Killeen, TX 76543, and **not** via WN2R.

QSL **TJ1AD** via P.O. Box 13062, Yaounde, Cameroon, and not via K4QKW, who can confirm only the 1973-75 operation of TJ1AD.

**R1FJZ** reports that DF7RX is **not** a QSL manager, only a mail drop. Serge will collect

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BP-174 12 VDC, 600 mA., Ni-Cad Batt. Pack .....	96.00
BP-180 7.2 VDC, 600 mA., Ni-Cad Batt. Pack .....	66.00
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his cards and confirm QSOs when he returns to Moscow in three to four months.

AA7VB, QSL manager for P40Z (after June 1995), P4 TI3 KH6 /AA7VB, V40Z, YV5/N5DKG, KL7/KZ5M, VP2EV (after 1995), V47W (after 1995), VP2EZ (Feb. 1996 only), VP2EWW (1995-96 only), has a new address: Dennis Motschenbacher, 3999 S. Lipan St., Englewood, CO 80110.

PY0TI is active from Trindade until mid-June; QSL to operate Joao Batista G. Mendonca, PY1UP, Rua Alfredo Backer 536, apto 1101, Bloco 05, Alcantara, 24452-000 Sao Goncalo RJ, Brazil.

QSL 9J2BO via Norm Friedman, W6ORD, 96 Palomino Circle, Palm Desert, CA 92111-3212.

The QSL address for 9K2ZZ, 9K2ZC, and 9K2YY has changed. QSL Derek and Ray McClure at 5 McKensie Circle, North Augusta, SC 29841.

QSL HC10T, HD10T, and HD90T via Ed Eklin, KG8CY, 810 Harry Paul Dr., Lake Orion, MI 48362. (Former QSL manager W2KF is a Silent Key.)

Contacts with the V31EV (NS0B), V31TP (WC0W), and V31RC (WG9L) operations will be automatically QSLed via the bureau system. If you absolutely can't wait, try direct via the respective operator.

QSL L44D via operator Atillo Cesar Scotti, LU4DFH, P.O. Box 19, Bragado 6640 BA, Argentina.

QSL FP5AC from Canada and the US to P.O. Box 1343, Saint-Pierre et Miquelon Islands, via Halifax NS B3K 1S0, Canada. From elsewhere, QSL to P.O. Box 1343, 97500 Saint-Pierre et Miquelon Islands, CTF North America.

QSL CS5FMX via operator Jorge, CT1FMX, P.O. Box 189, 2562 Torres Vedras, Portugal.

QSL contest stations IU2M, I2M, and I17M via the Italian bureau c/o IK2SGC.

QSL ZF2JC/ZF8 via operator John Cornwell, NC8V, 15100 E. Scatter Ridge Road, Athens, OH 45701.

While the QSL route for N9OQS/T5 is via the operator, the cards are not valid for DXCC, as it was a shipboard operation.

QSL V59X via Chad E. V. McClintyre, V51CM, Tsumkwe 9245, Namibia.

The V26B QSL haven't been printed yet, so please be patient and don't make second requests.

T94EU contacts up to Nov. 19, 1995 all have been answered by manager N2MAU, but he hasn't received logs for contacts made after that date. Again, please be patient and don't send second requests. Also note that the Bronx address is no longer valid; use the 1996 Callbook address.

QSL 9U/F5FHI via Gerald Debelle, F2VX, 4 La Haut d'Yvrac, Yvrac, F-33370, France. He will QSL all contacts via the bureau, as he receives logs from Africa. Gerald also has the logs of FO0CW/A and FO0CW/M.

73, Chod, VP2ML



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320 ..... KU9I/320      250 ..... KGØGX/246  
310 ..... PY2DBU/319      150 ..... KE4CLE/171  
310 ..... W6SHY/318      28 MHz ..... N8CIG  
310 ..... I4CSP/313

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Total number of active countries is 326. 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.

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# WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

## *FCC Affirms 219–220 MHz Band For Use By Amateur Service*

**O**n March 22, 1996 the Federal Communications Commission released an Order affirming secondary allocation of the 219–220 MHz band for use by the Amateur Radio Service. The allocation had been challenged by Fred Daniel doing business as Orion Telecom, a licensee in the Automated Maritime Telecommunications Systems (AMTS).

The 216–218 MHz and 219–220 MHz frequency bands currently are allocated on a primary basis to the Maritime Mobile Service for AMTS. Coast stations are assigned frequencies in the 217–218 MHz range, and ship stations are assigned frequencies between 219–220 MHz. Coast-station frequencies in the 216–217 MHz band currently are not assigned.

AMTS provides duplex phone, facsimile/data, and teleprinter ship-to-shore communications for the nation's navigable inland waterways and along offshore coastal waters. Most AMTS stations are on the Mississippi and Ohio Rivers and along the Gulf coast. Their communications consist primarily of maritime telephone service, which can dial into the public switched landline network, and operational weather, position, and supply reports.

### **Background of the Allocation**

In response to an American Radio Relay League petition requesting access to the 216–220 MHz band on a secondary, non-interference basis, the FCC allocated a one megahertz slice at 219–220 MHz to the Amateur Service. The League had sought the allocation on the basis that amateurs were forced to vacate the 220–222 MHz segment by August 27, 1995 to make way for narrowband business communications. The specific use of the band would be for amateur coordinated, point-to-point fixed digital message forwarding systems including intercity packet "backbone" networks. A message forwarding system is a group of amateur stations participating in a voluntary, cooperative, intercity arrangement where communications from the control operator of an originating station are transmitted to one or more destination stations via forwarding stations, which may or may not be automatically controlled.

Packet radio systems transmit digital data in groups, or "packets," using a specific format. Radio channels used by these systems are occupied only during the time individual packets of data actually are being transmitted. Upon completion of a transmission the channel becomes available for other traffic.

Amateur radio operators use packet radio for transmitting a variety of messages, computer programs, graphic images, and data bases. The use of the free amateur bands is a

very big advantage, since additional costs charged by service providers and telephone lines are eliminated. An advantage to the public is that these systems can also be used in times of emergency, disaster, or war to efficiently carry a large volume of messages when other communications facilities are out of service or overloaded.

Amateur radio operators use special wide-band packet radio networks to provide intercity links for their packet radio systems. The packet message forwarding systems are point-to-point fixed systems and are permitted in the 222–225 MHz band and on higher frequency bands. Amateurs are also permitted to send data, radio teletype, and analog signals, including all types of packet communications in the 222–225 MHz (1<sup>1</sup>/<sub>4</sub> meter) band.

The FCC said they believed that a secondary allocation at 219–220 MHz would serve the public interest by

1. Relieving congestion that exists in the 222–225 MHz band in certain geographic areas;
2. Encouraging the development and implementation of regional and/or nationwide digital message forwarding system networks that can be used for emergency and national defense communications purposes;
3. Facilitating connection of local packet modes to form such regional and nationwide networks; and
4. Providing spectrum for exploration of new technology related to these purposes.

The FCC chose the 219–220 MHz segment because it is essentially unused in the majority of the U.S. The 216–218 MHz segment is, however, allocated to various electronic tracking applications and the new Interactive Video and Data Service (IVDS), which has yet to be deployed, provides a way for TV viewers to respond back to television stations. Most IVDS licensees got the spectrum by buying the license at auction. However, it may never become popular since it appears that the free Internet is destined to become the return path for broadcaster inquiries.

A Naval Space Surveillance System operates at 216.98 MHz. NAVSPASUR provides a high-power electronic curtain from which energy is reflected by aircraft approaching the United States.

The FCC requires amateur packet stations operating between 219–220 MHz to notify both AMTS licensees when their operation is within 400 miles of an AMTS coast station and the ARRL, who will maintain a database of amateur 219–220 MHz operations to facilitate coordination and interference resolution. No amateur packet station may operate within 50 miles of an AMTS station without their written approval. Furthermore, no amateur station may cause interference to any radio service holding a primary allocation at or adjacent to the 219–220 MHz band, including AMTS, TV chan-

nel 11 and 13, IVDS, and the new Land Mobile (business) band operating at 220–222 MHz.

### **Objections to 219–220 MHz Amateur Access**

Of particular concern to Orion were the 40 channels used by ships between 219.0125 and 219.9875 MHz to communicate with coast stations. Orion argued that the FCC should rescind its decision to allocate the 219–220 MHz band to the amateur radio service because of the 80 km (50 statute mile) exclusion distance between AMTS and amateur operations is insufficient to protect primary AMTS operations from harmful amateur interference. Orion believes the rules should provide protection to AMTS under all conditions.

Orion further argued that a 925 km (575 mile) exclusion distance is necessary to protect AMTS operations. Orion said that such an exclusion distance would render the 219–220 MHz band unusable for the Amateur Radio Service because this exclusion distance around AMTS operation would effectively exclude amateur operations from urban areas where they are predominantly concentrated.

Orion added that it is particularly concerned that areas with the greatest demand for additional amateur spectrum are in urban areas near waterways where AMTS may be provided. While acknowledging that amateurs do indeed need additional spectrum for digital message forwarding systems, Orion does not believe amateurs should share frequencies that are the most likely to have active AMTS systems. They said the "allocation of this band on a secondary basis is not practical and should be rescinded."

Orion also stated that in the event the FCC does not rescind the allocation, the Commission should amend the rules to provide better protection for AMTS operation. Orion specifically requested the Commission to:

1. Modify the rules specifically to protect AMTS remote receivers;
2. Require all amateur operations in the 219–220 MHz band to use interference avoidance techniques;
3. Amend the rules to correspond specifically with the text of the Report and Order concerning the immediate resolution of any interference by amateurs to AMTS licensees;
4. Require type acceptance of all amateur equipment used in the 219–220 MHz band;
5. Require the amateur notification provided AMTS licensees to include the technical specifics of the proposed amateur operation; and
6. Require the maximum permissible power of amateur operations in the 219–220 MHz band be limited according to the percentage of the channel over which the signal is spread to prevent high-powered narrowband signals.

The ARRL said that a 575 mile "exclusion

*National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (817-461-6443)*

distance is without technical merit or justification" and "Orion has not justified its claim that a secondary amateur allocation is impractical." The ARRL believes that there is a greater potential for interference from other AMTS facilities than from amateur stations.

## The FCC Decision On 219-220 MHz

The FCC denied Orion's requests, stating that it believes that "it is appropriate and desirable to provide a secondary allocation for amateur point-to-point fixed digital message forwarding systems at 219-220 MHz." The FCC further believes that the 50 mile "exclusion zone" and 400 mile "notification distance" are sufficient to protect AMTS operations from interference caused by amateur stations.

The FCC acknowledged that a propagation phenomenon called tropospheric ducting can occur which may cause VHF signals to travel substantial distances. This, however, would be the extreme exception.

The FCC denied Orion's request that the 219-220 MHz band not be allocated on a secondary basis for amateur point-to-point fixed digital message forwarding systems. Nevertheless, the FCC took note of Orion's expressed concern that the amateur rules do not adequately specify the frequency range of AMTS operations, and thus, database searches conducted by amateurs could miss some AMTS coast stations. Accordingly, the FCC amended the rules to indicate that AMTS operations specifically use the 217-218 MHz and 219-220 MHz bands.

The Commission also refused to limit the power levels depending upon the channel bandwidth or to require that the amateur equipment used at 219-220 MHz be type accepted as required of AMTS equipment. "Amateurs have an exemplary record of interference avoidance with other services," the FCC added.

## Commissioner Issues Separate Statement

FCC Commissioner James Quello said he fully supported the secondary allocation of 219-220 MHz to the Amateur Service. "Shared frequency bands are an inevitable result of escalating demands for spectrum to provide innovative advanced communications services while maintaining critical and productive existing services," he said. "It is incumbent upon both this agency and our licensees to acknowledge this and strive toward more flexible and efficient spectrum management and usage. . . ."

Commissioner Quello took the opportunity, however, to criticize the FCC's new policy of massive restructuring, streamlining, and privatization of many of its functions—especially interference resolution. He is particularly concerned about recent FCC plans to close many of its field offices and to reduce its engineering staff.

Quello said, "First, we starve the relevant offices by diverting resources elsewhere which decimates the ranks of qualified technical personnel; then, we castigate those remaining as not up to the task, and propose doing away with the function. This is an archetypal example of 'blaming the victim.' I find it not only distasteful for its effect on morale but counterproductive and perhaps, most importantly,

impermissible without significant changes in our statutory mandate.

"I have written at length because of my profound concern that we not cease performing our core function of interference prevention through monitoring and interference resolution through enforcement while simultaneously adopting spectrum management policies and rules authorizing flexible usage in shared frequency bands. . . ."

"Radio frequency interference will inevitably

occur in shared bands in a congested radio frequency environment despite the best efforts of the operators. The purpose of our rules is to minimize its occurrence and deleterious effects.

"The means by which we accomplish this is through the monitoring and enforcement efforts of our technical staff. I do not want to have to say, 'I told you so' when we are unable to respond to interference complaints in the 219-220 MHz and other shared bands."

73, Fred, W5YI

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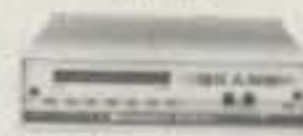


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# PROPAGATION

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## Sunspot Cycle Update—14 Spotless Days in February

The present solar cycle, the 22nd observed since accurate records have been kept, continues to decline slowly towards a minimum, expected to occur sometime between mid-1996 and early 1997.

The Royal Observatory of Belgium reports a mean sunspot number of 4 for February 1996. A high value of only 17 was reported on February 24. There were 14 days during the month when the sun was absolutely spotless!

February's mean value results in a 12-month running smoothed sunspot number of 16 centered on August 1995. This is a drop in one number from the previous month's level. A smoothed sunspot number of approximately 8 is forecast for June 1996.

The Dominion Radio Astrophysical Observatory at Penticton, British Columbia reports a mean value of 72 for the February 1996 10.7 cm solar flux level. This results in a smoothed value of 76 centered on August 1995. A level in the low 70s is expected during June 1996.

If you haven't already seen it, be sure to read the DX column by Chod Harris, VP2ML, in the April issue of *CQ*. It is entitled "DXing at Sunspot Minimums." It is the most comprehensive article that I have seen dealing factually with DX possibilities during low periods of sunspot activity. It might brighten your day to know that despite how bad the bands may seem and the scarcity of sunspots, there is still lots of DX to work, even at the very bottom of the cycle.

### 45th Anniversary Remembered

I would like to thank the many readers who took the time to send me congratulatory messages via e-mail and regular mail on my 45th anniversary as Propagation Editor of *CQ*, which was marked with the March 1996 issue. One of the nicest rewards a writer can receive is to know that there are readers out there who appreciate what is written. Your responses were most gratifying, and they give me the encouragement to continue to write this column as far into the future as I am able to do.

### Mailbag

I received the following interesting e-mail from Chuck Bolland, KA4PRF:

"... Back in 1991 and 1992 I did a study (unscientific) of the effect that moonlight (reflected sunlight) had on shortwave conditions. I had noticed over the years that when there was a full moon, conditions seemed to be better for a few days. As my study showed, the conditions seemed to be better the day before the full moon, the day of the full moon, and three days after the full moon. This suggested to me that it depended on the angle the light was being reflected towards the earth, because the moon was bright during other phases of its cycle as well, but conditions did not seem any better. ... Every morning for the two years I checked about 20 different broadcasting radio stations' frequencies from around the world. I

11307 Clara Street, Silver Spring, MD 20902  
(g.jacobs@ieee.org)

### LAST MINUTE FORECAST

Day-to-Day Conditions Expected for June 1996

Propagation Index.....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 3, 18, 21-22, 30	A	A	B	C
High Normal: 2, 4, 11, 17, 19-20, 23-24, 29	A	B	C	C-D
Low Normal: 1, 5-7, 10, 12-16, 25, 27	B	C	D	D-E
Below Normal: 8, 26, 28	C	C-D	D-E	E
Disturbed: 9	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 June 1st, good (B) on the 2nd, excellent (A) on the 3rd, good (B) on the 4th, fair (C) on the 5th through the 7th, etc.

estimated the signal quality. ... I gave each signal a number from 0 to 5, and entered the results into a spread sheet. From the spread sheet I constructed a graph that definitely showed a pattern of signal peaks when there was a full moon period. ... Today is the 5th of February. ... I have been able to hear a number of stations. ... a lot better than usual. I check(ed) the calendar and found that this is a day of a full moon."

Chuck also pointed out that he has a copy of the old and the new *Shortwave Propagation Handbook*, but that no mention is made in them about any possible effects of the moon on shortwave propagation.

Here is my reply to Chuck:

"Thank you for your recent e-mail, which I find to be very interesting. Yes, you are right. My books do not mention any effects that the moon might have on ionospheric conditions, because frankly, there has been no research in this field that I am aware of. One reason possibly is that the moon would not be considered as a likely source of radiation. On the other hand, your own experiments, as unscientific as they may be, certainly have some interesting results. I cannot rule out the possibility that the moon's gravitational effect might have some influence on the ionosphere, perhaps causing it to rise and fall much as the ocean tides do! It's a thought, anyway."

In a subsequent e-mail dated March 5, Chuck again reported an improvement in shortwave reception on a date when the moon was full.

Readers who would like to participate with KA4PRF in a more comprehensive study of reception conditions during periods of a full moon, or who may have any comments to make on his observations, can reach Chuck Bolland at P.O. Box 18402, West Palm Beach, FL 33416, or by e-mail at [chuck@mail.flnet.com](mailto:chuck@mail.flnet.com)

### Book Kudos

*The NEW Shortwave Propagation Handbook* has been on sale for about a year. Co-edited by myself, Ted Cohen, N4XX, and Bob Rose, K6GKU, it has received good reviews and I am told that sales are good. When a "competitive" publication writes a rave review, however, then you know that the book has hit its mark. Many thanks to Jerry Hall, K1TD, for his review, which appeared in the February 1996 issue of *QST*. Here are Jerry's closing words:

"... This handbook is one that you will want to read from cover to cover to glean all the information you can. But, once read, instead of gathering dust on your bookshelf, it will continue to serve as a valuable reference book to help you determine what bands to use—and when—to communicate with various parts of the world. If your Amateur Radio interests involve HF or VHF propagation, you'll want to keep this book in your hamshack."

Completely revised and updated, *The NEW Shortwave Propagation Handbook* contains approximately twice the information of the original *Shortwave Propagation Handbook*, which is out of print. The new volume explains the theory behind ionospheric propagation, the sunspot cycle, and the science of propagation forecasting; shows you how to make your own forecasts; and even looks at ionospheric propagation on the VHF bands. A complete chapter is devoted to computer propagation programs, and another chapter contains propagation prediction charts to all areas of the world for all phases of a solar cycle so you will be on the right band at the right time for openings.

*The NEW Shortwave Propagation Handbook* contains both tutorial and hands-on information gained from a total of more than 100 years of experience between the three authors in the field of shortwave communications. It retails for \$19.95 (+ \$4.00 s&h). Orders can be placed directly with *CQ* at 1-800-853-9797 or by fax to 516-681-2926.

### Salting the Ionosphere

It is time again for me to take my annual "salting the ionosphere" pilgrimage. Usually I go to places where physical or natural conditions are conducive for symbolically asking Mother Nature to "salt the ionosphere" so that good propagation conditions will occur during the annual *CQ* World-Wide DX Contest periods. As unscientific as this may sound, it seems to have produced favorable results during the past five contest periods, and most notably last year.

This year, during the last weeks of June I'll

### HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An \* indicates the best time to listen for 160 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

- (4) Opening should occur on more than 22 days
- (3) Opening should occur between 14 and 22 days
- (2) Opening should occur between 7 and 13 days
- (1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate daylight time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the propagation index will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

Eastern & Central Africa	11-16 (1)	16-18 (1) 18-20 (2) 20-21 (1)	22-00 (1)	22-00 (1)
Southern Africa	11-13 (1)	01-03 (1) 05-07 (1) 15-16 (1) 16-18 (2) 18-19 (1)	20-21 (1) 21-01 (2) 01-02 (1)	22-01 (1)* 23-01 (1)*
Central & South Asia	Nil	07-10 (1) 20-23 (1)	05-07 (1) 20-22 (1)	Nil
Southeast Asia	Nil	07-10 (1) 19-23 (1)	Nil	Nil
Far East	Nil	07-08 (1) 08-10 (2) 10-12 (1) 20-23 (1)	04-06 (1)	Nil
South Pacific & New Zealand	19-22 (1)	19-21 (1) 21-01 (2) 01-07 (1) 07-10 (2) 10-12 (1)	02-03 (1) 03-06 (2) 06-07 (1)	03-06 (1) 03-05 (1)*
Australasia	19-22 (1)	06-08 (1) 08-09 (2) 09-12 (1) 17-19 (1) 21-23 (1) 23-01 (2) 01-04 (1)	03-04 (1) 04-06 (2) 06-07 (1)	03-06 (1)
Caribbean, Central America & Northern Countries of South America	15-17 (1)** 09-12 (1) 12-15 (2) 15-18 (3) 18-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-16 (2) 16-18 (3) 18-21 (4) 21-23 (3) 23-00 (2) 00-02 (1)	20-22 (1) 22-23 (2) 23-03 (3) 03-05 (2) 05-07 (1)	22-00 (1) 00-04 (2) 04-06 (1) 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-17 (1)** 09-12 (1) 12-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	06-08 (1) 08-09 (2) 09-15 (1) 15-17 (2) 17-19 (3) 19-20 (4) 20-22 (3) 22-00 (2) 00-04 (1)	21-23 (1) 23-03 (2) 03-06 (1)	00-05 (1) 01-04 (1)*
McMurdo Sound, Antarctica	Nil	20-22 (1) 22-00 (2) 00-02 (1)	00-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

### June 15-August 15, 1996 Time Zone: EDT (24-Hour Time) EASTERN USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe & North Africa	13-18 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	19-21 (1) 21-22 (2) 22-00 (3) 00-01 (2) 01-02 (1)	21-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Northern & Eastern Europe	Nil	06-07 (1) 07-09 (2) 09-15 (1) 15-18 (2) 18-19 (3) 19-22 (2) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1)	21-23 (1)
Eastern Mediterranean & Middle East	11-13 (1) 16-17 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-06 (1) 06-08 (2) 08-09 (1)	20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1)
Western Africa	11-14 (1) 14-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-01 (1)	20-22 (1) 22-01 (2) 01-02 (1)	21-01 (1)

### June 15-August 15, 1996 Time Zones: CDT & MDT (24-Hour Time) CENTRAL USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Southern Europe & North Africa	13-17 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	20-22 (1) 22-00 (2) 00-02 (1)	21-00 (1)
Northern & Eastern Europe	Nil	06-07 (1) 07-09 (2) 09-14 (1) 14-17 (2) 17-20 (1) 20-22 (2) 22-23 (1)	20-23 (1)	21-23 (1)
Eastern Mediterranean & Middle East	Nil	07-09 (1) 14-15 (1) 15-17 (2) 17-19 (1) 19-21 (2) 21-22 (1)	20-23 (1)	Nil
Western Africa	14-16 (1)	06-08 (1) 13-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	20-00 (1)	21-23 (1)

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Eastern & Central Africa	Nil	16-18 (1) 18-20 (2) 20-21 (1)	20-23 (1)	Nil
Southern Africa	10-12 (1)	05-07 (1) 14-15 (1) 15-17 (2) 17-18 (1) 22-00 (1)	21-23 (1) 23-00 (2) 00-01 (1)	22-00 (1)
Central & South Asia	Nil	09-11 (1) 18-20 (1) 20-22 (2) 22-00 (1)	05-07 (1) 19-21 (1)	Nil
Southeast Asia	19-21 (1)	08-10 (1) 20-21 (1) 21-23 (2) 23-00 (1)	05-07 (1)	Nil
Far East	20-22 (1)	07-08 (1) 08-11 (2) 11-21 (1) 21-23 (2) 23-01 (1)	04-07 (1)	04-06 (1)
South Pacific & New Zealand	15-19 (1) 19-21 (2) 21-22 (1)	17-19 (1) 19-22 (2) 22-00 (3) 00-02 (2) 02-07 (1) 07-10 (2) 10-14 (1)	01-03 (1) 03-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	01-04 (1) 04-05 (2) 05-06 (1) 03-05 (1)*
Australasia	16-18 (1) 20-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 15-17 (1) 20-22 (1) 22-00 (3) 00-02 (2) 02-04 (1)	01-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

Caribbean, Central America & Northern Countries of South America	15-18 (1)** 09-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-16 (2) 16-18 (3) 18-20 (4) 20-22 (3) 22-00 (2) 00-02 (1)	20-22 (1) 22-23 (2) 23-03 (3) 03-05 (2) 05-06 (1)	22-00 (1) 00-04 (2) 04-05 (1) 00-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-17 (1)** 09-12 (1) 12-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-02 (1)	21-23 (1) 23-03 (2) 03-05 (1)	22-04 (1) 00-03 (1)*
McMurdo Sound, Antarctica	Nil	18-21 (1) 21-23 (2) 23-01 (1)	22-04 (1) 04-06 (2) 06-07 (1)	04-06 (1)

Central, Northern & Europe	Nil	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (1) 21-23 (1)	20-22 (1)	Nil
Eastern Mediterranean & Middle East	Nil	06-08 (1) 14-16 (1) 19-20 (1) 20-21 (2) 21-22 (1)	20-22 (1)	Nil
Western Africa	10-14 (1)	07-09 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	20-23 (1)	Nil
Eastern & Central Africa	Nil	14-16 (1) 16-18 (2) 18-19 (1) 06-08 (1)	Nil	Nil
Southern Africa	Nil	06-08 (1) 13-16 (1) 22-00 (1)	20-21 (1) 21-22 (2) 22-23 (1)	20-22 (1)
Central & South Asia	Nil	07-08 (1) 08-10 (2) 10-11 (1) 18-20 (1) 20-22 (2) 22-23 (1)	05-07 (1) 18-20 (1)	Nil
Southeast Asia	19-23 (1)	07-09 (1) 09-11 (2) 11-12 (1) 21-23 (1) 23-01 (2) 01-03 (1)	03-05 (1) 05-06 (2) 06-07 (1)	04-06 (1)
Far East	14-16 (1) 20-23 (1)	07-10 (2) 10-13 (1) 21-23 (1) 23-00 (2) 00-02 (3) 02-04 (2) 04-07 (1)	02-03 (1) 03-04 (2) 04-05 (3) 05-06 (2) 06-07 (1)	03-06 (1)
South Pacific & New Zealand	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	02-07 (1) 07-10 (2) 10-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 00-02 (2)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1)	00-02 (1) 02-06 (2) 06-07 (1) 02-05 (1)*
Australasia	15-18 (1) 18-21 (2) 21-22 (1)	19-21 (1) 21-22 (2) 22-00 (3) 00-01 (2) 01-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (1)	00-01 (1) 01-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	02-05 (1) 05-06 (2) 06-07 (1) 04-06 (1)*
Caribbean, Central America & Northern Countries of South America	15-18 (1)** 10-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-10 (3) 10-15 (2) 15-18 (3) 18-21 (4) 21-22 (3) 22-23 (2) 23-02 (1)	19-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-06 (1)	20-21 (1) 21-03 (2) 03-05 (1) 23-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	12-16 (1)** 10-12 (1) 12-13 (2) 13-15 (3) 15-17 (2) 17-18 (1)	05-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-18 (3) 18-19 (4) 19-20 (3) 20-22 (2) 22-00 (1)	20-21 (1) 21-23 (2) 23-01 (1) 01-03 (2) 03-04 (1)	22-03 (1) 00-02 (1)*
McMurdo Sound, Antarctica	16-18 (1)	17-20 (1) 20-22 (2) 23-01 (1)	21-23 (1) 02-03 (1) 03-06 (2) 07-09 (1)	04-06 (1)

**June 15–August 15, 1996**  
**Time Zone: PDT (24-Hour Time)**  
**WESTERN USA TO:**

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Southern Europe & North Africa	Nil	06-07 (1) 07-08 (2) 08-14 (1) 14-17 (2) 17-19 (1) 22-00 (1)	20-23 (1)	Nil

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**Line Voltage Requirement:** 200/240V, 50/60Hz  
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**Drive Power:** 50 watts for 1,500 watts output  
**Tube:** Svetlana 4CX800A Tetrode (2)  
**QSK:** Standard Feature  
**Line Voltage Requirement:** 200/240V, 50/60Hz  
**Cabinet Size:** To be announced later  
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\*Indicates best time for 160 meter openings.  
 \*\*Indicates best time for 10 meter openings.  
 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.

be going to visit *Magnetic Hill* in Nova Scotia. In this area there are magnetic anomalies which permit a car, for example, to move uphill without the use of its engine. The ionosphere above and in the vicinity of Magnetic Hill is where the first reflection point takes place for most North American HF signals beamed in a northeasterly direction towards Europe. Look for me through the local 2 meter repeaters in VE1-land from about June 20 through the 28th.

## June Propagation

Twenty meters looks like it should be the best band for DX propagation during June. Expect it to open just after sunrise, and to remain open for a few hours in almost all directions. When conditions are Low Normal or better, chances are good for openings to Europe, Central and South America, the South Pacific, Australasia, and the Far East before noontime absorption sets in. A second, and usually stronger, peak is expected during the late afternoon, when good openings should be possible towards Europe, Africa, Central and South America, and the Middle East. After sunset, and until midnight, look for good openings to South America, Antarctica, the South Pacific, Australasia, and the Far East. When conditions are High Normal or better, there may also be post-sundown openings on 20 meters to Europe, Africa, and the Middle East.

Not too much DX is expected on 15 or 17 meters this month, but some should be possible. When conditions are at least Low Normal, expect fairly good openings towards Central and South America as early as 9 AM. The best time for these openings, however, should be during the afternoon hours and possibly as late as the sundown period. The band may also open occasionally from the eastern half of the United States towards Africa, and from the western half towards the South Pacific, Australasia, and the Far East. The best time to check for these openings is during the afternoon hours, especially when conditions are High Normal or better.

Few, if any, DX openings are expected on 12 or 10 meters, except to those areas of the Caribbean and Central America within a 1300 mile range of short-skip sporadic-E openings from the USA. An occasional longer opening into South America may be possible during the late afternoon hours, when conditions are High Normal or better.

Longer hours of daylight and seasonally higher levels of static should reduce considerably the chances for DX openings on 30, 40, 80, and 160 meters. Some fairly good openings, however, are forecast to several areas of the world for 30 and 40 meters during the hours of darkness and up to an hour or two after local sunrise. Somewhat fewer, but often good openings should also be possible on 80 meters during much of the same time period.

Plenty of good short-skip openings are expected on the HF bands during June. For distances less than 250 miles try 80 meters during the day and 160 meters at night. For openings between 250 and 750 miles, 40 and 30 meters should be best during the day and 80 meters at night. For openings beyond 750 miles, 20 meters should be optimum during the day and 30 and 40 meters at night. Frequent short-skip, sporadic-E type openings are also expected on 10, 12, 15, and 17 meters over distances between approximately 600 and 1300 miles.

## VHF Ionospheric Openings

Expect a considerable increase in sporadic-E propagation during June and the summer months. This should result in fairly frequent 6 meter openings over a range of approximately 1000 to 1400 miles. During periods of geographically widespread ionization, two-hop 6 meter openings may occasionally be possible up to about 2300 miles. An occasional 2 meter short-skip opening, between approximately 1200 and 1400 miles, may also be possible during periods of intense sporadic-E ionization. Short-skip openings are most likely to occur between 10 AM and 2 PM and again between 6 and 10 PM local daylight time, although they can occur at other times as well.

Look for some meteor activity between June

8 and 10, which could increase the possibility for meteor-scatter-type openings on the VHF bands.

Check the "Last-Minute Forecast" at the beginning of this column for those days during June that are expected to be Below Normal or Disturbed on the HF bands. These are the days on which auroral and other types of ionospheric propagation may be possible on the VHF bands.

This month's CQ Propagation Charts contain DX predictions for the period June 15 through August 15, 1996. Short-Skip charts for June, for openings between 50 and 2300 miles, and from Hawaii and Alaska, appeared in last month's column.

73, George, W3ASK

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## Build Your Own 30 Meter Transceiver

(from page 16)

and Q15) and increase the Q16 input resistance to extend the output power. There is enough drive to use a stronger output device, however, my intention is to stay under the 5 watt QRP limit.

Fig. 6 shows the sidetone circuit and the audio power amplifier and clamp. There are many single-stage IC circuits that could replace U8. However, this device has low distortion at normal listening levels and a peak output of about 2 watts. The RC sidetone oscillator frequency is about 800 Hz. You may change the sidetone frequency by adjusting the 820 ohm resistor in the base of Q17. The stiff clamps, Q18 and Q19, guarantee collector saturation during keying.

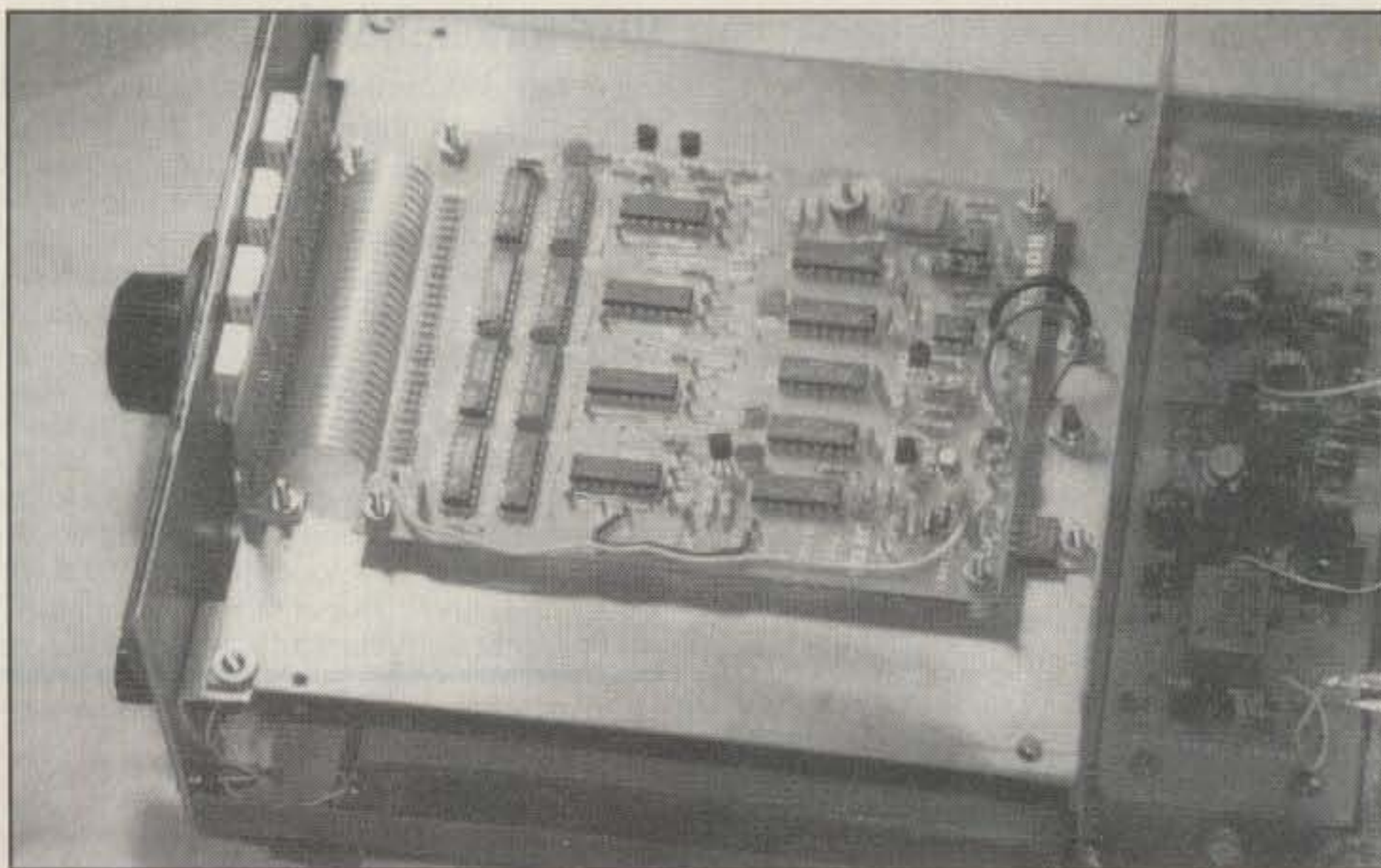
Fig. 7 shows the TR switch and keying circuits. The keyer, Q20 and Q21, has a rise and fall time of about 4.7 ms, set by the 4.7K ohm and 1  $\mu$ F capacitor time constant in the base of Q21. The antenna relay driver, Q23+Q22, has a hold time set by the 100 ohm and 22  $\mu$ F capacitor in the base of Q23. You can adjust these periods to your operating preferences; however, I find these values work well in the 15 to 20 WPM transmit range. If your keying rate is closer to 10 WPM, try doubling the 100 ohm resistor in the Q23 base.

### Some How-To Construction Ideas

Everyone who builds a home-brew project has a different set of priorities. It depends a lot on what your end desire is. Do you want something "cobbled" together or something you can operate with pride? Any home-brew project is "get what you put in." Its final quality and appearance equal the effort you give it. If you want something that works well and looks good, you need to relax and take your time building and testing one stage at a time. Understand how each stage works and verify its operating conditions before going to another. When you get to the last stage, just "tweak" a little, and presto—you're done!

Dedicated PC boards make construction easier, but my experience shows that often it's smarter (and cheaper) to use general-purpose boards in home-brew projects. With general-purpose boards you have the flexibility to make changes. Another problem is part sizes. The PC board layout will always use a part that is either bigger or smaller than what you have in the shack. This usually makes your finished assembly messy. This project used four general-purpose PC boards (Archer Experimenter part #276-170) to mount all parts. These boards, available from Radio Shack, are ideal for either digital or analog circuits. You can use almost any part available and not worry about size or shape. You can see in the photographs that the part density is low, and there is plenty of room for growth.

The assembled boards mount on a chassis made from double clad PC material. Using copper-clad PC material for a chassis adds a degree of flexibility to your project. It lets you solder shields or tie points wherever needed. Any soldered in-place shields add stiffness to



View looking into the assembly with the cover removed. The counter mounts to a sheet of PC material acting as a support chassis and shield. The transmitter assembly is on the right behind another shield.

your final assembly. I built the chassis, cabinet, and cover with ordinary hand tools and some patience. The thin aluminum chassis was hand-formed using simple wooden blocks. By using scrap material, my chassis cost was "zilch."

To protect the oscillators, I soldered shields between and around these stages. I reinforced the VFO section with two small PC-board sections mounted underneath the main chassis to stiffen the entire region around the tuning capacitor and oscillator circuits. The variable capacitor has an external vernier drive. The VFO tunes about 64 kHz. With an 8:1 vernier drive, each shaft revolution equals about 16 kHz, or about 22 degrees per kHz. This will give you plenty of selectivity for 30 meters.

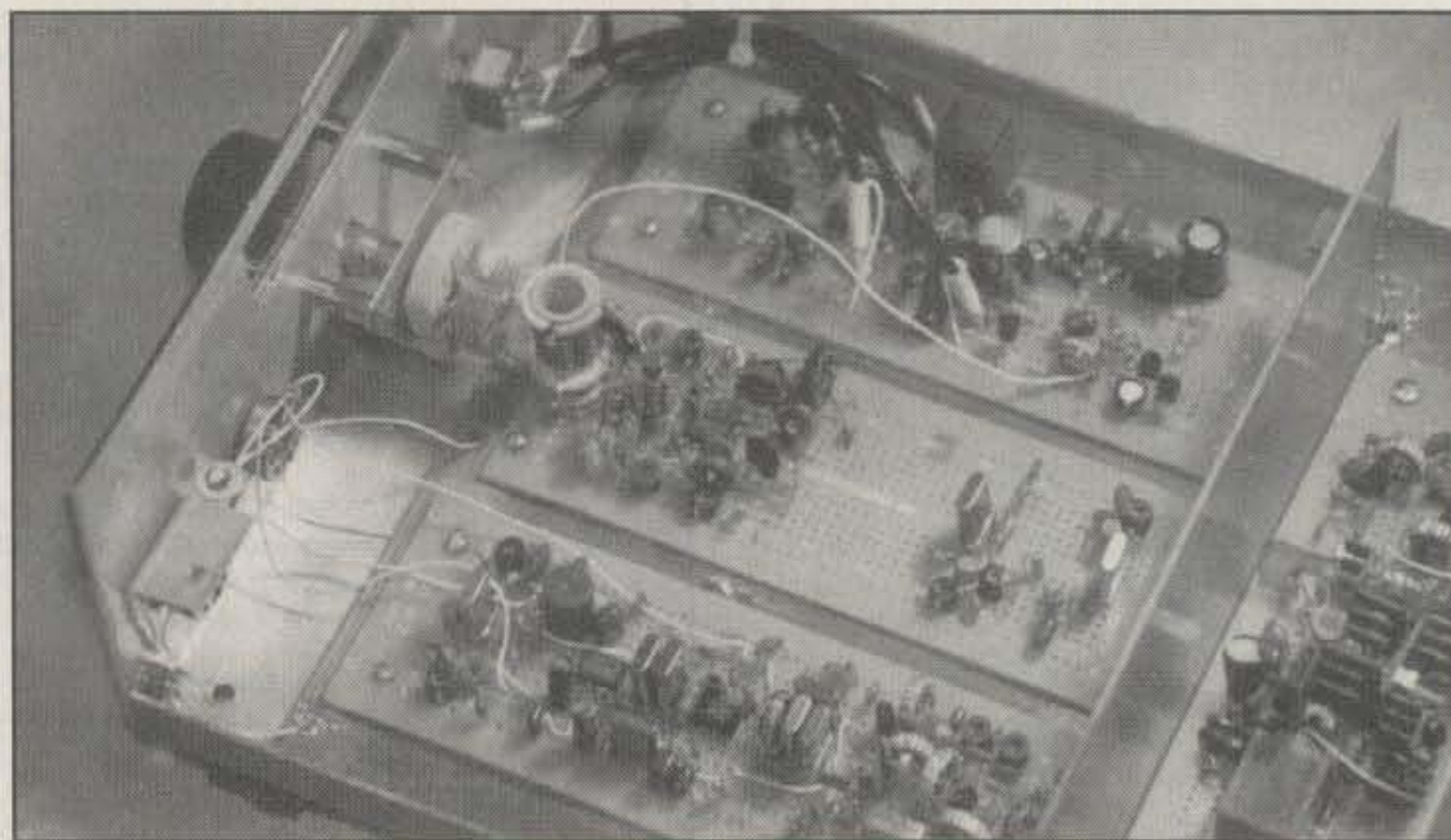
The front-panel decal is a PC-generated layout printed on plain paper, multi-coated with

Krylon®; and glued to the panel face. A scrap piece of smoke-colored plastic glued across the front-panel face covers the digital display and adds a little "class" to the finished unit.

To simplify wiring and reduce assembly size, I favor 28- or 30-gauge wire for interconnections. Except in the transmitter output stage, there is very little current in these circuits. Also, small-diameter coax or twisted pairs keep your assembly neat. Both small coax and wire need extra preparation time, but the results are worth the effort.

### Don't Wait To Start Testing

Don't wait until you get to the end to start testing and alignment; start testing as you build and install each stage onto the general-pur-



View looking into the assembly with the counter removed. The case is a thin sheet of aluminum hand-formed using wooden blocks and a vice. Point-to-point interconnections were made from the bottom of the boards. There is a small gap for wiring between the boards and the case bottom surface. Shields solder directly to a sheet of PC material acting as a support for the boards. The transmitter board is on the right behind a shield isolating the audio, oscillator, and receiver boards. The oscillator board shields are removed for clarity.



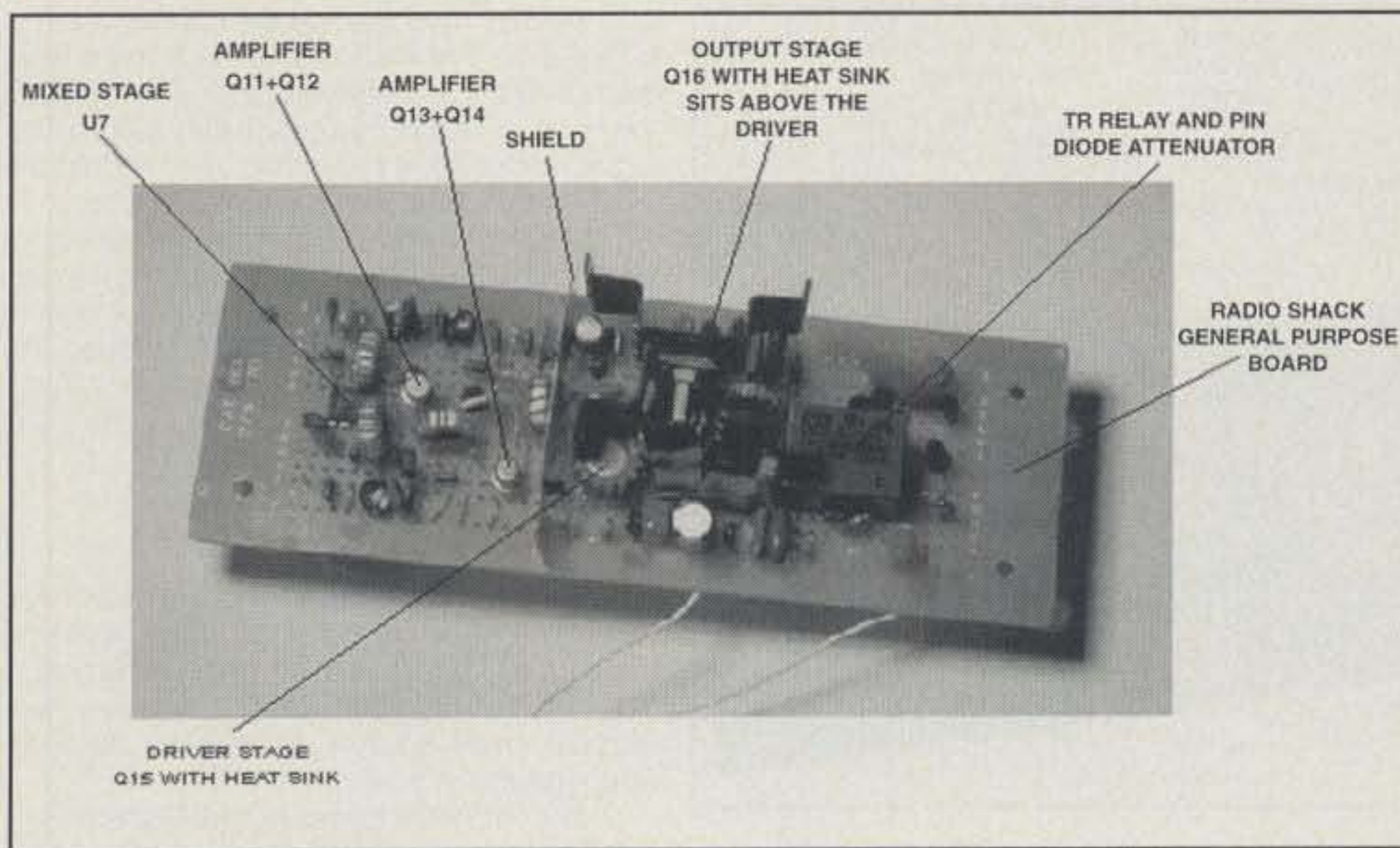


Diagram of the transmitter board assembly. All parts are mounted on the near side. Interconnections are point-to-point. A thin foil reinforces ground on the back side. The transmit oscillator is located on the VFO board along with the local oscillator.

pose boards. As you assemble and test a stage, you can align it. Then when you finish construction you have already debugged each stage, prealigned it, now it's only a matter of peaking and you're done!

For best receiver alignment use a stable 0.25  $\mu$ V source. You should have visible de-

tected audio with an antenna signal under 0.25  $\mu$ V. The overall receiver S+N/N should be about 10 dB with a 0.5  $\mu$ V antenna signal.

The transmitter alignment is easy. To start, disconnect the +13.6 VDC source to the output stage, Q16. With the LO connected, the U7 output level is about 0.5V p-t-p. I set these

by peaking for maximum signal on the base of Q13. Then connect the PA voltage (+13.6 VDC), a dummy load, and apply power. The PA stage has fixed part values and there is no tweaking needed.

The output stage operates class-C and the antenna power of this rig exceeded 4 watts at +13.6 VDC. High-gain transistors have a large output for low drive levels. This means it's easy to damage these devices with poor loading. When you first test your PA stage looking into an antenna, slowly increase the drive power and DC voltage. The circuit should remain stable under full power over the entire tuning range.

### Now Add A Digital Frequency Readout

As a finishing touch, add a simple digital counter in your project for tuning accuracy. I added a Howes<sup>6</sup> DFD4 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 rest simply "spills off" the counter. Small internal jumpers program the counter to offset the VFO count start point and display the actual tuned frequency.

There are several inexpensive programmable digital counter kits available. The three I recommend are the CCI model TK-1, the C. M. Howes model DFD4, and the S&S Engineering model PC1.<sup>7</sup> The DFD4 advantages are low panel height, built-in +5V regulator, and small clock pulse. It is available as a kit with all parts



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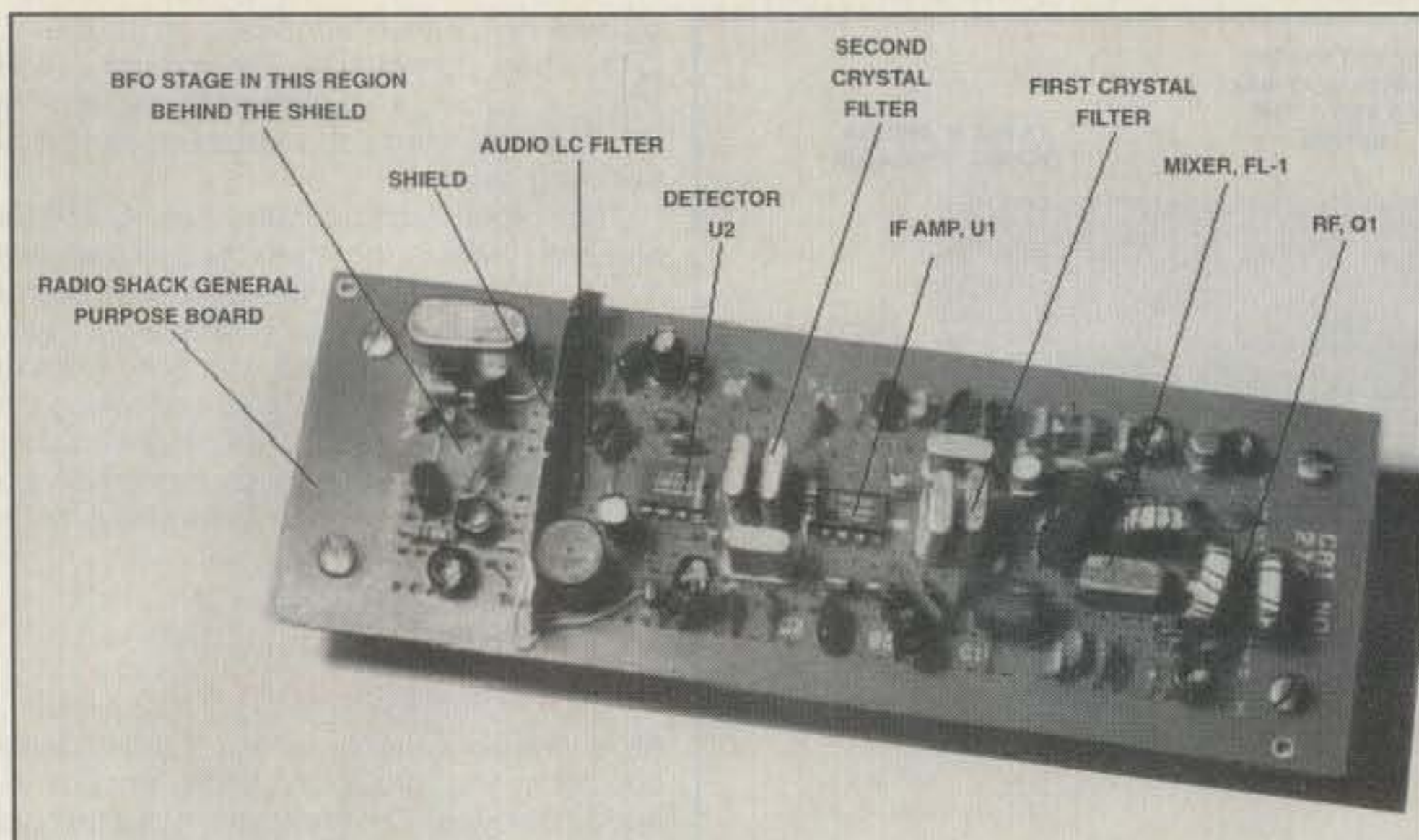


Diagram of the receiver assembly. All parts are mounted on the near side. Interconnections are point-to-point. A thin foil reinforces ground on the back side. The local oscillator is located with the VFO. The audio and VFO oscillator boards are similar in appearance.

or fully assembled. The TK-18 requires more front-panel space, needs a separate +5V regulator, and generates a strong clock pulse which (without extra filtering and shielding) can affect the receiver audio. The TK-1 is not available as a complete kit, but is available either fully assembled or as an empty PC

board with complete instructions; you furnish the parts. All TK-1 parts are available from OSE.<sup>9</sup> The S&S Engineering PC1 counter kit is probably the best documented of the three, and is easily constructed by a beginner. The circuits of all three counters are similar and provide the QRP project an operating fre-

quency display correct to the nearest tenth of a kiloHertz. The instructions in all three units describe how to assemble, test, and program the counter. In all three cases they start counting at some value other than zero so that the display coincides with the tuned frequency.

Fig. 8 shows how I joined the VFO with a Howes counter. In this unit I set the Howes counter offset or count start at .308.2 counts for a .100.0 display at a 10.1 MHz tuned frequency. This offset includes an error adjustment for the HFO, IF crystal center, and CW audio filter passband frequency.

### Some Handy Notes

1. The Toroid coils are wound with AWG #28 wire. You might find that AWG #30 is easier to use or you might have a roll of #26 in the shack. The effect of different wire size on the inductance is small, so don't hesitate to use a different gauge in your project.

2. The capacitor codes are: MF = Metal Film; C = Ceramic; P = Polystyrene, and M = Mica; NPO = Negative, Positive, Zero. NPO is a characteristic often specified for RF circuits requiring good temperature stability. You will sometimes run across capacitors marked "CG0"; that is a good substitute. I favor Monolithic capacitors for general use because of their small size and RF qualities.

3. Most of the resistors are 1/4 watt; however, there are some obvious places where you can reduce assembly size with 1/8 watt parts. There are also plenty of places where



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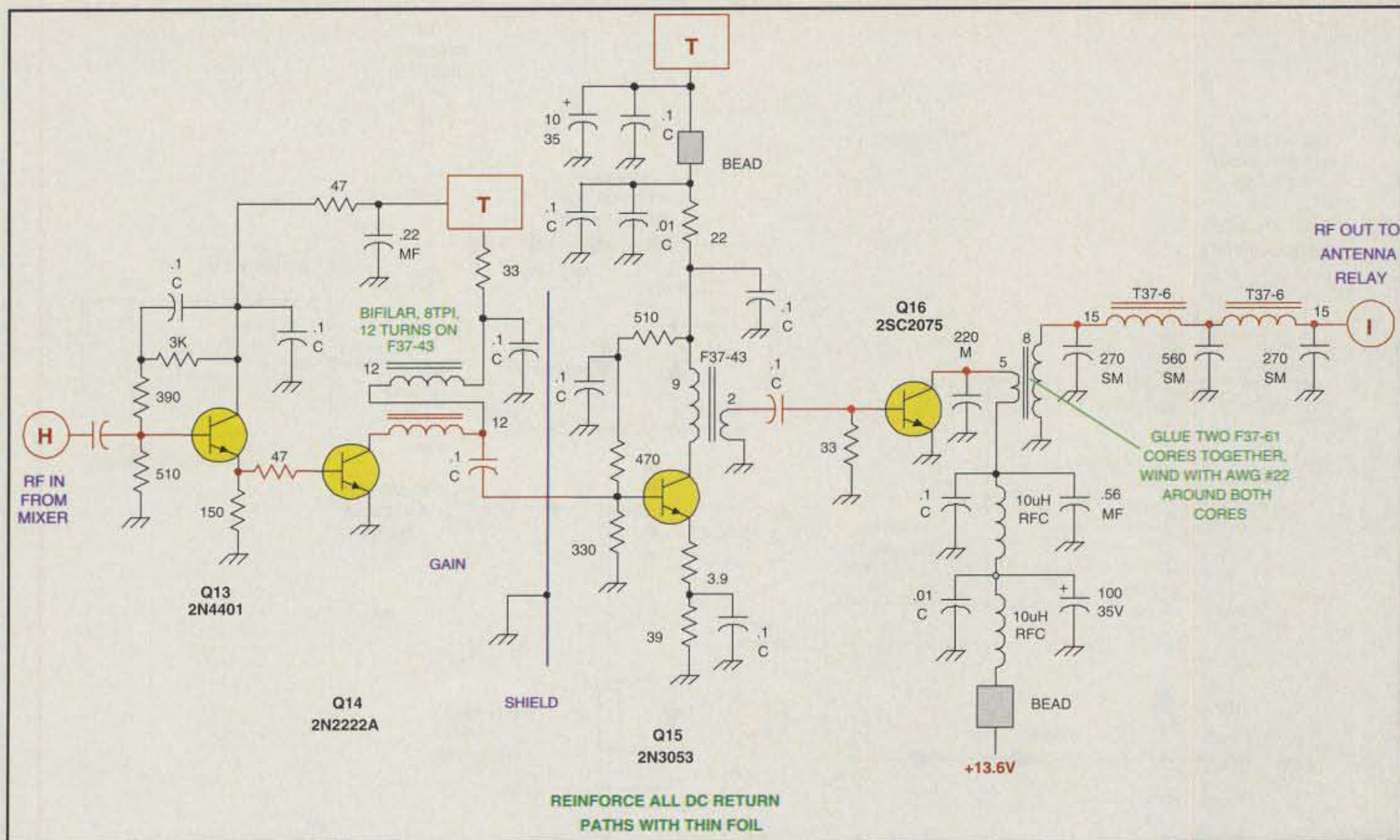


Fig. 5— Two class A buffer stages drive a final class C output amplifier. The direct coupled amplifier, Q13+Q14 provides voltage gain, with the Q15 buffer adding enough power to drive Q16, the transmitter PA. A separate Vcc source is suggested for Q16.

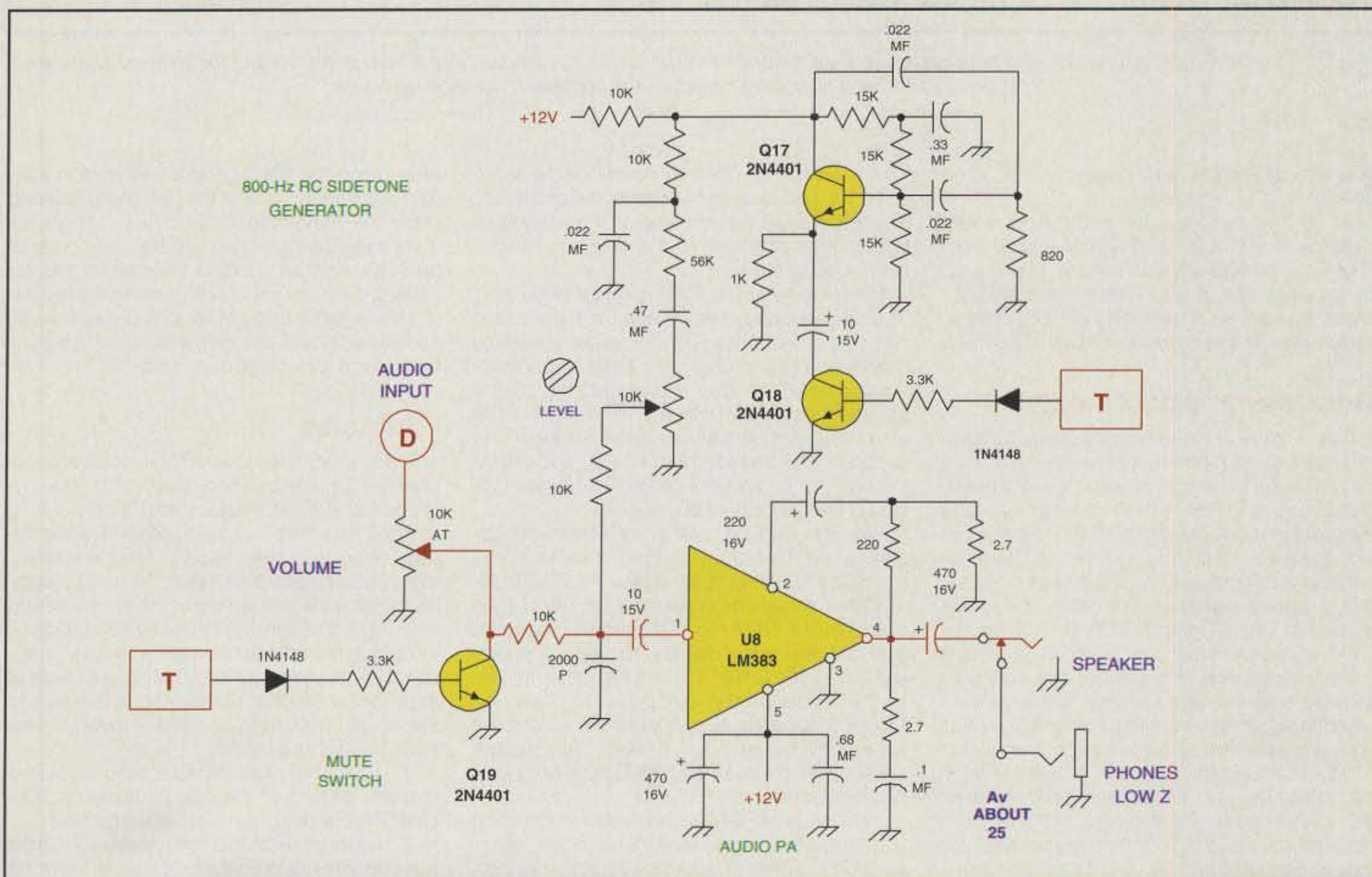


Fig. 6— The audio mute, sidetone oscillator, and audio PA stages. A variety of single IC audio amplifiers work well here. The LM380 is a good substitute but has a different pin-out.

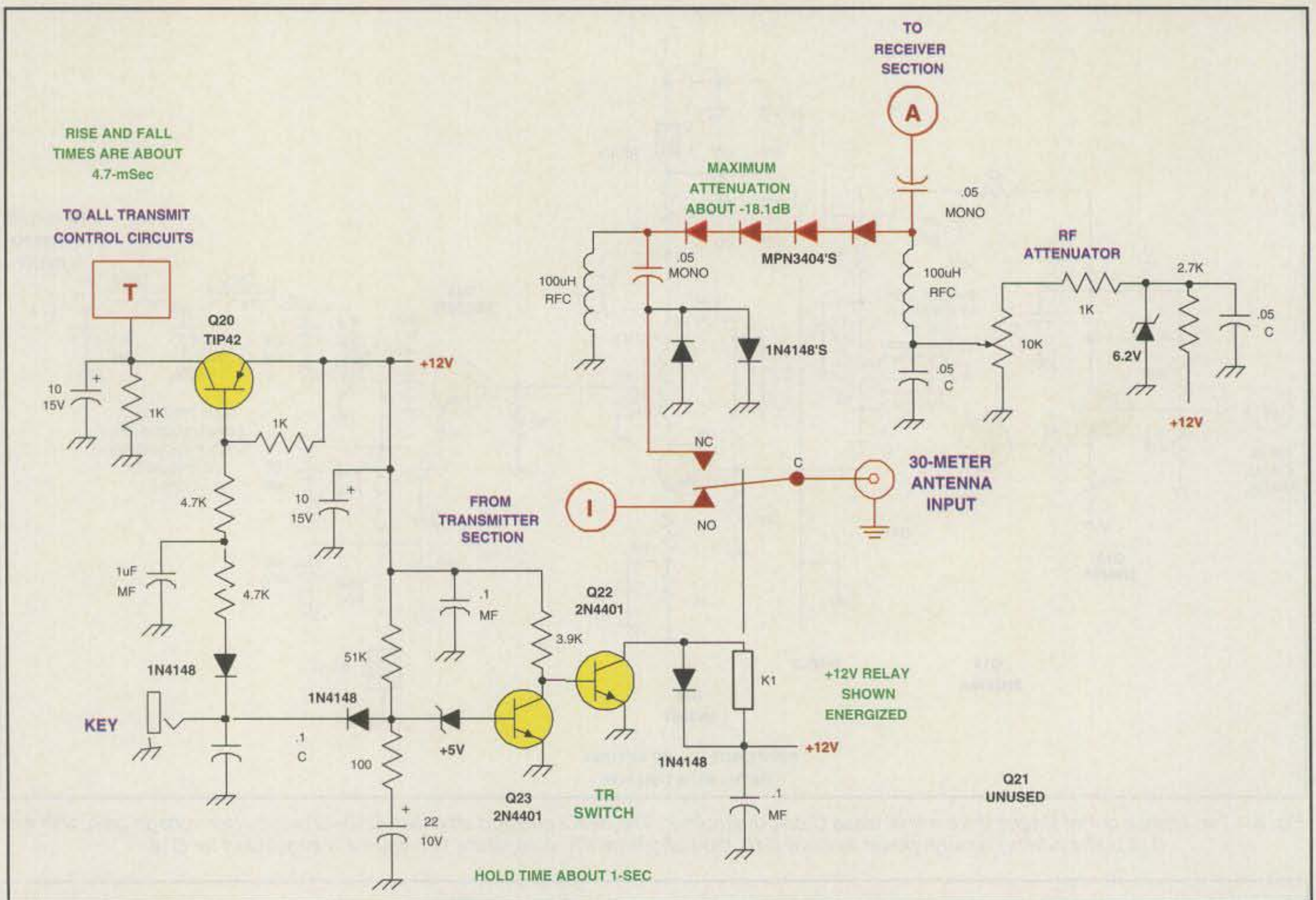


Fig. 7— The TR-switch, attenuator, and shaped keyer. Bias is applied to two series pin-diodes from a front panel control for antenna attenuation. The keying and relay switching circuits have controlled rise and fall times.

you can use chips and keep the size even smaller.

4. The 82 mH inductor in the post audio detector is a TOKO 10RB type available from Digi-Key<sup>10</sup>. There are also several TOKO variable inductors that are suitable for the VFO. I recommend type 7P with a 12  $\mu$ H inductance, 10% range. These are available from Digi-Key.

### Brief Words About Analysis

I refined many of these circuits using computer analysis. I favor three inexpensive software programs for amateur projects: the ARRL *Radio Designer*<sup>11</sup>, the *IRFD*<sup>12</sup> design set, and *Electronic Work Bench (EWB)*<sup>13</sup>. These are Windows compatible programs. Of the three programs, I find that *EWB* is the easiest to use. It is designed well so anyone can quickly learn to use it. Unlike most SPICE programs, the *EWB* human interface is graphic. It uses a mouse to move parts in and out of a work area to build and test your circuits. Because it's a visual program it's very intuitive which makes it easy to use and apply to amateur projects.

Most SPICE type software programs such as *Radio Designer* use net-lists to describe an AC circuit model for analysis. However, this ignores any DC analysis. It presumes that you already know or can find DC conditions using your calculator. The nice thing about *EWB* is that in addition to performing an AC analysis, it also measures your circuit DC conditions.

This is a big help when trying to trouble-shoot a circuit you previously computer modeled. These *EWB* DC benchmarks will quickly give you an idea of where your problem is when it isn't working right.

Learning to apply *EWB* is quick and easy. You use a mouse to move electrical parts and test equipment onto your computer screen to model and test your circuit. *EWB* has a built-in multimeter, scope, a Bode-plotter, plus a variety of digital test pieces. That's right! *EWB* also has digital test and analysis abilities. The program can analyze both analog and digital circuits. It's a powerful piece of software that would find a home in any shack.

Fig. 9 is an *EWB* computer screen "snapshot" of the filter-amplifier in fig. 4 under analysis in my PC. The display shows the *EWB* built-in signal generator emulating the mixer (U7) output and a Bode Plot of the circuit response. You can see in the display that the mixer output enters the DTC filter and then is amplified by the DC-coupled stage Q11+Q12. The Bode Plotter graphs the circuit response across the frequency range 5 to 15 MHz. The picture shows that the peak occurs at 10.1 MHz and has a gain of about 15.5 dB.

Wes Hayward, W7ZOI, includes a collection of computer programs with his book, *Introduction to Radio Frequency Design*. His programs relate to the text. These are simple DOS routines that make the design of filters and matching networks a simple load-n-run task.

After using the *IRFD* program to design a filter, for instance, I model the design in *EWB* and verify the performance. Since most filters require a little fine tuning to use standard parts or peak a response, *EWB* is the perfect tool for making changes and quickly seeing the results.

This is just a taste of what you can do with computer-aided design tools. Now it's your turn. Good luck on your project!

### Footnotes

1. The D-layer is the lowest region of the ionosphere. It ionizes by UV emissions of solar hydrogen and short x-rays. It exists only during the day and dies quickly at night. During the day, radio energies under 5 MHz are effectively absorbed by the D-layer, forcing LF communication via ground wave. Thirty meter signals pass through the D-layer and reflect off the E and F levels but at a steep angle. Long-distance propagation at 10 MHz improves at night because D-layer absorption is less and low-angle signals reach the F-layer, where multi-hop DX is possible.

2. There is an excellent QRP article by Dave Ingram, K4TWJ, in the August issue of *CQ—QRP Alive with Thrills and DX* (page 68).

3. Higher collector currents move you up the base-emitter curve where there is room for higher signal levels to bias the junction before causing distortion.

4. You can expect variations of about 200

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- ← Incoming data
- ← Outgoing data appears here

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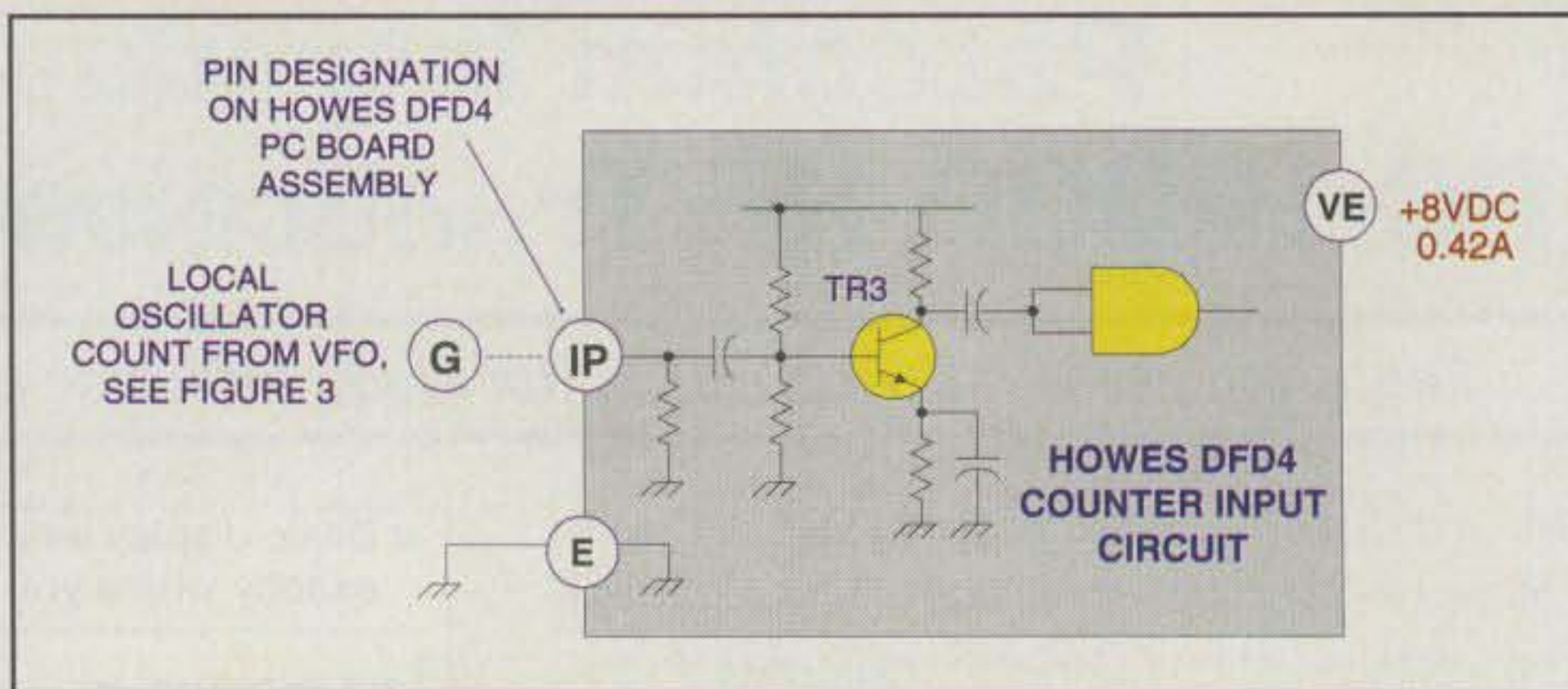


Fig. 8- Interfacing the VFO and the HOWes DFD4 counter. Set the count offset per Howes instructions. If you power up the DFD4 with the Up/Down link disconnected, the counter will show the offset.

Hz, depending on crystal selection criteria.

5. *Solid State Design for the Radio Amateur*, ARRL, 1986, page 34. There is no better reference for the design of amateur VFO circuits.

6. The Howes counter kit is available through Townsend Electronics, Inc., P.O. Box 415, Pierceton, IN 46562 (phone 1-219-594-3661, or FAX 1-219-594-5580).

7. S&S Engineering, 14102 Brown Road, Smithburg, MD, 21783 (301-416-0661). A complete review of this kit is in the August 1995 issue of *CQ* on page 24. Paul Carr, N4PC, does an excellent job of describing how programmable counters operate.

8. The PC board set (three parts) and counter assembly instruction packet are available from Communications Concepts, Inc., 508 Millstone Drive, Xenia, OH 45385 (1-513-426-8600).

9. Ocean State Electronics, P.O. Box 1458, 6 Industrial Drive, Westerly, RI 02891 (1-800-866-6626).

10. Digi-Key, 701 Brooks Ave, South, Thief River Falls, MN 56701 (1-800-344-4539).

11. *ARRL Radio Designer*. This software

package is available through the ARRL and is an RF CAD program developed by Compact Software of Patterson, New Jersey. The package is a derived SPICE program for Windows. It simulates small signal performance and will graph circuit resistance, impedance, gain, noise figure, and stability.

12. *Radio Frequency Design*, by Wes Hayward, W7ZOI. This software is included with the book and is a collection of programs related to the text. These simple programs will reduce many of your design tasks to answering questions posed by the program. One program, *ZMAT*, is worth the price of the admission. It is a must-have for the experimenter.

13. EWB refers to the inexpensive Interactive Image Technologies (111 Peter Street, Suite 801, Toronto, Canada M5V 2H1; phone 1-416-977-5550) SPICE program called *Electronics Workbench*. This is a strong software tool that lets you simulate circuits in your home computer. The program is very easy to use (might take you 10 minutes or so) and it's ideal for designing and building amateur circuits.

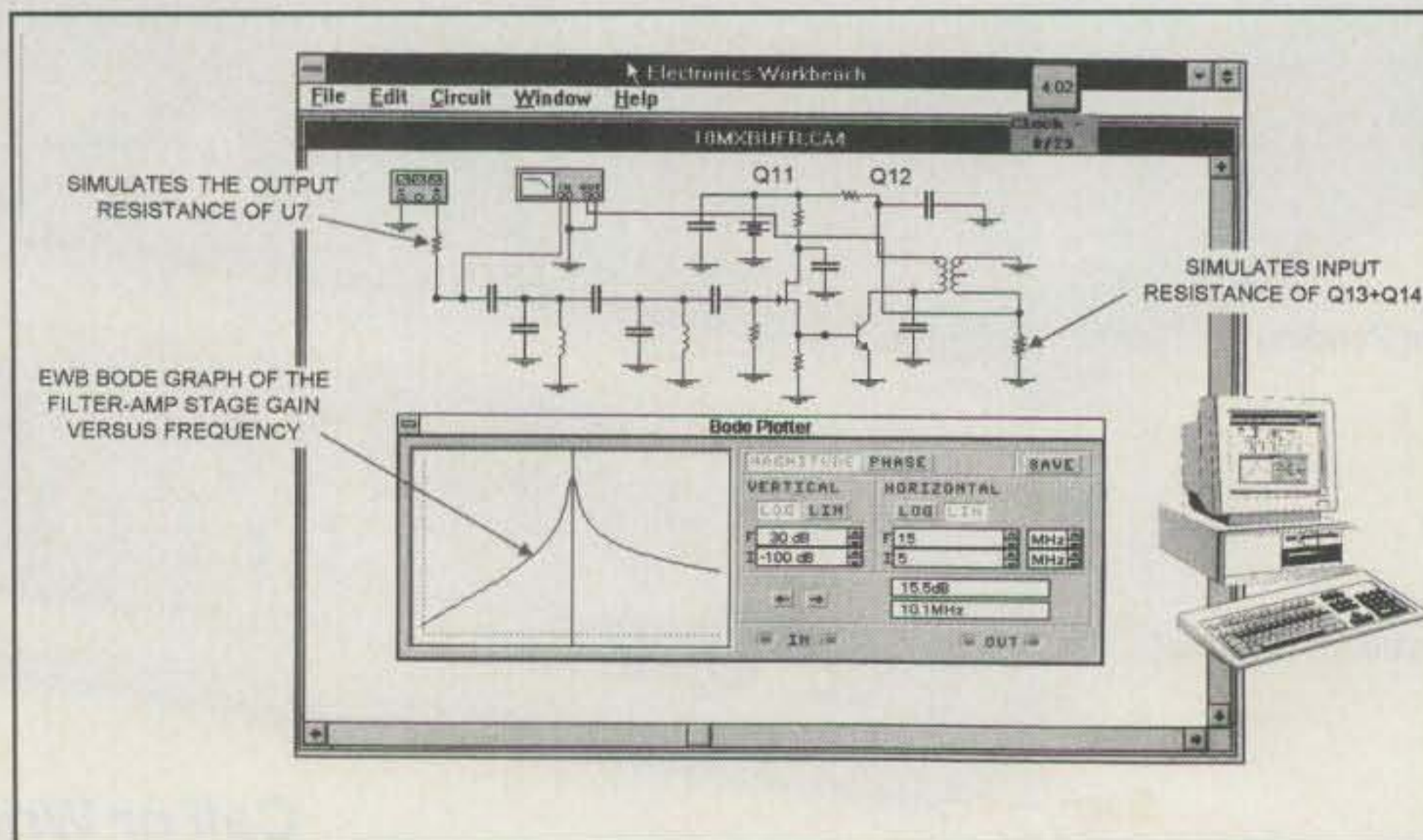


Fig. 9- A computer screen snapshot of the electronic workbench program with a bode graph of the post mixer filter-amplifier circuit in fig. 4. EWB is an easy-to-use IBM Windows program that will let you learn more about the circuits in your projects. It's an easy way to find out if your design works before you start soldering parts.

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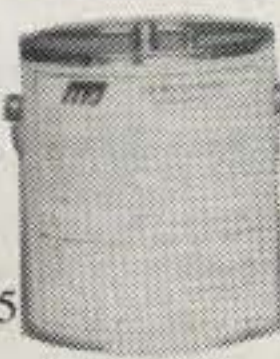


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## ANNOUNCEMENTS (from page 6)

Fairgrounds, Friendship, Wisconsin. For more information, contact Adams County ARC, P.O. Box 232, Friendship, WI 53934 (608-564-7887). (Exams.)

June 1, **NCARC Superfest**, Larimer County Fairgrounds, Loveland, Colorado. Contact Michael Robinson, AA0UB, 970-282-1167. (Exams.)

June 1, **Pine State ARC Hamfest**, Hermon High School, 1/2 mile east of Hermon Village, Maine. Contact Roger W. Dole, RR #2 Box 730, Bangor, ME 04401 (207-848-3846). (Exams.)

June 1, **Hamfest Nashville '96**, Tennessee State Fairgrounds, Nashville, Tennessee. Contact David Scott, KK4WZ, P.O. Box 23322, Nashville, TN 37202-3322 (615-736-7855 days; 615-356-2929 evenings).

June 2, **Manassas Hamfest and Computer Show**, Prince William County Fairgrounds, Manassas, Virginia. For further information, commercial vendors contact Joe, K4FPT, at 703-368-5424; general info, contact Mary Lou, KB4EFP, at 703-369-2877. (Handicapped accessible.)

June 2, **19th Annual Hamfest/Swap 'n Shop**, Chelsea Fairgrounds, Chelsea, Michigan. For more information, call Alan Robbins at 313-878-0363, or send an SASE to 3800 Hooker Road, Pinckney, MI 48169. (Handicapped accessible.)

June 2, **42nd Annual Breezeshooters Hamfest and Computer Show**, Butler Farm Show Grounds, Butler, Pennsylvania. For more info, send SASE to Breezeshooters, Kurt Schreiber, KA3LNG, 104 Forrest Grove Rd., Coraopolis, PA 15108 (412-859-3969).

June 2, **Contoocook Flea Market**, Exit 7 off I-89, 14 miles NW of Concord Flea Market, Contoocook, New Hampshire. For info, contact John Moore, N1FOJ, 603-746-4817, or packet BBS WA1ALM@WA1WOK.

June 2, **Bergen ARA Spring Hamfest**, Fairleigh Dickinson University, Teaneck, New Jersey. Contact Jim Joyce, 201-664-6727. (Exams contact Bob Neukonn, 201-427-3568 before 10 PM.)

June 2, **Newington Amateur Radio League Ham Radio & Computer Fleamarket**, Newington High School, Newington, Connecticut. Contact Fred Jarvis, 34 Meadow St., Newington, CT 06111, (860-666-1952). (Exams; preregistration required to Paul Sheldon,

N1LJA, 1509 Summer Hill Dr., S. Windsor, CT 06074.)

June 2, **Starved Rock Radio Club Hamfest**, Bureau County Fairgrounds, Princeton, Illinois. Contact Bruce, KU9A, or Debbie Burton, N9DRU, 1153 Union St., Marseilles, IL 61341-1710 (815-795-2201).

June 8, **16th Annual IRA Hamfestival**, Hudsonville Fairgrounds, 5 miles west of Grand Rapids, Michigan. Call Kathy Werkema, KB8KZH, 616-698-6627. (Exams.)

June 8, **Winston-Salem Hamfest**, Computer & Electronics Fair, Dixie Classic Fairgrounds, Winston-Salem, North Carolina. Contact Forsyth ARC, P.O. Box 11361, Winston-Salem, NC 27116-1361 (phone 910-723-7388; fax 910-765-6656). (Exams.)

June 8, **North Jersey Hamfest**, NJ National Guard Army, Riverdale, New Jersey. Contact Bernie, WB2YOK, fax/voice 201-584-5399.

June 8, **Central Ontario Amateur Radio Fleamarket**, Bingeman Park, Kitchener, Ontario, Canada. Contact Ted Eaton, VE3GJE, 102-21 Woodlawn Rd. E., Guelph, ON Canada N1H 1G6 (519-823-1027).

June 9, **Pleasant Hill Ham and Computer Show**, Pleasant Hill Fire Company, Hanover, Pennsylvania. Contact Ralph Stoffel, N3KZS, P.O. Box 381, Manchester, MD 21102 (410-239-8451). For show's exam information, call Bill, NZ3J, at 717-359-7090; or Pat, WW3U, at 717-632-4237 (pre-registration).

June 9, **The Annual Egyptian Fest Hamfest/ Computer Fair/Flea Market**, Granite City Campus, Belleville Area College, Granite City, Illinois. Contact Egyptian Radio Club, P.O. Box 562, Granite City, IL 62040; or call Bill Dusenbery, N9OQK, at 618-398-1456. (Exams.)

June 9, **Northern Kentucky Ham-O-Rama '96**, Erlanger, Kentucky Lions' Park. Contact N8JMV, c/o NKARC, P.O. Box 1062, Covington, KY 41012 (513-797-7252 evenings).

June 9, **Central Pennsylvania Ham and Computer Fest**, Union Township Volunteer Fireman Grounds, Winfield, Pennsylvania. For information, call Derek Batz, N2QWE, at 800-656-6066.

June 9, **Hall of Science ARC Hamfest**, New York Hall of Science parking lot, Flushing, New York. Call Arnie Schiffman, WB2YXB, 718-343-0172 (evenings).

June 14-15, **Albany ARC Hamfest & Georgia Computer Fair**, James H. Gray Civic Center, Albany,

Georgia. Contact Albany ARC, P.O. Box 70601, Albany, GA 31708-0601. (Exams Friday at 7 PM.)

June 15, **Raritan Valley Radio Club '96 Hamfest**, Columbia Park, Dunellen, New Jersey. For more information, contact John Manna, WA2F, 908-722-9045; or Bob Pearson, WB2CVL, 908-846-2056; for pre-registration call Guy Glaser, KE2CG, 908-968-0297 (before 8 PM).

June 15, **Bluefield Hamfest**, Graham Middle School, Bluefield, Virginia. For more information, send SASE to Bluefield Hamfest, Inc., 412 Ridgeway Drive, Bluefield, VA 24605-1630; or call Don Williams, WA4K, at 540-326-3338. (Handicapped accessible; exams.)

June 16, **Lake County (IN) ARC Dad's Day Hamfest**, Lake County Fairgrounds, Crown Point, Indiana. Contact Dave Snell, N9WLP, 833 Schilling Dr., Dyer, IN 46311 (219-865-6131). (Exams 9 AM.)

June 16, **Monroe County Communications Assn. Hamfest**, Monroe County Fairgrounds, Monroe, Michigan. Contact Fred VanDaele, 4 Carl Dr., Monroe, MI 48162 (313-242-9487).

June 22, **Lake County Hamfest**, Lake County Independent Amateur Radio Assn., Murray County Coliseum, Sulphur, Oklahoma. Contact Michael Key, KC5RPT, P.O. Box 38, Overbrook, OK 73453 (405-223-5647).

June 28, **Black Hills ARC Hamfest**, Surbeck Center, South Dakota School of Mines & Technology, Rapid City, South Dakota. Write to P.O. Box 294, Rapid City, SD 57709 (SASE). (Exams.)

June 29, **North Bay ARA Swap Meet**, Vallejo Sr. High School, Vallejo, California. Contact Joe Thompson, KE6FCH, or Mary Thompson, KE6NLT, 925 Tennessee Street, Vallejo, CA 94590 (707-552-5770).

June 29, **The PARA Annual Hamfest**, Paducah Executive Inn Convention Center, Paducah, Kentucky. Contact David Fraser, 230 Jason Drive, Kevil, KY 42053 (phone 502-488-2031; e-mail fraser@vci.net). (Exams.)

June 30, **Six Meter Club of Chicago Hamfest**, DuPage County Fairgrounds, Wheaton, Illinois. Call 708-442-4961.

June 30, **Whitewater Valley ARC Fly-in/Drive-in Hamfest & Computer Show**, Richmond Municipal Airport, south of Richmond, Indiana on State Route 227. Contact Ken, KB9UO, or Janet, KB9UP, 3425 Woods Dr., Richmond, IN 47374 (317-935-2853).

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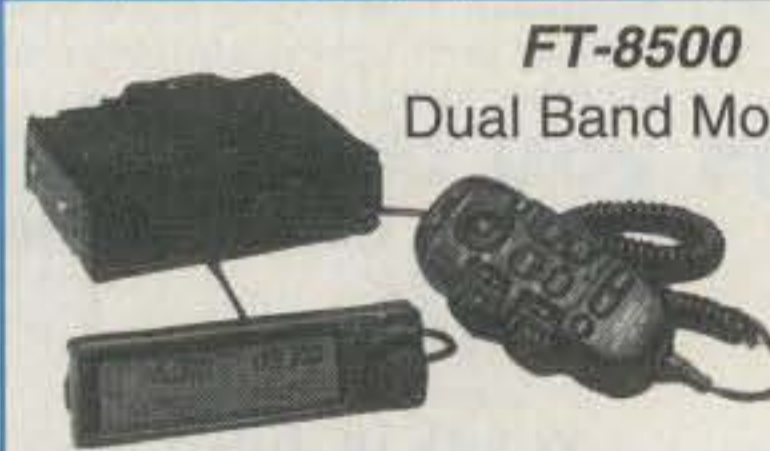
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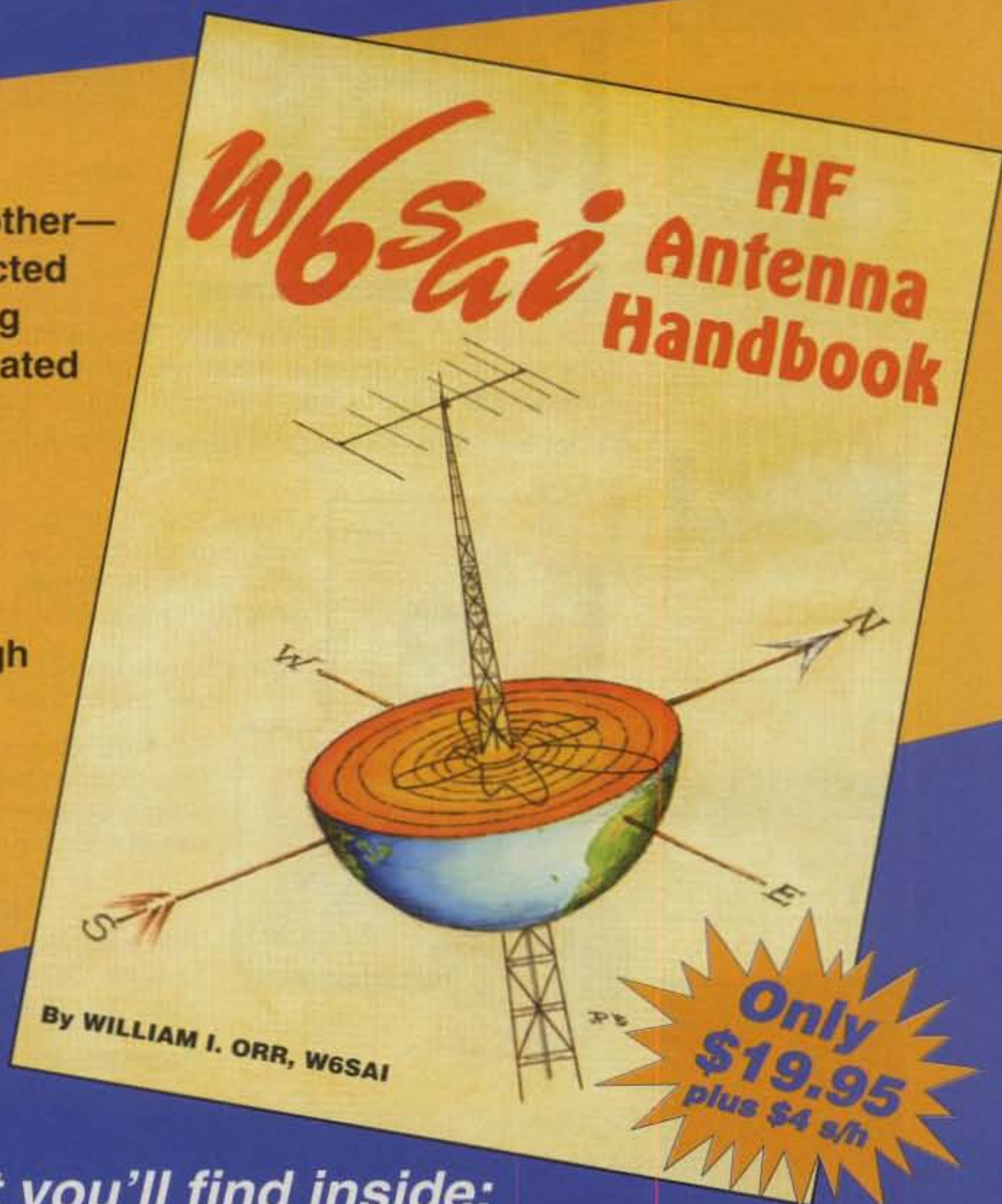




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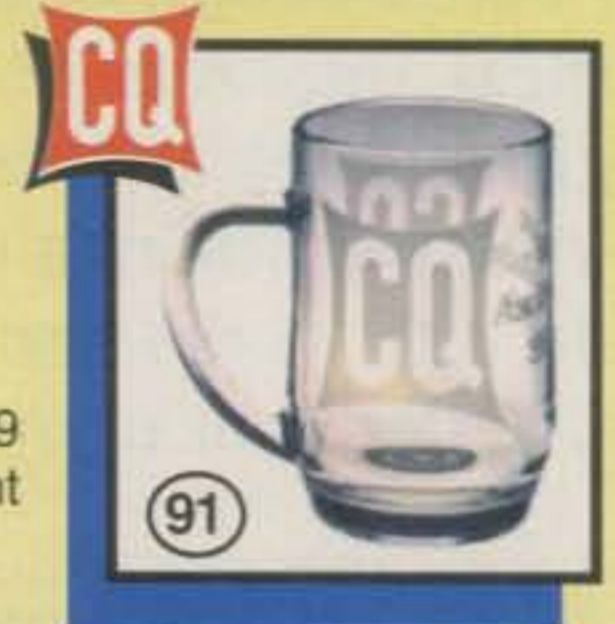


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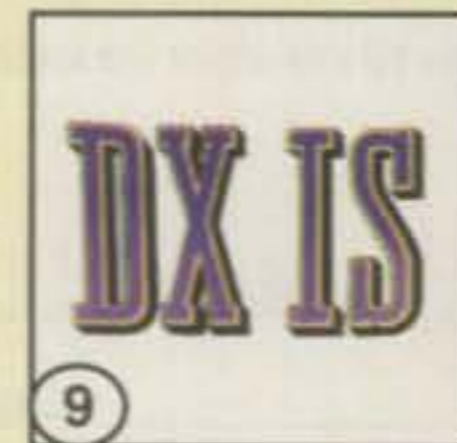
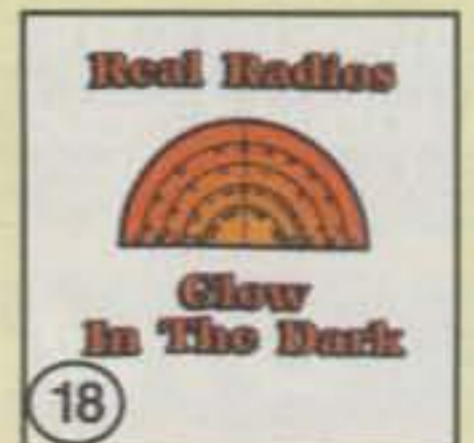
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
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
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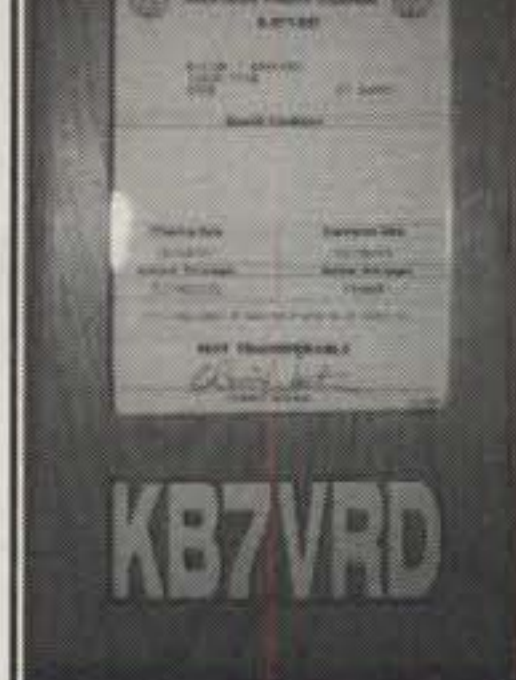
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# INTRODUCING R7000

**The next generation  
of 7 band antenna  
technology is here!  
Cushcraft is proud to  
introduce the R7000.**

- **EXPANDABLE TO 80M**  
Transform your R7000 into a R7000+ with R80 kit (trap, tubing, guy & ground wire)
- **RELIABLE**  
New trap design is stable in all conditions
- **EASY INSTALLATION**  
For typical use, tuning is not needed after installation
- **AUTOMATIC BAND CHANGING**  
To any band from 10 through 40m (80m with R80 kit)
- **SLIM SILHOUETTE**  
Gain favor of family and neighbors with the slim, smooth profile of our new trap design.

#### SPECIFICATIONS

FREQUENCY  
10, 12, 15, 17, 20, 30, 40 M  
(80 M with optional add-on)  
HEIGHT  
R7000 - 24 feet (7.3 M)  
R7000+ - 32 feet (9.8 M)

The all new R7000 is a 10 through 40 meter, no ground radial antenna that is expandable to include the excitement of 80 meters. It includes the best features of it's predecessors the R5 and R7 plus many more. R7000 means excellent performance, easy installation and use, slim silhouette and high reliability.

### CHECK OUT THESE FEATURES

**Controlled Inductance Traps**  
Cushcraft holds the trap inductance within close tolerance so there's less tuning and outstanding in-weather performance.

**AL6063 Cover Design**  
The cover completes the LC circuit of the trap. The beauty is in the simplicity; these elegant trap covers make stable capacitance and higher power handling possible.

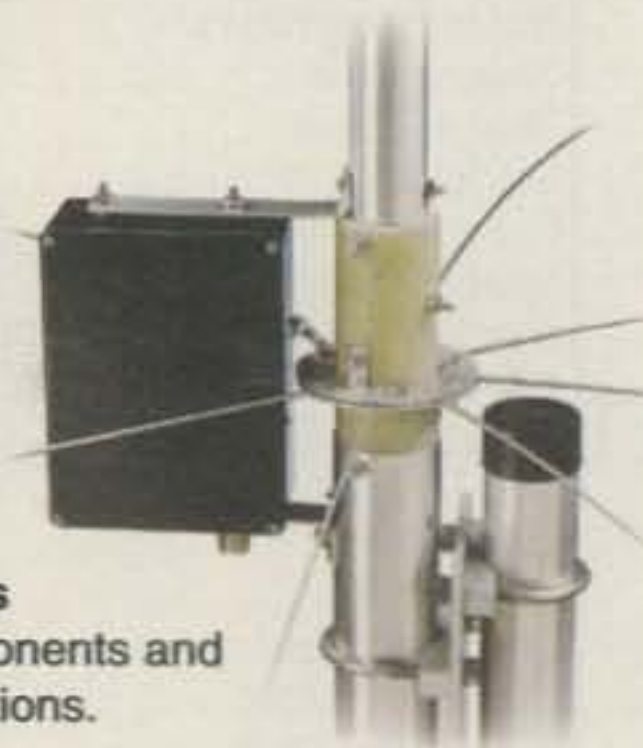


**All Materials**  
are either stainless steel, aluminum, or high impact plastic.

**Double Wall Tubing**  
makes up the lower three sections. This 0.116 inches of wall insures top performance in winds up to 80 mph.

**Mounting Hardware**  
is extra rugged and makes installation easy on any 1-3/4" to 2-1/8" OD mast.

**Stainless Steel Screws**  
stabilize the base components and insulator in windy conditions.



If you'd like to know more about the R7000 and R7000+, check it out at <http://www.cushcraft.com>. We'll even show you what's inside the black box and tell you how it works. Or get an R7000 brochure from your dealer anywhere in the world, [hamsales@cushcraft.com](mailto:hamsales@cushcraft.com), or by contacting our ham sales department.

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# One tough little dual bander!

## Features

- Frequency Coverage  
Wide Band Receive  
RX: 76-200 MHz, 300-540 MHz, 590-999 MHz\*  
TX: 144-148 MHz, 430-450 MHz
- AM Aircraft Receive
- MIL-STD 810 Rating
- Digital Coded Squelch (DCS)
- 112 Memory Channels
- 12V DC Direct Input
- High Speed Scanning
- Alphanumeric Display
- CTCSS Encode (Decode w/FTT-12)
- Auto Range Transpond System™ (ARTS™)
- Dual Watch
- Direct FM
- High Audio Output
- ADMS-1C Windows™ Programmable
- Four Battery Savers:  
Automatic Power-Off (APO)  
Receive Battery Saver (RBS)  
Selectable Power Output (SPO)  
Transmit Battery Saver (TBS)
- Time Out Timer (TOT)
- 2.5 and 5 Watt Versions Available
- Optional Digital Voice Recording System (DVRS)
- Full line of accessories



"You notice how loud this HT's audio is?"

"Yeah, it's Mil Spec tough like a commercial HT."



"Easy to operate, small, great price!"

"Yaesu did it again!"



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Dynamic and exclusive features set the FT-50R apart, too. Wide Band Receive includes 76-200 MHz (VHF), 300-540 (UHF), and 590-999 MHz\*. Dual Watch checks sub-band activity while receiving on another frequency, then when a signal is detected, shifts operation to that frequency. Digital

Battery Voltage displays current operating battery voltage. Digital Coded Squelch (DCS) silently monitors busy channels. Auto Range Transpond System™ (ARTS™) uses DCS to allow two radios to track one another. And, the FT-50R is ADMS-1C Windows™ PC programming compatible, too. To round out the FT-50R, it has four battery savers, and super loud audio—remarkable in an HT this size.

A reliable companion where ever you go, the FT-50R is one tough little dual bander with all the features you want!

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  - Digital Automatic Notch
  - Digital Ultra-Narrow CW Filter
  - Digital Automatic APF (Audio Peak Filter)
- Rx 100 kHz -29.990 MHz
- New Single Crystal Control DDS
- RTTY/DATA Mode
- HF Packet Ready
- IF Notch
- APF (Audio Peak Filter)
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- Memory CW Keyer
- CW Pitch Control & CW Reverse Mode
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