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# 73<sup>®</sup> Amateur Radio Today

## Build:

- VLF to HF Receiving Loop
- Bench DC P.S.
- Ladder Xtal Filters for NBFM

## More Tesla

## Testing VHF DX

## The 21st-Century Scrounger



COVER:  
World ARDF  
Championships  
page 51

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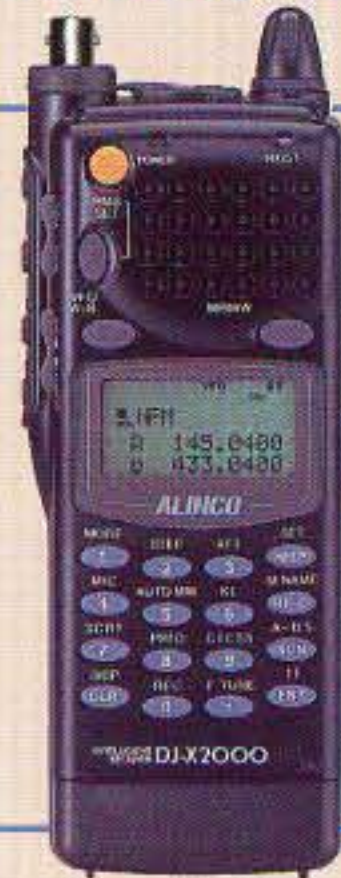
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# Are You Prepared?

*Every radio enthusiast should own at least one scanning receiver. **Alinco offers four great choices!***

*No matter what your role, if you're an emergency responder, part of the government, media, business or just an involved citizen, a multi-mode scanning receiver can keep you informed and up with current events. There's a world of communications happening all day, every day. Stay on top of developments with an Alinco scanning receiver.*

*Here are some of the activities you can monitor: Shortwave, commercial AM & FM broadcasts, Ham radio, police, auto racing communications, fire, security, medical, FRS, GMRS, CB, maritime, weather, news media, railways, military, aircraft control, service industries, search & rescue operations and much more!*



## DJ-X2000

*Alinco's top of the line "Intelligent Receiver" tunes from 100 KHz ~ 2.15 GHz with excellent sensitivity* and a triple conversion front end. Receives WFM, NFM, AM, USB, LSB, CW and FM stereo\*, 2000 memory channels with alpha-numeric labeling, download free computer control software from the Alinco web site. Flash Tune™ locks onto and monitors strong local signals! On board "Help" feature, digital recorder, frequency counter, CTCSS search & decode, Channel Scope™ spectrum activity display, Ni-Cd battery & quick charger included. BNC antenna port with new, wide-range "ducky" antenna included.

## DJ-X3

*Amazing performance in a small, easily carried package!* Coverage range from 100 KHz ~ 1.3 GHz with 700 memory channels. Receives WFM, FM stereo\*, NFM and AM modes. Includes SMA "ducky" antenna, earphone, and internal ferrite-bar antennas for AM & shortwave. Ultra sensitive triple-conversion front end. Large illuminated display. Free downloadable control software from the Alinco web site.



## DJ-X10

*This high-performance receiver covers 100 KHz ~ 2 GHz*, has 1200 alpha-numeric memory channels, internal "help" feature, Channel Scope™ spectrum display, receives, AM, NFM, WFM, USB, LSB and CW, triple conversion front end, superb sensitivity, BNC antenna port with wide-range "ducky" antenna and an amazing array of optional accessories. Check Alinco's web site for computer control software.



## DJ-X2

*Is this the world's smallest scanning receiver?* "Credit Card" size is easily carried in a shirt or jacket pocket, yet it opens a world of reception, covering 522 KHz ~ 1 GHz. 700 memory channels; AM, FM, WFM modes. Internal Lithium-ion battery PLUS snap-on dry-cell power pack. Effective RF "sniffer" feature detects hidden transmitters (patent pending). Three different antenna modes including internal ferrite bar. Easy and Expert user operating profiles. Preset, memory and VFO operating modes. Illuminated display. Free computer control software available at the Alinco web site.



## IHMM3 Magnetic Scanner Antenna

BNC connector, just 13.5 inches high. Powerful rare-earth magnet, 9 feet of RG-174 cable. Receives 100 ~ 1200 MHz, can transmit on 2m, 440~ 450 MHz and 824~ 896 cellular frequencies. Also available with Motorola style antenna connector.



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Cellular reception blocked on USA models. Unblocked versions available for qualifying agencies, documentation required.

\*Optional stereo headphones required to receive FM stereo transmissions.

Specification subject to change without notice or obligation. Check local regulations before using a scanning receiver in mobile operation.

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Photo by Joe Moell KØOV

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*Check out this LED super-system.*

## QRX . . .

### 12-Step Program for E-mail Forwarders

OK, everyone, all together:

1. I will NOT get bad luck, lose my friends, or lose my mailing lists if I DON'T forward an E-mail!

2. I will NOT hear any music or see a taco dog, if I DO forward an E-mail.

3. Bill Gates is NOT going to send me money, and Victoria's Secret doesn't know anything about a gift certificate they're supposed to send me.

*Continued on page 6*

**Manuscripts:** Contributions for possible publication are most welcome. We'll do the best we can to return anything you request, but we assume no responsibility for loss or damage. Payment for submitted articles will be made after publication. Please submit both a disk and a hard copy of your article [IBM (ok) or Mac (preferred) formats], carefully checked drawings and schematics, and the clearest, best focused and lighted photos you can manage. "How to write for 73" guidelines are available on request. US citizens, please include your Social Security number with submitted manuscripts so we can submit it to you know who.

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MODEL SS-12IF



MODEL SS-18



MODEL SS-25M



MODEL SRM-30



MODEL SRM-30M-2



MODEL SS-12SM/GTX



MODEL SS-10EFJ-98

**SPECIAL FEATURES:**

- HIGH EFFICIENCY SWITCHING TECHNOLOGY SPECIFICALLY FILTERED FOR USE WITH COMMUNICATIONS EQUIPMENT, FOR ALL FREQUENCIES INCLUDING HF
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- LOW PROFILE, LIGHT WEIGHT PACKAGE
- EMI FILTER
- MEETS FCC CLASS B

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- FUSE PROTECTION
- OVER TEMPERATURE SHUTDOWN

**SPECIFICATIONS:**

INPUT VOLTAGE: 115 VAC 50/60HZ  
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SWITCH SELECTABLE  
OUTPUT VOLTAGE: 13.8VDC

**AVAILABLE WITH THE FOLLOWING APPROVALS: UL, CUL, CE, TUV.**

**DESKTOP SWITCHING POWER SUPPLIES**

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-10	7	10	1 7/8 x 6 x 9	3.2
SS-12	10	12	1 7/8 x 6 x 9	3.4
SS-18	15	18	1 7/8 x 6 x 9	3.6
SS-25	20	25	2 1/8 x 7 x 9 1/8	4.2
SS-30	25	30	3 1/4 x 7 x 9 1/8	5.0

**DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS**

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2 1/8 x 7 x 9 1/8	4.2
SS-30M*	25	30	3 1/4 x 7 x 9 1/8	5.0

**RACKMOUNT SWITCHING POWER SUPPLIES**

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3 1/2 x 19 x 9 1/8	6.5
SRM-30	25	30	3 1/2 x 19 x 9 1/8	7.0

**WITH SEPARATE VOLT & AMP METERS**

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3 1/2 x 19 x 9 1/8	6.5
SRM-30M	25	30	3 1/2 x 19 x 9 1/8	7.0

**2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL**

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3 1/2 x 19 x 9 1/8	10.5
SRM-30-2	25	30	3 1/2 x 19 x 9 1/8	11.0

**WITH SEPARATE VOLT & AMP METERS**

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3 1/2 x 19 x 9 1/8	10.5
SRM-30M-2	25	30	3 1/2 x 19 x 9 1/8	11.0

**CUSTOM POWER SUPPLIES FOR RADIOS BELOW**

- EF JOHNSON AVENGER GX-MC41
- EF JOHNSON AVENGER GX-MC42
- EF JOHNSON GT-ML81
- EF JOHNSON GT-ML83
- EF JOHNSON 9800 SERIES
- GE MARC SERIES
- GE MONOGRAM SERIES & MAXON SM-4000 SERIES
- ICOM IC-F11020 & IC-F2020
- KENWOOD TK760, 762, 840, 860, 940, 941
- KENWOOD TK760H, 762H
- MOTOROLA LOW POWER SM50, SM120, & GTX
- MOTOROLA HIGH POWER SM50, SM120, & GTX
- MOTOROLA RADIUS & GM 300
- MOTOROLA RADIUS & GM 300
- MOTOROLA RADIUS & GM 300
- UNIDEN SMH1525, SMU4525
- VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

**NEW SWITCHING MODELS**

- SS-10GX, SS-12GX
- SS-18GX
- SS-12EFJ
- SS-18EFJ
- SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
- SS-12MC
- SS-10MG, SS-12MG
- SS-101F, SS-121F
- SS-10TK
- SS-12TK OR SS-18TK
- SS-10SM/GTX
- SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
- SS-10RA
- SS-12RA
- SS-18RA
- SS-10SMU, SS-12SMU, SS-18SMU
- SS-10V, SS-12V, SS-18V

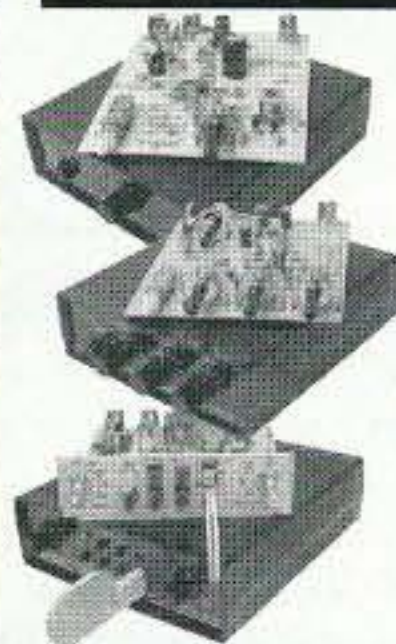


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**35 WATT LPFM STEREO TRANSMITTER**



- ✓ 35W RF output, VSWR protected
- ✓ Automatic audio & power controls
- ✓ Digital synthesized PLL
- ✓ Full front panel control
- ✓ 110/220VAC, 12VDC operation

Whether your application is export or LPFM, the PX1 has you covered. From the over-rated continuous duty power supply & power amplifier to the 2 line vacuum fluorescent display, your station will be the easiest to setup and the most reliable for continuous operation. Full microprocessor controls provide a "virtual engineer". Check out [www.highpowerfm](http://www.highpowerfm) for full details.

PX1 35W Professional FM Stereo Transmitter \$1,795.95

**TOUCH-TONE TONE GRABBER**



- ✓ New-built-in RJ11 phone jack
- ✓ Large memory holds over 500 numbers
- ✓ Big bold 8 digit display, auto insertion of dashes
- ✓ New-output latch jack

Dialed phone numbers on the radio, repeater codes, control codes, anywhere touch-tones are used, you can read and store them! All new design for 2002. Capture those tones with the TG2!

TG2 Tone Grabber Tone Reader Kit \$59.95  
 CTG2 Matching Case & Knob Set \$14.95  
 AC125 110 VAC Power Adapter \$9.95

**ELECTROCARDIOGRAM HEART MONITOR**



- ✓ Visible and audible display of your heart rhythm
- ✓ Re-usable sensors included; just like visiting the hospital!
- ✓ Bright LED "beat" indicator
- ✓ Monitor output for oscilloscope display

Enjoy learning about the inner workings of the heart while covering the stage by stage electronic circuit theory of ECG/EKG systems. Be heart smart and learn at the same time!

ECG1 Electrocardiogram Heart Monitor Kit \$34.95  
 CECG Matching Case & Knob Set \$14.95  
 AC125 110 VAC Power Adapter \$9.95  
 ECGP10 Replacement Reusable Probe Patches (10-Pack) \$7.95

**XLR TO RCA AUDIO CONVERTER**



- ✓ Connect consumer outputs to XLR inputs
- ✓ Left & right audio gain adjustments

So you're trying to connect consumer audio outputs with RCA connectors (unbalanced) to XLR (balanced) inputs. Always a problem...Not anymore with the R2XL1!

R2XL1 Unbalanced to Balanced Audio Converter Kit \$49.95  
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**PROFESSIONAL FM STEREO RADIO STATION**



- ✓ Synthesized 88 to 108 MHz with no drift!
- ✓ Built-in mixer - 2 line inputs and one microphone input!
- ✓ High power module available for export use
- ✓ Low pass filter for great audio response

Our FM100 is used all over the world by serious hobbyists as well as churches, drive-in theaters, and schools. Frequency synthesized PLL assures drift-free operation with simple front panel frequency selection. Built-in audio mixer features LED bargraph meters to make setting audio a breeze. The kit includes metal case, whip antenna and built-in 110 volt AC power supply.

FM100 Super-Pro FM Stereo Radio Station Kit \$249.95  
 FM100WT 1 Watt, Wired Export Version \$399.95

**SYNTHESIZED FM STEREO TRANSMITTER**



- ✓ All new design & features for 2002!
  - ✓ Fully adjustable RF output
- Our #1 kit for years has just gotten better for 2002! Totally redesigned, the FM25B has all the features you've asked for. From variable RF output, F connector RF output jack, line input, loop output, and more.

Includes case, power supply, whip antenna, audio cables.  
 FM25B Synthesized FM Stereo Transmitter Kit \$129.95

**AUTOMATIC COLOR/BW IR CAMERA**



- ✓ Color during the day, IR B&W at night!
  - ✓ Automatically turns on IR illumination!
  - ✓ Waterproof to IP57 standards!
  - ✓ Black anodized housing with universal mount
- Best of both worlds! This video camera is a waterproof COLOR camera during the day. When the light level drops, it automatically changes to B&W and turns on its built-in IR illumination, with 10 IR LEDs. Powered by 12VDC and terminated with a professional BNC connector. B&W only model also available if color is not needed.

Both in heavy anodized black housing.  
 CCD309 Color/B&W IR Waterproof Bullet Camera \$169.95  
 CCD308 B&W IR Waterproof Bullet Camera \$109.95  
 AC125 110 VAC Power Adapter \$9.95

**MINI B&W CAMERA WITH IR ILLUMINATION**



- ✓ Built in IR illumination!
  - ✓ Sees in total darkness!
- What a deal! This miniature B&W video camera has 6 high power IR LEDs built into it to provide illumination in total darkness! No need for external IR illuminators. Attractive black aluminum housing easily mounts at any angle with the built-in swivel bracket. Runs on 12VDC, and includes professional BNC output plug-in harness.

CCD303 Mini B&W IR Illuminated Camera \$59.95  
 AC125 110 VAC Power Adapter \$9.95

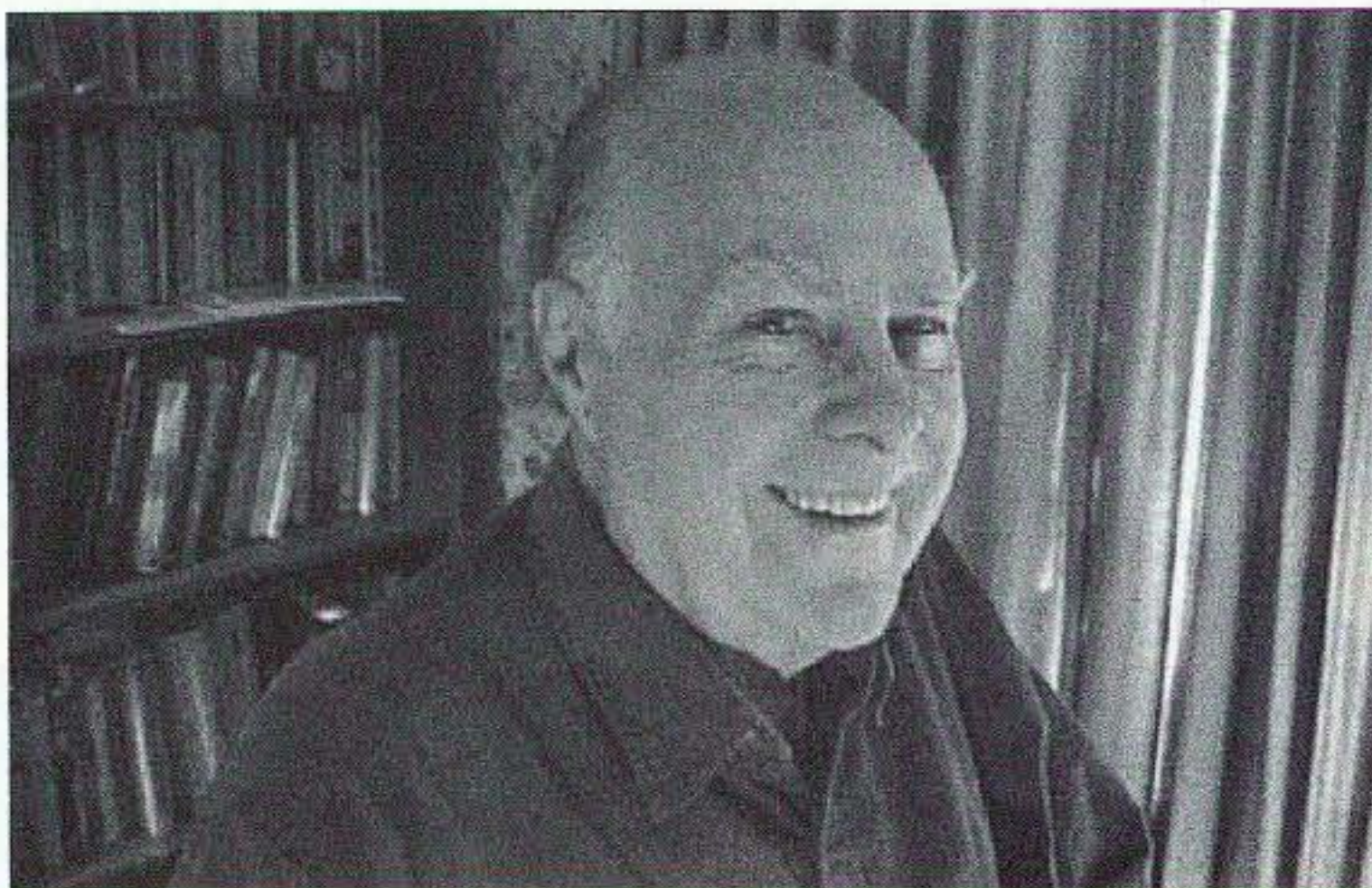
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## Wise Up & Beat the Odds

### NEVER SAY DIE

Wayne Green W2NSD/1

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www.waynegrain.com

#### Shareware

It was the fun I was having with ham teletype (RTTY) that got me to start a newsletter back in 1951. I just had to share the fun I was having with as many others as I could. My little mimeographed newsletter grew into a small magazine. Pretty soon I was doing an RTTY column for *CQ* and there were thousands of us having a ball with this first digital mode of communication. The next thing I knew I was the editor of *CQ* and sharing the fun I was having with amateur radio with tens of thousands of readers.

When the publisher fired me rather than catch up on the year's pay he owed me I decided to start my own magazine — this one — so I could share the fun I'd had building my own equipment, working DX, pioneering on the VHF bands, and so on.

In my editorials I've shared the fun I've had on DX-peditions, my ham satellite contacts, slow scan, RTTY, repeaters, and so on. I've always urged my readers to "come on in, the water's fine."

So what about you, Buster? What's it take to get you busy with your word processor and sharing the fun ham radio has and is providing you? If it wasn't any fun you'd be looking for something else to do, right?

Field Day is a ball, but have you ever bothered to share the fun you've had with others by sending in an article or at least a letter to the editor?

How many exciting times have you had that you'll

never forget? Like the time I managed to work Moscow via Oscar where there was a 20-second window of opportunity! Like the contest weekend when I worked 100 countries on 20m SSB. Like the night I decided to see if I could work all states on 75m — and did! Like the time I worked all continents within 20 minutes. Like the time I worked W7IMW/C7 in Tiensin, China modulating a signal generator running a tenth watt. Like I could go on for days with things I'll never forget.

I'd love to publish pages and pages of letters about the exciting things you'll never forget.

Six meters has been going berserk lately, with the twin sun spot peaks. Too bad if you've been missing the once-in-a-lifetime conditions. Too bad, too, if you haven't been sharing your excitement with as many others as you can via your word processor. Tsk.

#### Advertising

Another really fun part of the hobby is getting a new piece of equipment and using it. Again, here's an opportunity for you to share the fun you're having with as many other hams as you can. Get busy writing. Sure, we can read the ads and sales literature, but nothing is more persuasive than hearing from others who are having a ball with something new.

Judge Glanzer K7GCO is all fired up over his six meter Raibeam, and he writes about it. He loves it and wants to

share the fun he's been having with others. So, how about you? Hey, wake up!

When some company is putting out a great product, give 'em a hand — and I don't mean by clapping. Help 'em get the word out.

Sure. I'd love to have more ham industry advertising — the more ads we have, the more pages you'll have to read. But it's going to take the sales of equipment for them to have the money to advertise. I'm not sure that they are aware of the concept that their sales depends on their prospective customers being aware of their products, and that awareness is the result of exposure. If your prospective customers don't know you exist, you won't. So you can help the manufacturer by sharing the fun you've had with others, at least via a letter.

#### More Sharing

While most of the readers turn first to my editorials to find out what weird subject of book I want to share with them next, there are a few who grouse when I'm not writing totally about hamming. I really feel sorry for anyone with so little an interest in learning about things — and most of the stuff I write about you aren't going to find many other places — if any.

#### Speed Reading

Yes, speed reading is real. Yes, people can learn to read thousands of words per minute, and with 100% comprehension. The good news is that

anyone who really wants to can learn to speed read. The bad news is that it's a whole lot more difficult for adults to learn than for young kids. Kids from eight to twelve are able to learn to speed read in a few hours.

How come the difference? Slow reading, where you go one word at a time, is a left brain operation. Speed reading, where you see a whole page at a time, is a right brain deal, so you have to retrain the right brain to this new task. Kids, whose brains are still busy growing more neurons and connections, have a big advantage.

When you look at a picture you don't look at each little part of it, you take in the whole picture. With a little practice, it just takes a glance for you to describe every detail of the picture. It's the same thing with learning to speed read.

When I took a speed reading class at the local high school they taught us to see groups of words, and then whole lines. This sped us up, but just from the usual couple hundred words per minute to a few more hundred, not thousands. At that time the concept of photo-reading was not even on the horizon.

A book and a video from George Stancliffe, Box 227, Toppenish WA 98948, with his *Speed Reading 4 Kids* info, explains how anyone can teach kids 8-12 to speed read, even if they aren't able to do it themselves. The video shows how easily and quickly

*Continued on page 59*

# Big Savings on Radio Scanners

## Uniden® NEW!



### Bearcat® 780XLT Trunk Tracker III

Mfg. suggested list price \$529.95

**Less -\$190 Instant Rebate / Special \$339.95**

**500 Channels • 10 banks • CTCSS/DCS • S Meter**

**Size: 7 5/8" Wide x 6 15/16" Deep x 2 13/16" High**

**Frequency Coverage:** 25.0000-512.0000 MHz., 806.000-

823.9875MHz., 849.0125-868.9875 MHz., 894.0125-1300.000 MHz.

The Bearcat 780XLT has 500 channels and the widest frequency coverage of any Bearcat scanner ever. Packed with features such as Trunktracker III to cover EDACS, Motorola and EF Johnson systems, control channel only mode to allow you to automatically trunk certain systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display & backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control with RS232 port, Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for \$29.95; The BC780XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. For fastest delivery, order on-line at [www.usascan.com](http://www.usascan.com).

### Bearcat® 895XLT Trunk Tracker

Mfg. suggested list price \$499.95

**Less -\$320 Instant Rebate / Special \$179.95**

**300 Channels • 10 banks • Built-in CTCSS • S Meter**

**Size: 10 1/2" Wide x 7 1/2" Deep x 3 3/8" High**

**Frequency Coverage:** 29.000-54.000 MHz., 108.000-174

MHz., 216.000-512.000 MHz., 806.000-823.995 MHz., 849.0125-

868.995 MHz., 894.0125-956.000 MHz.

The Bearcat 895XLT is superb for intercepting trunked communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: PS001 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; PS002 DC power cord - enables permanent operation from your vehicle's fuse box \$14.95; MB001 Mobile mounting bracket \$14.95; EX711 External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.



## SCANNERS

### Bearcat® 245XLT Trunk Tracker II

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**300 Channels • 10 banks • Trunk Scan and Scan Lists**

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Our Bearcat TrunkTracker BC245XLT, is the world's first scanner designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Our scanner offers many new benefits such as Multi-Track - Track more than one trunking system at a time and scan conventional and trunked systems at the same time. 300 Channels - Program one frequency into each channel. 12 Bands, 10 Banks - Includes 12 bands, with Aircraft and 800 MHz. 10 banks with 30 channels each are useful for storing similar frequencies to maintain faster scanning cycles or for storing all the frequencies of a trunked system. Smart Scanner - Automatically program your BC245XLT with all the frequencies and trunking talk groups for your local area by accessing the Bearcat national database with your PC. If you do not have a PC simply use an external modem. Turbo Search - Increases the search speed to 300 steps per second when monitoring frequency bands with 5 KHz. steps. 10 Priority Channels - You can assign one priority channel in each bank. Assigning a priority channel allows you to keep track of activity on your most important channels while monitoring other channels for transmissions. Preprogrammed Service (SVC) Search - Allows you to toggle through preprogrammed police, fire/emergency, railroad, aircraft, marine, and weather frequencies. Unique Data Skip - Al-



lows your scanner to skip unwanted data transmissions and reduces unwanted birds. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in your scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - An LCD light remains on for 15 seconds when the back light key is pressed. Autolight - Automatically turns the backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BC245XLT automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BC245XLT also works as a conventional scanner. Now it's easy to continuously monitor many radio conversations even though the message is switching frequencies. The BC245XLT comes with AC adapter, one rechargeable long life ni-cad battery pack, belt clip, flexible rubber antenna, earphone, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, ESAS or LTR systems. Hear more action on your radio scanner today. Order on-line at [www.usascan.com](http://www.usascan.com) for quick delivery.

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Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner.....	\$159.95
Bearcat 245XLT 300 ch. Trunktracker II handheld scanner.....	\$189.95
Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner.....	\$89.95
Bearcat Sportcat 200 alpha handheld sports scanner.....	\$169.95
Bearcat Sportcat 180B handheld sports scanner.....	\$149.95
Bearcat 80XLT 50 channel handheld scanner.....	\$99.95
Bearcat 60XLT 30 channel handheld scanner.....	\$74.95
Bearcat BCT7 information mobile scanner.....	\$139.95
AOR AR8200 Mark II Wide Band handheld scanner.....	\$539.95
AOR AR16BQ Wide Band scanner with quick charger.....	\$209.95
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ICOM PCR1000 computer communications receiver.....	\$379.95
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continued from page 1

4. Ford will NOT give me a 50% discount even if I forward my E-mail to more than 50 people!

5. I will NEVER receive gift certificates, coupons, or freebies from Coca-Cola, Cracker Barrel, Old Navy, or anyone else if I send an E-mail to 10 people (OR OUTBACK STEAK HOUSE!!!).

6. I will NEVER see a pop-up window if I forward an E-mail ... NEVER, NEVER!!

7. There is NO SUCH THING as an E-mail tracking program, and I am not STUPID enough to think that someone will send me \$100 for forwarding an E-mail to 10 or more people!

8. There is NO kid with cancer through the Make-a-Wish program in England collecting anything! He did when he was 7 years old. He is now cancer-free and 35 years old and DOESN'T WANT ANY MORE POSTCARDS or GET WELL CARDS.

9. The government does not have a bill in Congress called 901B (or whatever they named it this week) that, if passed, will enable them to charge us five cents for every E-mail we send.

10. There will be NO cool dancing, singing, waving, colorful flowers, characters, or program that I will receive immediately after I forward an E-mail. NONE, ZIP, ZERO, NADA!!

11. The American Red Cross will NOT donate 50 cents to a certain individual dying of some never-heard-of disease for every E-mail address I send this to. The American Red Cross RECEIVES donations.

12. And finally, I WILL NOT let others guilt me into sending things by telling me I am not their friend or that I don't believe in Jesus Christ. If God wants to send me a message, I believe the bushes in my yard will burn before He picks up a PC to pass it on!

Now, repeat this to yourself until you have it memorized, and send it along to at least five of your friends before the next full moon or you will surely be constipated for the next three months, and all of your hair will fall out.

Received on the Internet (where it had been forwarded to us).

## And Now, a Word From ...

No, Newsline isn't a sponsor of 73 — or affiliated with it in any way — but it is the source of much grist for the QRX mill. And much more important, Amateur Radio Newsline provides desperately needed publicity about ham radio to ARS and non-ARS outlets around the world. We urge 73 readers to support Newsline with a donation — and tell them Uncle Wayne sent you! — J.B.

Hi, I'm Andy Jarema N6TCQ, Chief Financial Officer of the not-for-profit organization you know as the Amateur Radio Newsline.

Let me start by saying that we really appreciate the individuals who give of themselves in the form

of helping us out, but we don't hear from enough clubs. There are literally thousands, perhaps tens of thousands of traditional radio clubs and repeater clubs out there. These are the wonderful folks who re-transmit our broadcasts, bringing your nets increased value, and giving your members the latest in amateur radio news and information to enhance their hobby.

But *Amateur Radio Newsline* cannot continue without the funding needed to pay the monthly bills. And right now, we can't.

In the quarter century that it has existed, no one at the *Amateur Radio Newsline* has ever taken a salary. We all volunteer our time and talents. But we ARE faced with monthly expenses for gathering and delivering the news to YOU! We are talking telephone, Internet access, and the like. This hasn't changed.

We are also talking about the money we spend each year to help ensure the future of amateur radio through the Young Ham of the Year award program. Yes, Vertex Standard, CQ, Dave Bell Associates, and Rosewood cover the expenses and gifts for the recipient. They do not cover the administration expenses. That's our part, and it ran close to \$1,200 last year.

The bottom line is this. I am asking that you try to find it within your organizational or individual heart to help us continue this service. As we have said before, whether *Amateur Radio Newsline* continues to provide this service or instead disappears is totally your decision. We are here to serve you for as long as you want us. Your response during the next few weeks will provide the answer.

The address for *Amateur Radio Newsline* is Post Office Box 660937, Arcadia CA 91066. Our Web site, with more information, is [www.arnewline.org].

Thank you so much! — N6TCQ.

## Helping the Future: The IRLP4KIDS Net

The Internet Radio Linking Project is now playing host to youth in amateur radio. This, with the formation last December of the new "IRLP4KIDS Net."

The cyberspace-to-radio network was the brainchild of Paul Cassel VE3SY. Its purpose is to support young hams and to give them a place to meet and interact with one another. The net meets Saturdays at 0100 UTC on IRLP Reflector #2. In North America, the net is on Friday nights at 9:00 p.m. Eastern Daylight Time. Currently, the network has about a half dozen young members, and it welcomes more.

To join or learn more, take your son or daughter and Web browser over to [www.groups.yahoo.com/group/irlp4kids] to join the IRLP4KIDS e-group.

Also, the net is looking for more young control

stations. If you are a young ham or know one who wants to become part of this thrilling youth-oriented Internet radio linking project, contact Jason Nochlin by E-mail to [K0IIN@arri.net].

Thanks to K0IIN, via Newsline, Bill Pasternak WA6ITF, editor.

## Wrong Number

If you get an E-mail, voice mail, or page telling you to call a phone number with an 809 area code, beware. The *CGC Communicator* reports that chances are, it's a scam and your phone bill will be astronomical. The FCC has already issued a public warning about calling this area code. It's on the Web at [www.fcc.gov/cib/consumerfacts/809.html].

Thanks to CGC Communicator and the FCC, via Newsline, Bill Pasternak WA6ITF, editor.

## Dear Sire ...

The following is (supposedly) an actual letter. The original was typewritten, and the original spelling and grammar have been left intact.

To Mr. (name omitted)  
District Manager for Alabama Radio Shack  
3300 N. Pace Blvd  
Pensacola, FL. 32505

Dear Sire,

This letter is complain about the problems I have having with the ham radio model number 19-1101 I had got from your company Radio Shack. I had this shipped special to me from your store 1096 Eastdale Mall Montgomery Alabama. I was got this because I think that i would get transmitt further that I did with the TRC 217 40 channel walkie talkie.

The problem that had first was when I was going to hook this radio HTX-1000 to the antenna the conektor on the radio was wrong it wouldn't attach to my cable. I was able to hook it finally by making a small change in in the connektor. As soon as I tried to use it there was no sound coming at all.

This happened for two days and I never did get to talk to anybody the whole two days. That day the cable company came knocking my door and said there was something causing problems at my house and disconnected my radio from the cable line. you knew when I brought the Radio that I was going to use that for my antenne. You didn't tell me not to why not?

Next time I decided to put the HTX-1000 in my automobile I thought I would see how it worked their. I hooked it to my CB-antenna and at least I could hear people. But what happens now is no one wants to talk to me because they says you have to have a licencs to talk to them.



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Why? I dont have to have a licencs to talk on my CB. They'll talk to me there. Anyhow it dont matter much anymore because somebody done took the radio HTX-1000 from my automobile.

What I would like for you Radio Shack to do is refund my money because I don't have the radio anymore and its not my fault I dont and I think you should give me back my money. Also the cable company here says that I hurt something in there line and want to be paid fix it. It will cost \$2482.98 to fix the equipment they say was damaged because you didnt tell me not to hook it to the cable. Please remit to me the check for \$2758.53 for damages due.

To save this matter from going to court the check must be in my hand by June first or I will turn this over to my attorneys of law.

Thank you  
(name withheld)

Thanks to Radio Flyer, the U\*BE\*T (Utah) ARC newsletter, May 2000.

## Things You Can Learn From a Dog

- Never pass up the opportunity to go for a joyride.
- Allow the experience of fresh air and the wind in your face to be pure ecstasy.
- When loved ones come home, always run to greet them.
- Let others know when they've invaded your territory.
- Run, romp, and play daily.
- Eat with gusto and enthusiasm.
- Be loyal.
- Never pretend to be something you're not.
- If what you want lies buried, dig until you find it.
- When someone is having a bad day, be silent, sit close by, and nuzzle them gently.
- Thrive on attention and let people touch you.
- Avoid biting when a simple growl will do.
- On hot days, drink lots of water and lie under a shady tree.
- When you're happy, dance around and wag your entire body.
- No matter how often you're scolded, don't buy into the guilt thing and pout ... run right back and make friends. Bond with your pack.
- Delight in the simple joy of a long walk.

Thanks to Radio Flyer, the U\*BE\*T (Utah) ARC newsletter, Dec. 1997.

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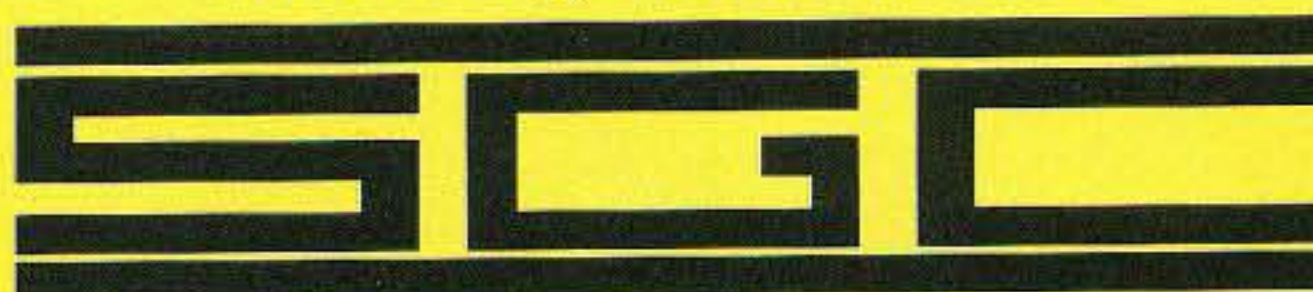
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# LETTERS

## From the Ham Shack

**Art Housholder K9TRG.** You are always asking for pictures of ham functions, so here is one. I think you know that we have had a ham luncheon every Thursday here on the northwest side of Chicago, in the Palatine area, for many years, at the Palatine Inn on the Northwest Highway. We have moved to different locations a few times in the last 10 to 15 years. A few of us get there as early as 10 a.m.; the rest wander in later. We do try to leave shortly after noon, as the restaurant starts to get full then. By then, most of us have freeloaded off of the coffee pot long enough. The food is reasonably priced, good selection, good quantity, prepared well, and best of all, tastes good.

The common bond of course is ham radio and computers. We have had FCC directors, pilots, magazine editors, race car mechanics and drivers, machinists, truck drivers, a dean and professors from Harper College, Motorola vice presidents, you name it.

Some of us bring magazines that we have read and pass them on; some of us bring computer-related hardware and/or software that we pass on. Sometimes someone brings a new home-brew item or something "store bought" to show and tell.

All hams and nonhams are welcome. We would love to see and meet new people. If anyone would like more information, I have had the same *Callbook* address and phone number for at least 30 years. My E-mail address is [ahousholder1@attbi.com], or [ahousholder@juno.com].

**William Baker W1BKR, president, Thirteen/WNET, New York NY.** I appreciate the terrific articles in 73 this April. Of particular importance was the Watts/Wagner article about the history of Nikola Tesla. It was most informative, many thanks.

**Les Warriner WA7HAM.** Having taught Basic Electronics and Amateur Licensing Classes for the past 17 years both at the Highline Community College and here in our little agricultural community, I have found some interesting facts.

When we get started going through our spiel, we start looking at blank faces with expressionless eyes, not understanding what we are talking about. Like if our wives describe to us some fine information on a sewing project. The vocabulary is strange and different.

So, to get them used to some of the words and not necessarily (yet) their uses, I have made up a number of word puzzles that are handed out and that they have the opportunity to work on. The comments have been very positive, especially from the younger generation that has not yet had the opportunity to get used to some of our slang.

It is fun to watch their expressions when you are in a lecture or Q&A session when these words that they have become acquainted with start to make sense to them.

Then, the week before testing, I hand out yet another puzzle — except that these are

local ham calls. In our case, within a circle 20 miles in diameter around our QTH. This one really gets them going. "Oh, I know him," etc.

In that I believe that the two-day memorization courses touted by the ARRL are not only bad for our hobby but also cheat the attendee, our courses here are 10 weeks and we graduate knowledgeable hams who know how to act on the air. Many now are Extra class. A number have gone on to various entities and are computer techs, etc.

Even our high school now has a credit class in computers, repair, upgrade, installation, networks, all of the "goodies." This ham class was a large part of starting this credit class, as the graduates of the ham class were doing this type of work in the district.

Just thought that maybe you'd like to know of our success and the methods used. After all, ham radio IS fun! 73!

**Kevin Abnett, Fairbanks AK.** You have a lot of crazy-sounding ideas. Each year fewer of your ideas sound crazy to me. More and more of your ideas are making sense. One of us must be losing his grip on reality. ;-)

**Ken VE1DS.** Hi, Wayne: I just finished reading your April editorial re the future of the hobby. I have been an amateur for 36 years and also worked in the telecomm field all my life. I have also seen a lot of modes come and go, also DXing, county hunting, cc numbers, and the other attractions of the hobby. Kids are not interested in a lot of this stuff, as it can't compete with the Internet.

Now we have a tool that I think will bring on the kids. If you have time, please go to this URL and download the I link program. It's very small, and you can get started in a few minutes. This mode allows you to use the Internet as a transparent path between the computers in two ham shacks. Big deal, not really — the kids are doing this all the time with their friends on MSN, etc. However, the important difference is that you can then interface to your VHF/UHF/HF rig and continue to pass the signal to a mobile or any other station via a repeater or your own station.

This would allow two kids with pocket-size 2-meter rigs, to QSO, e.g., VK-land school playground to another schoolyard in



**Photo A.** Palatine (IL) area hams get together for a luncheon every Thursday. L-R: Frank W9FM, Don WA9DGY, Ron WB9PTA, John WA9JBT, Art K9TRG.

## LOW NOISE PREAMPS

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- Miniature MOSFET Preamp.
- Low noise figure.
- Available for various bands from 28 to 450 MHz.



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- Exciting new AM receiver for the 118-137 MHz aircraft band.
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- ELT monitor to detect and locate downed aircraft.

- Dip switch frequency selection.
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R121 Receiver in cabinet (see website)..... \$299

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A very sensitive wideband fm receiver optimized for NOAA APT & Russian Meteor weather fax on the 137MHz band.

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- R139 Receiver Kit with case and ac power adapter. \$189
- R139 Receiver w/t in case with ac power adapter.... \$239
- Internal PC demodulator board & imaging software.. \$289
- Turnstile Antenna ..... \$135



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A sensitive and selective professional grade receiver to monitor critical NOAA weather broadcasts. Good reception even at distances of 70 miles or more with suitable antenna. No comparison with ordinary consumer radios!

Automatic mode provides storm watch, alerting you by unmuting receiver and providing an output to trip remote equipment when an alert tone is broadcast. Crystal controlled for accuracy; all 7 channels (162.40 to 162.55).

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RWX Rcvr kit with cabinet, speaker, & AC adapter ..... \$99  
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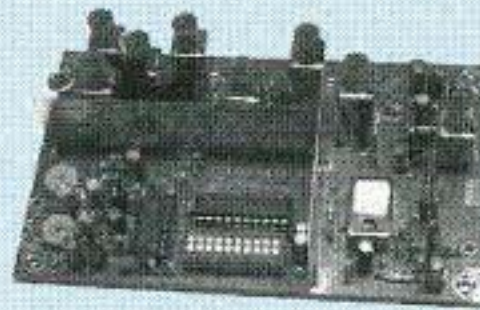
#### T304 Synthesized UHF Exciter:

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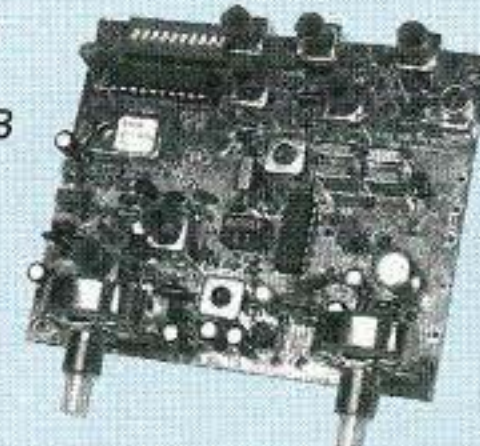
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# YOU Can Build This VLF to HF Loop Receiving Antenna

*Part 1 of 3.*

*A year ago, I built and tested more than 50 different ferrite loop antenna configurations. This article shows you how to build a loop tuner and a range of plug-in ferrite and air-loop antennas for receiving frequencies from 20 kHz to 7 MHz.*

**D**espite exaggerated claims that circulate, loop antennas aren't a magic solution to curing all local power line noise, nor will one fully substitute for a full-size outdoor antenna. Nevertheless, loop antennas do permit nulling noise or interfering signal and offer surprising performance for a miniature antenna.

## What's a loop antenna?

Loop antennas have been with us as long as radio has existed. Indeed, Heinrich Hertz demonstrated the

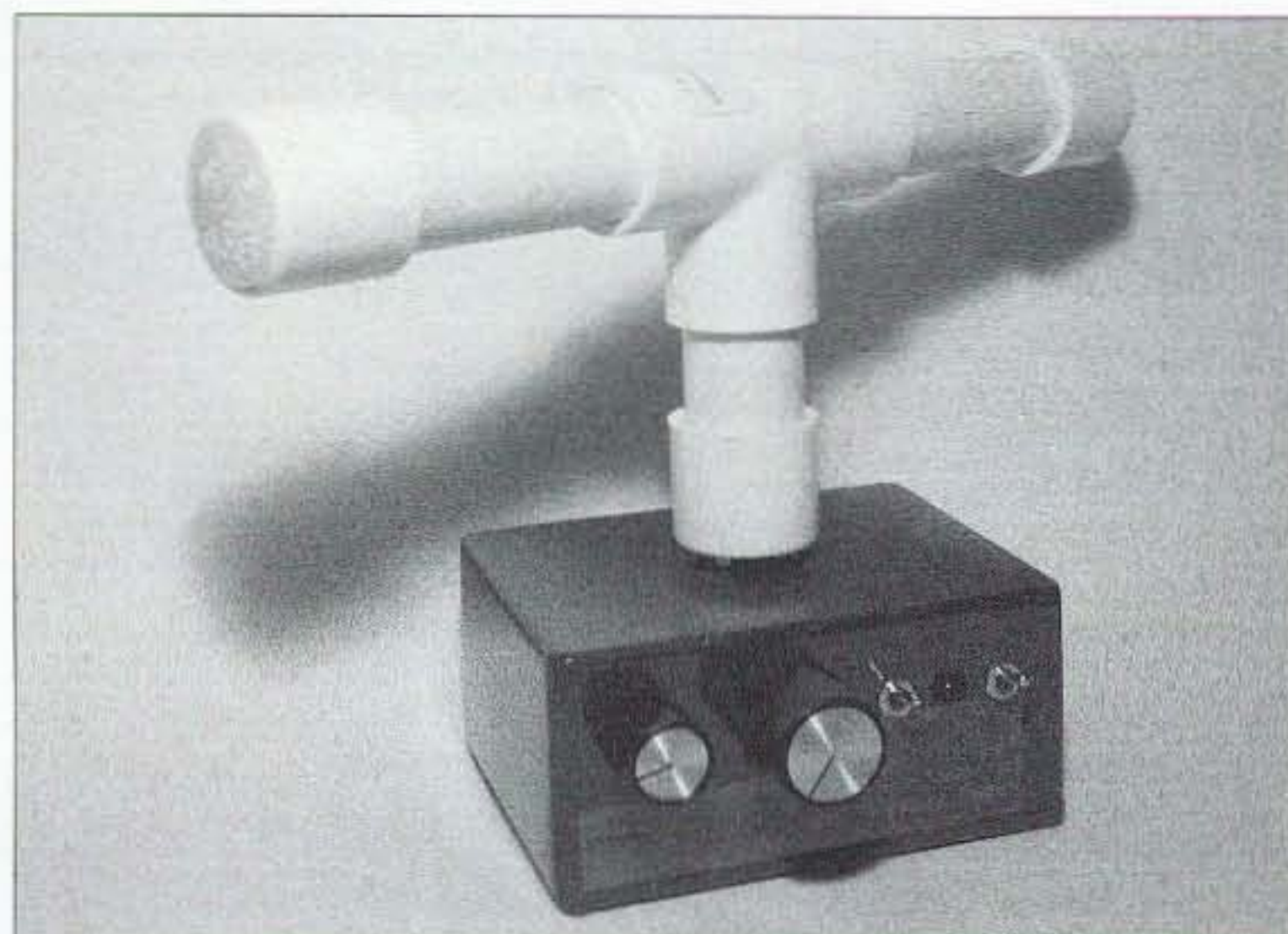
existence of radio waves in experiments in 1886–88 using a loop receiving antenna. (He used an end-loaded dipole for transmitting, though!)

The simplest definition of a loop antenna is one in which the antenna conductor forms a closed circuit. The antenna conductor may be formed into a square, triangle, circle, or diamond. It may have one turn, or multiple turns. It may be formed over air, or over a magnetically active material such as ferrite. But, it's still a loop.

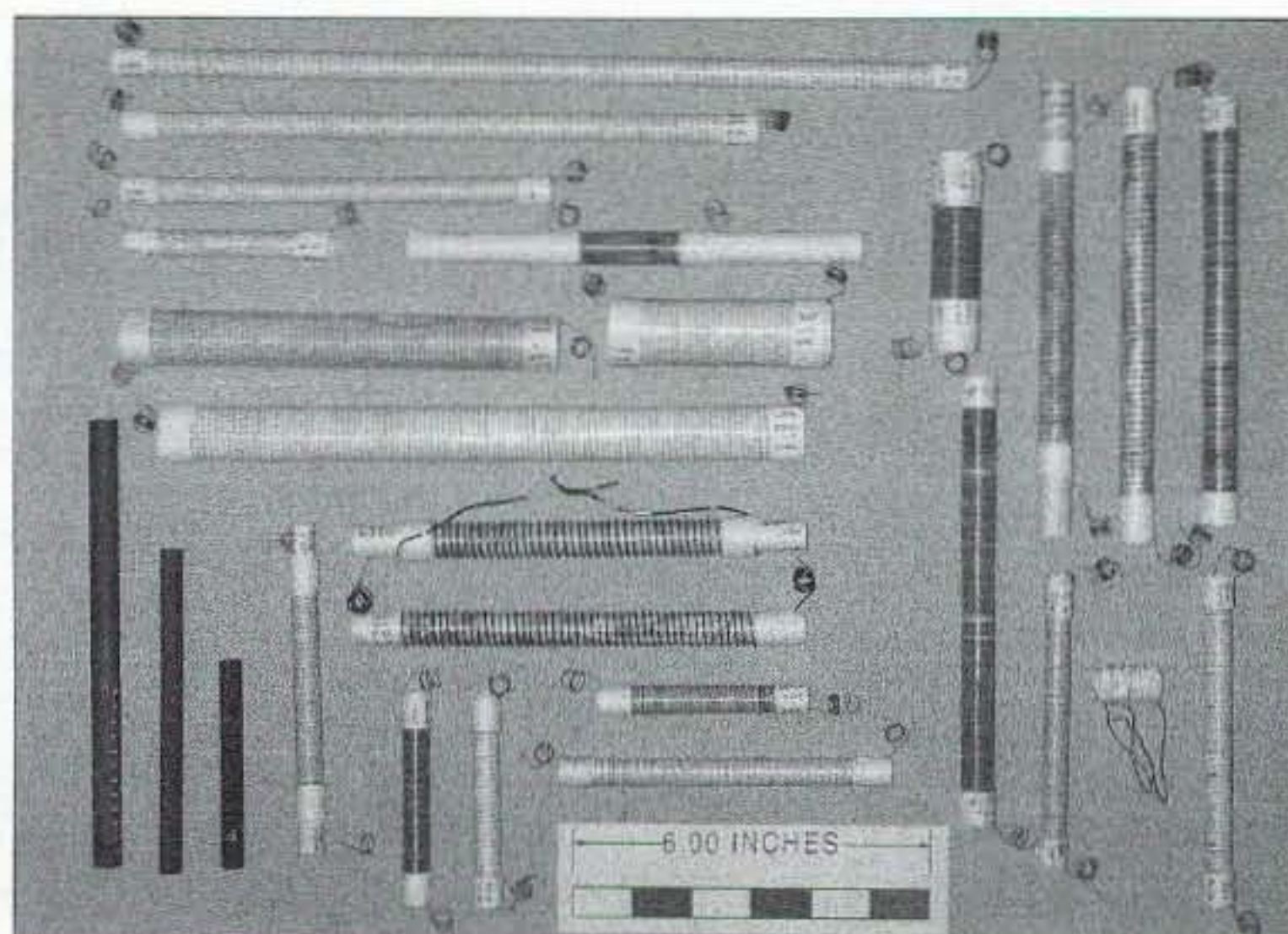
The most important factor in analyzing a loop antenna is its size. This

project involves "small" loop antennas. A "small" loop is one where the loop diameter is much less than a wavelength. At 7 MHz, the highest frequency involved in this project, a wavelength is around 140 feet. The largest loop I built is a square around 1 foot on a side, or about 0.007 wavelengths, so it's safe to consider it "small." The remainder of this article will only refer to a "loop" with the understanding that we mean "small loop."

A loop antenna is an inductor, and like any other inductor it can be resonated with a capacitor. It can be shown



**Photo A.** Front view — loop tuner with ferrite loop.



**Photo B.** Some of the ferrite loop antennas that the author built.

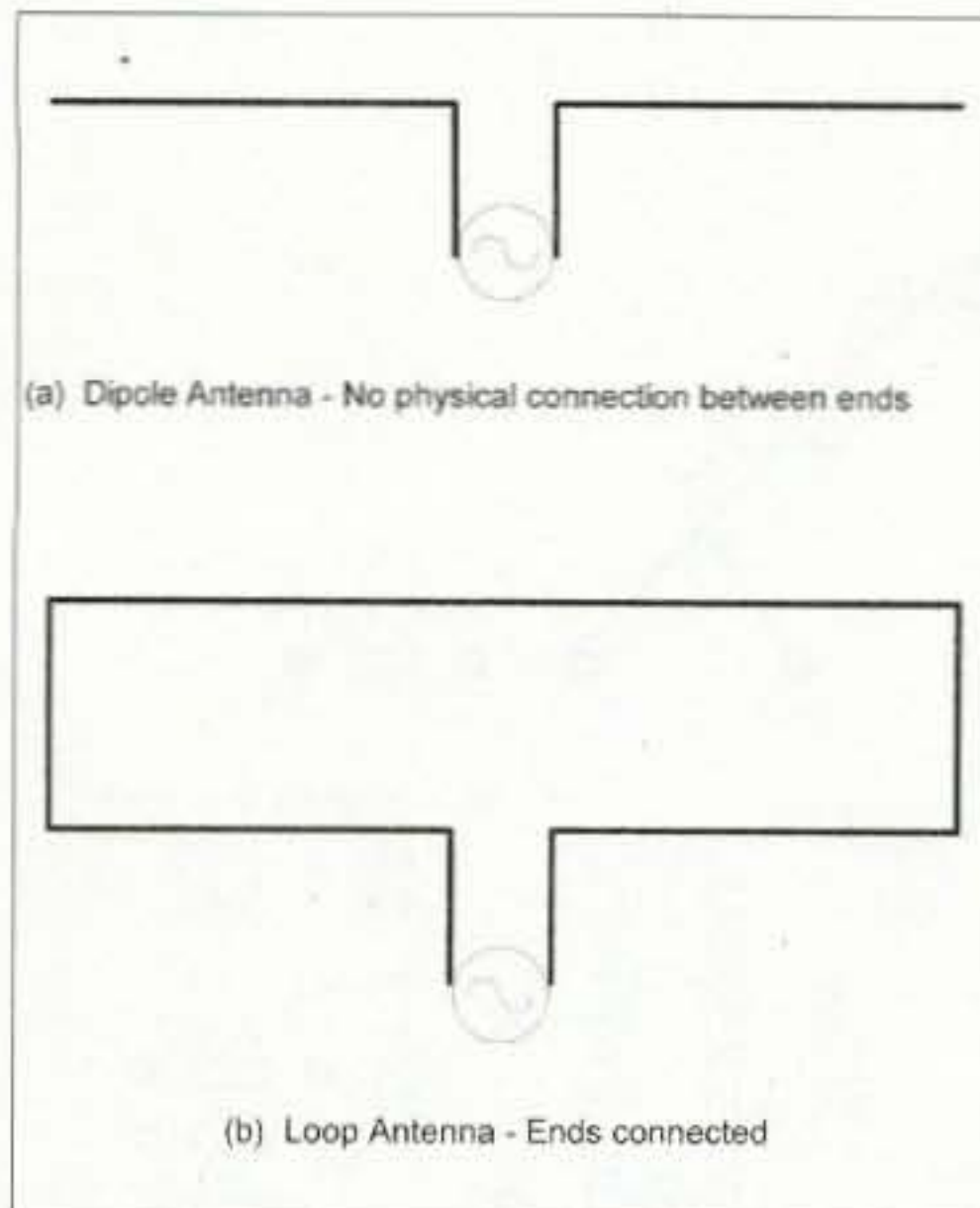


Fig. 1. Dipole versus loop antenna.

that a resonant loop antenna will develop an open circuit voltage given by the following equation:

$$V_{OC} = [(2\pi ENAQ\mu_{eff})/\lambda] \cos \phi \quad [1]$$

where:

$V_{OC}$  is the open circuit voltage at the ends of the loop in volts

$E$  is the field strength of the incoming signal, in volts/meter

$N$  is the number of turns in the loop  
 $A$  is the area of the loop in square meters

$Q$  is the  $Q$  of the tuned circuit consisting of the loop inductance and tuning capacitor

$\mu_{eff}$  is the effective permeability of the core, 1 if air core, 20 or so for Type 61 material, and about 35 for Type 33

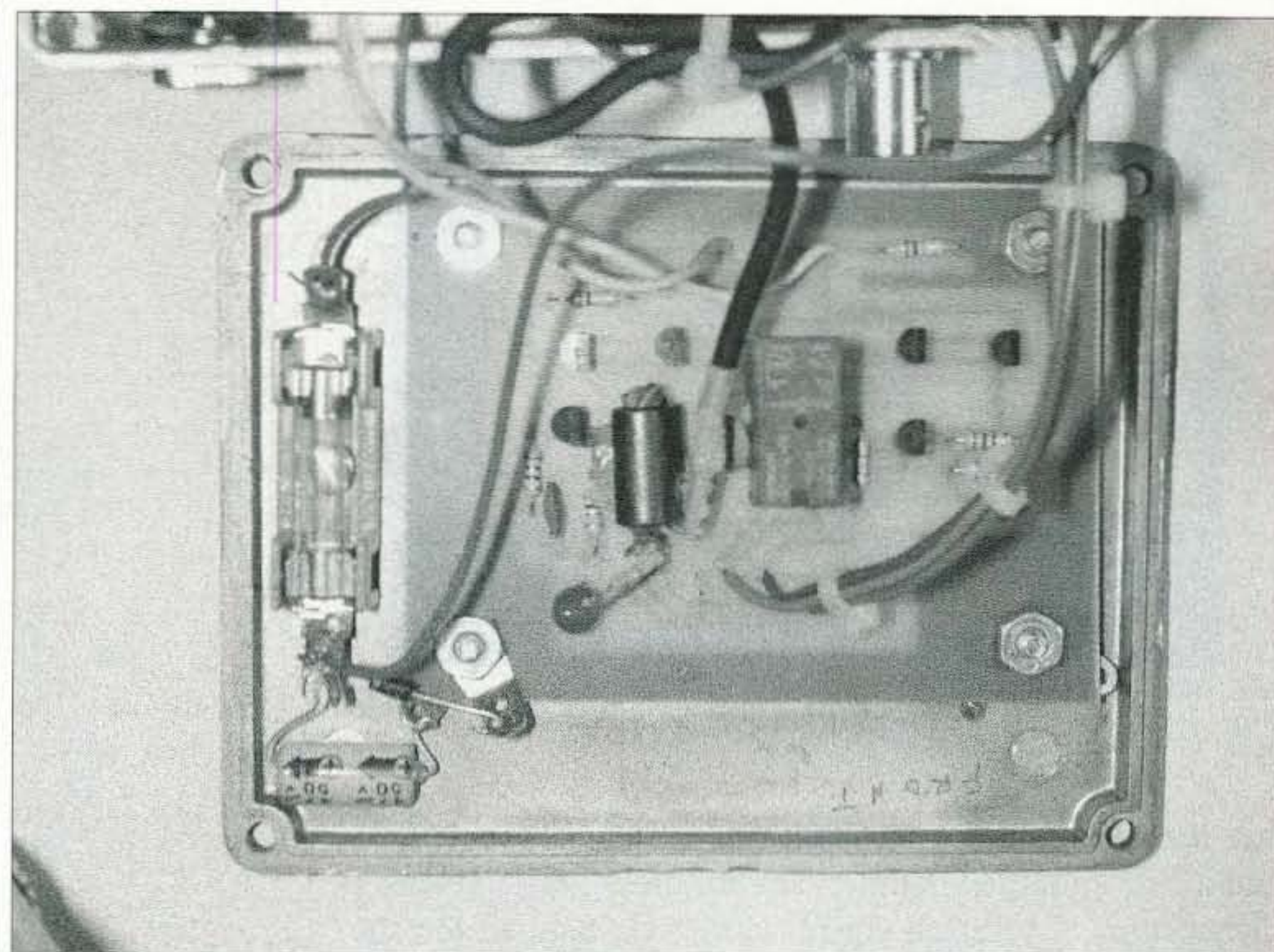


Photo C. PC board installed in tuner housing.

material when made into rods of the size I used ( $\mu_{eff}$  is a function of both the  $\mu$  of the underlying material as well as the rod length to diameter ratio)

$\cos \phi$  is the cosine of the angle the plane of the loop makes with the incoming signal

$\lambda$  is the wavelength of the signal in meters

Those elements of Equation 1 that are under our control are  $A$ ,  $N$ ,  $Q$ , and  $\mu_{eff}$  — for a stronger received signal we can increase the size of the loop, wind more turns, use larger wire for higher

$Q$ , and, possibly, wind the loop on a material with a large  $\mu_{eff}$ . Of course, real-world factors, such as distributed capacitance, size, weight, and available core material impose limits on practical loops.

### Loop tuner: theory of operation

Varactor diodes D1–D4 tune the loop inductance to resonance. Relay K1 switches D1–D4 between two modes: normal and low frequency. In normal mode (K1 not powered), D1 is paralleled with D2 and D3 is paralleled with D4. These two paralleled strings

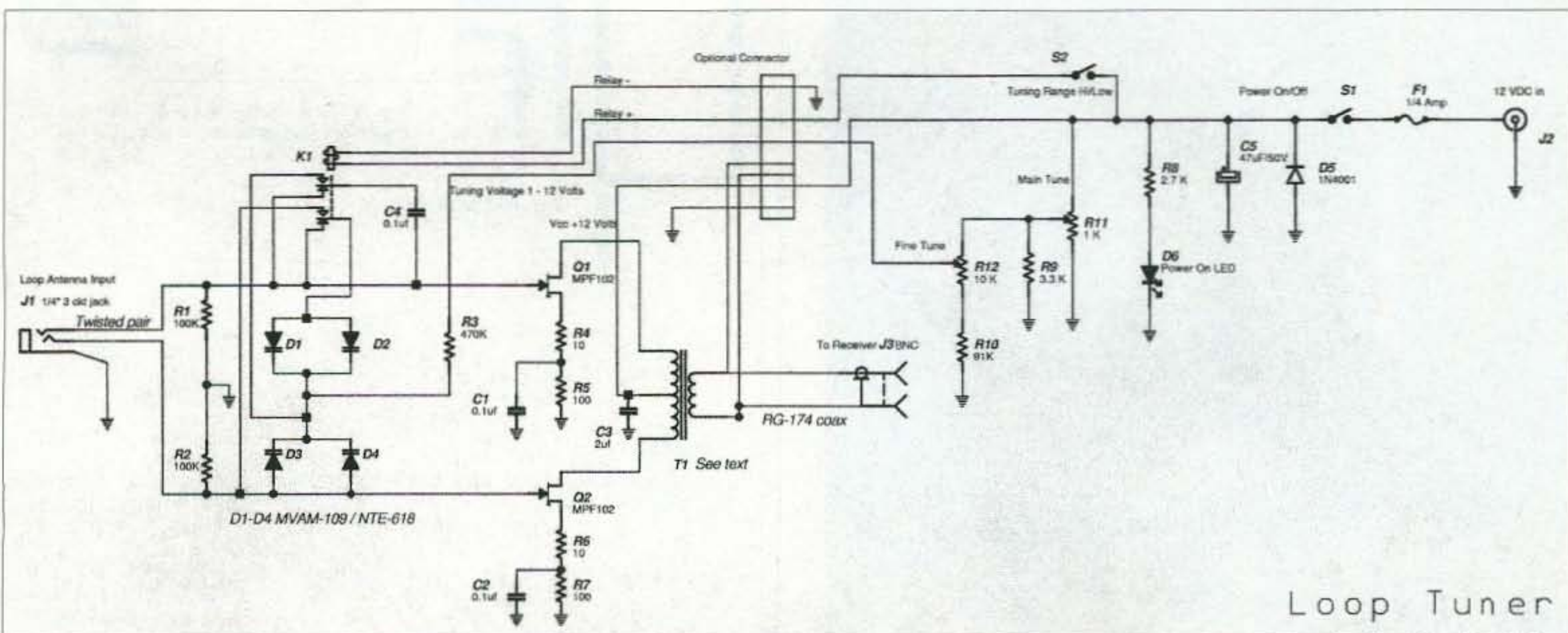


Fig. 2. Schematic diagram.

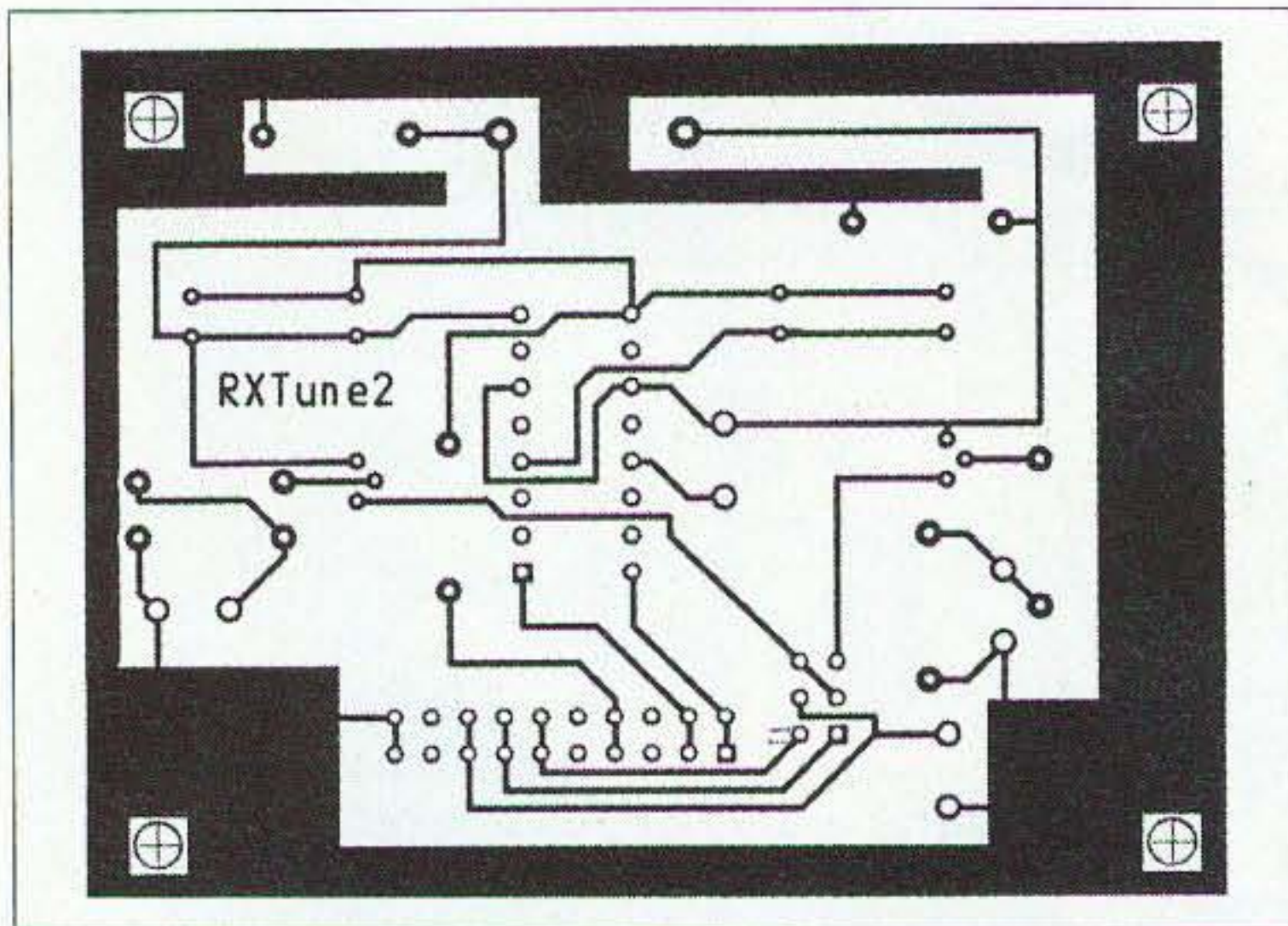


Fig. 3. PC board, copper side view.

are then in series for RF. This gives a net equivalent capacitance equal to a single varactor diode, but minimizes interaction of received signal with diode bias. In low frequency mode, D1-D4 are paralleled. This provides four times the capacitance of a single varactor. Some degradation of performance occurs in this configuration, but it permits an additional tuning range with a single loop antenna.

In either normal or low frequency mode, D1-D4 are reverse-biased by the tuning voltage. R3 isolates the tuning

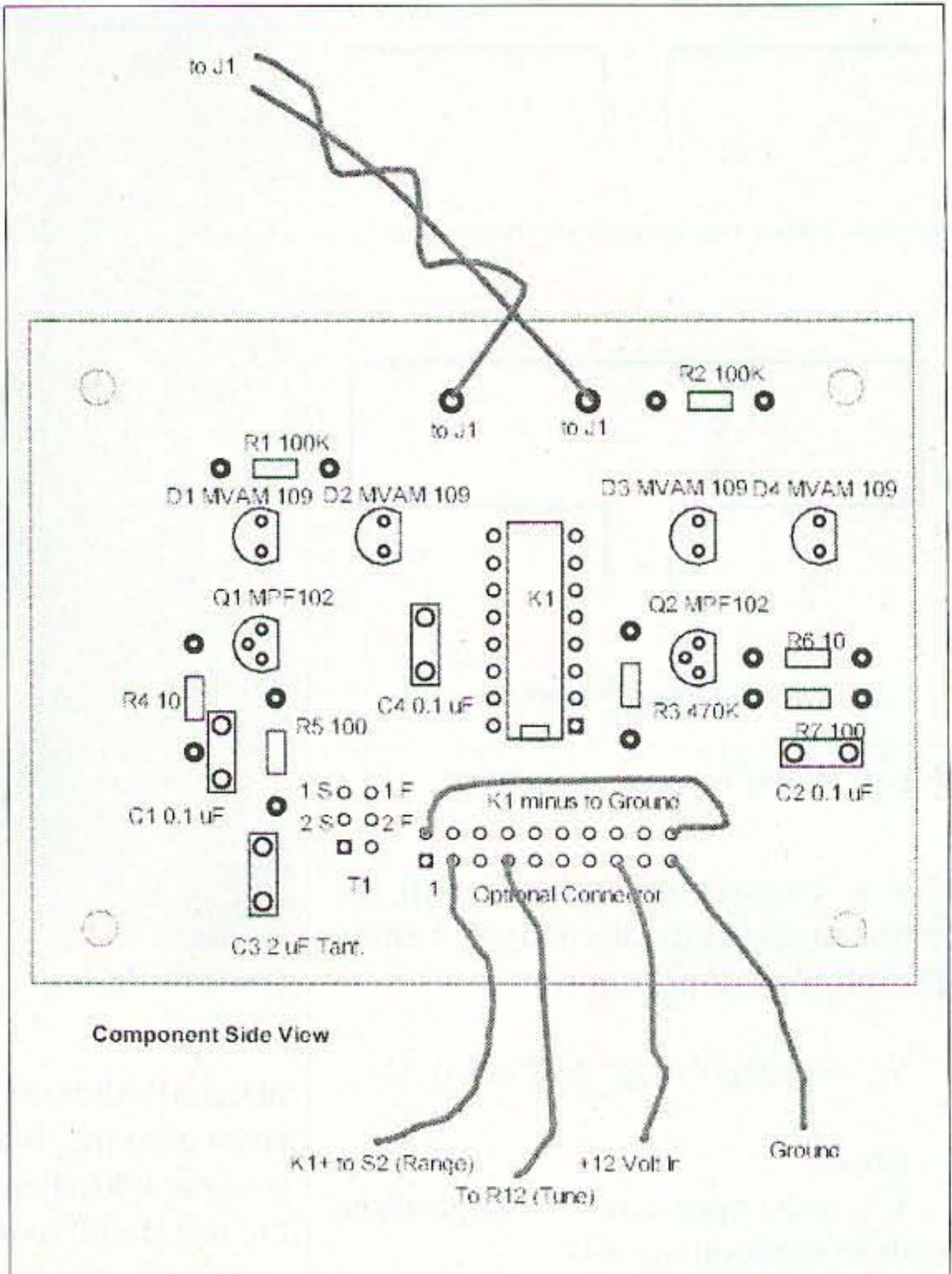


Fig. 4. Parts layout component side view.

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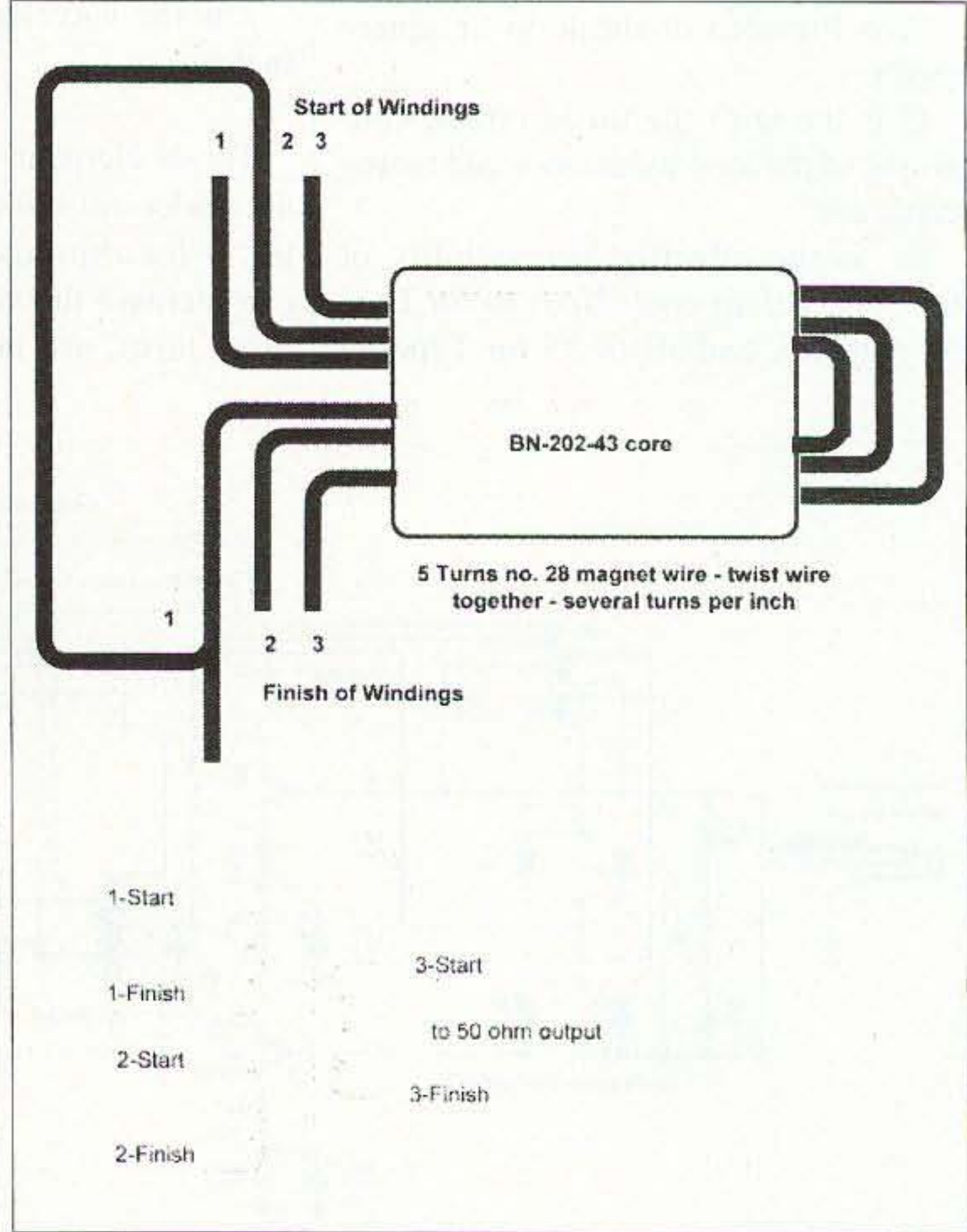


Fig. 5. Winding T1.

Qty.	Name	Value	Comments
3	C1, C2, C4	0.1 $\mu$ F	Disc ceramic
1	C3	2 $\mu$ F tantalum, 35 V	
1	C5	47 $\mu$ F 50 V electrolytic	
4	D1-D4	MVAM-108 varactor	Substitute NTE-618
1	D5	1N4001	Safety diode, 1 A, >50 V PIV satisfactory
1	D6	Power-on LED	
1	F1	1/4 A	
1	J1	1/4-in., 3-ckt jack	
1	J2	Coaxial DC power jack	Radio Shack: Select to match your preferences
1	J3	BNC chassis mount	
1	K1	Omron model G5V-2-H1 with a 12 V coil	Substitute with caution: This must be a relay that works with low-level signals
2	Q1, Q2	MPF102 FET	
2	R1, R2	100k	1/4 W 5% carbon film
1	R3	470k	1/4 W 5% carbon film
2	R4, R6	10 $\Omega$	1/4 W 5% carbon film
2	R5, R7	100 $\Omega$	1/4 W 5% carbon film
1	R8	2.7k	Select for desired LED brightness; 1 W may be necessary
1	R9	3.3k	1/4 W 5% carbon film
1	R10	91k	1/4 W 5% carbon film
1	R11	1k pot	1 W
1	R12	10k pot	
2	S1, S2	SPST mini toggle switch	
1	T1	5 trifilar turns BN 43-202 binocular core	See text
1		PCB	
1		10-pin connector	Optional; Molex 22-27-2101
1		Mating 10-pin connector	Optional; Molex 22-01-2105 or 22-02-2101
1		LMB die-cast box KAB3432	
2		Knobs for R11 & R12	
1		14-pin DIP socket for K1	Optional
1		Fuseholder for 3 AG fuse	

Table 1. Loop tuner parts list.

voltage from the resonant circuit formed by D1-D4 and the loop inductance.

Q1 and Q2 form a conventional balanced amplifier. This circuit is taken from Chapter 2, *Ferromagnetic-Core Design & Application Handbook*, M.F. "Doug" DeMaw (MFJ Publishing Co., Inc., Starkville, MS, 1996). R4 and R6 are un-bypassed to help stability. T1 consists of 5 trifilar turns of no. 28 wire wound through a BN-202-43 binocular core. C2 bypasses RF from the DC power supply and should accordingly have low RF reactance through the desired frequency range. A

tantalum capacitor should be used to meet this requirement. If you use a conventional 2.2  $\mu$ F electrolytic, parallel it with a 0.1  $\mu$ F disk ceramic.

The +12 volt input power enters through a standard coaxial power plug, and is protected by fuse F1. In the event of an inadvertent polarity reversal, safety diode D5 will be forward-biased, thereby blowing F1. Switch S1 controls power to the circuit, while S2 enables or disables relay K1, thereby switching between normal and low frequency ranges. C5 provides low frequency bypassing of the input voltage, while R8 and D6

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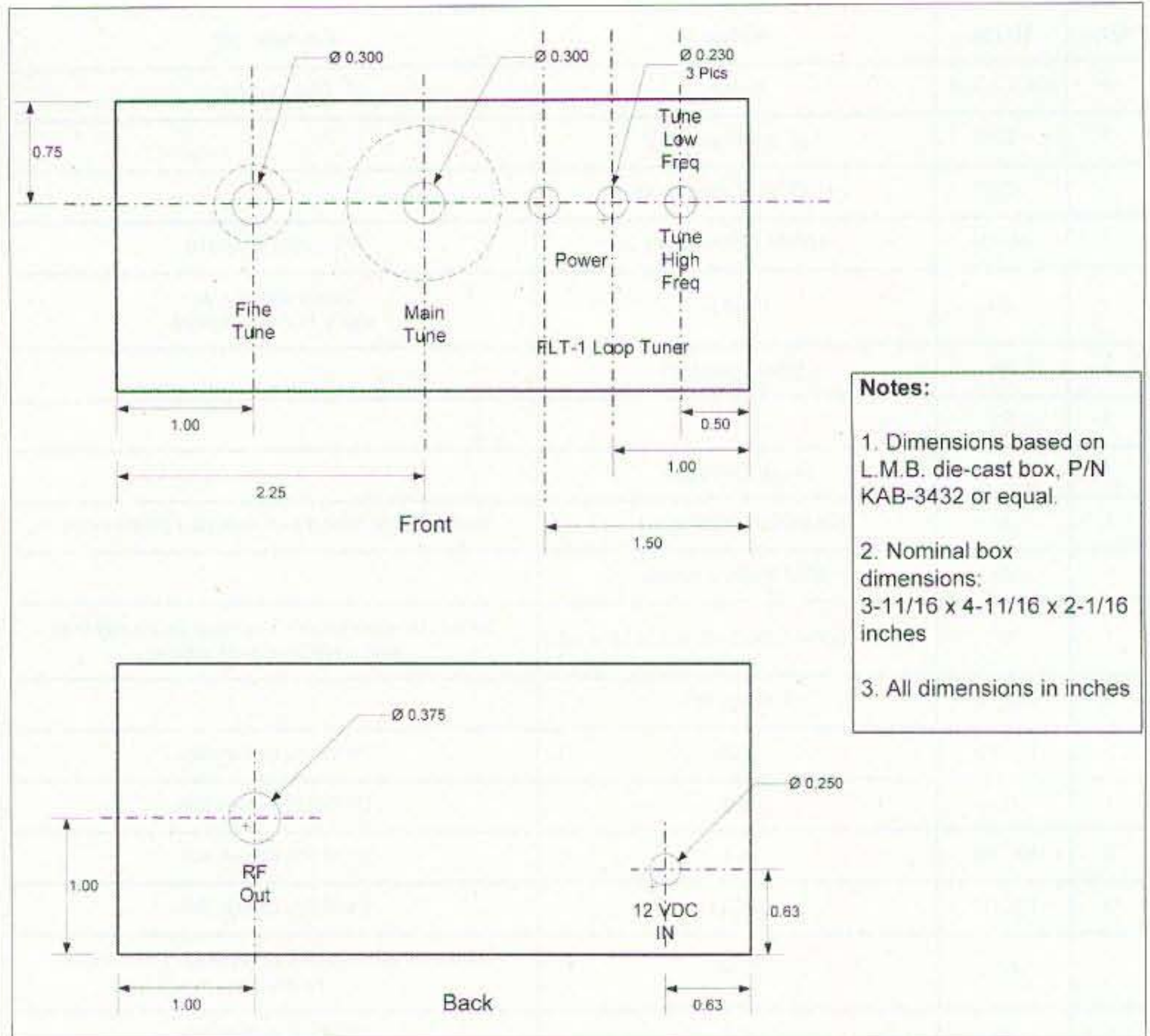


Fig. 6. Front and back layout.

indicate power-on status. Depending upon the particular LED you use, adjust R8's value to give the desired brightness.

R9 and R11 provide coarse tuning, providing a voltage output between 0 and +12 volts. The coarse tuning voltage is connected with R12 and R10, which form a variable voltage divider that shifts the coarse tuning voltage downward by a maximum of 10%. To reduce interaction between the coarse and fine tuning, I've made

the R12-R10 voltage divider resistance much higher than the coarse tuning adjustment. Don't omit R9; although it looks unnecessary, it helps linearize the coarse tuning. (Part 3 of this series will include a section on linearizing a nonlinear world.) R11 dissipates less than 200 mW, so a 1-watt pot will work.

The minimum capacitance value reflects about 10 pF stray due to the PC board and the wiring associated with J1.

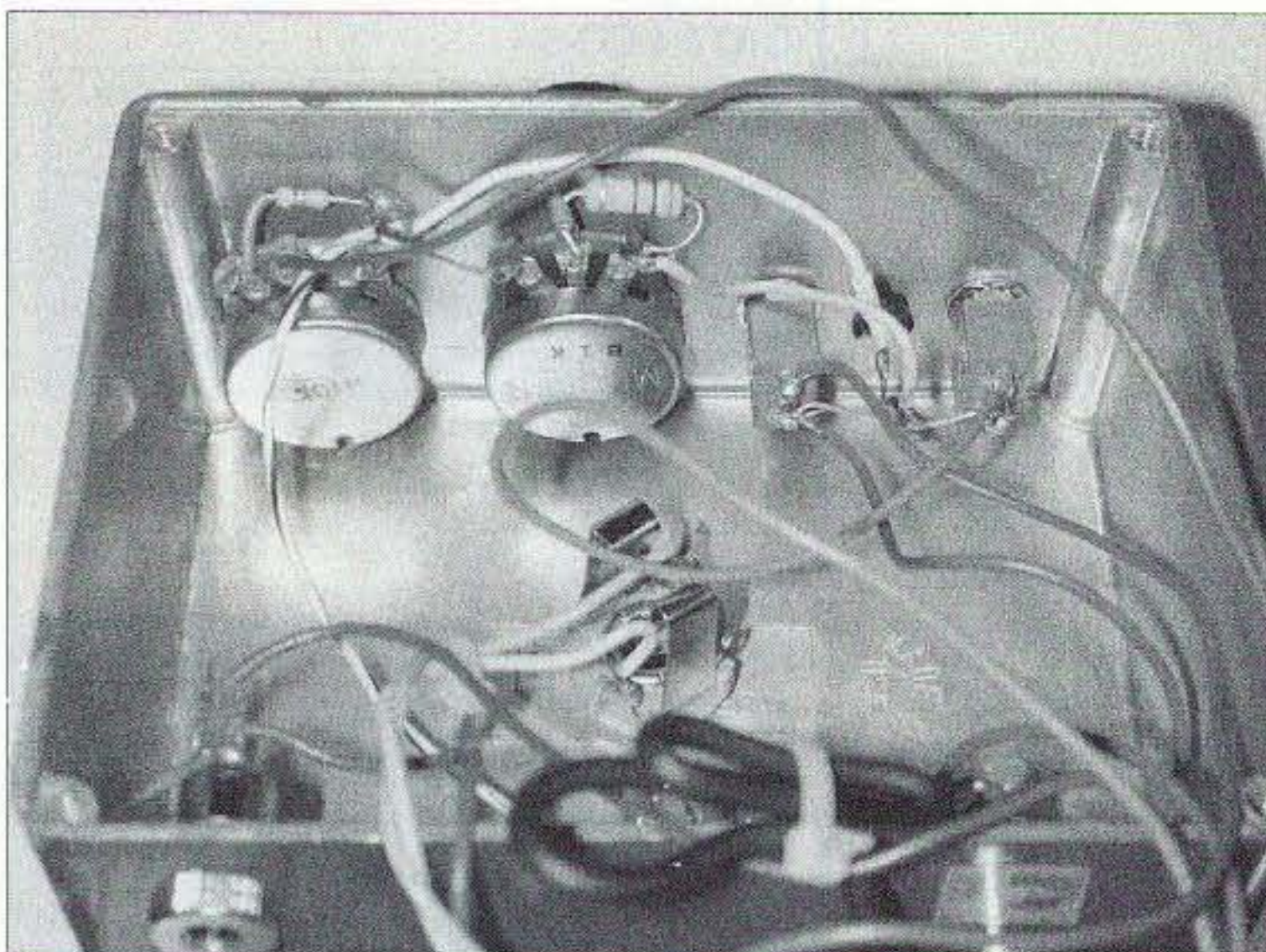


Photo D. Control circuit wiring.

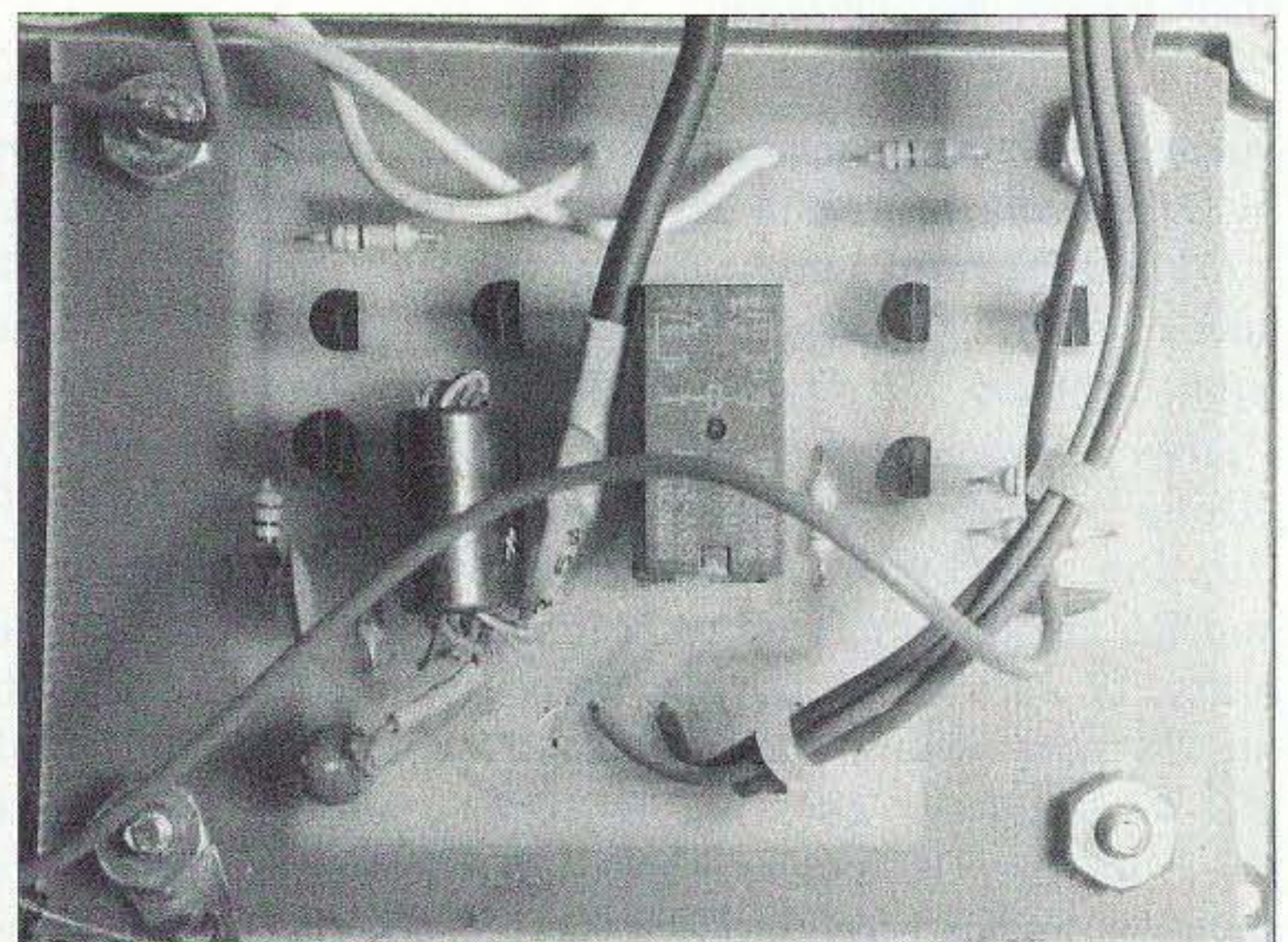


Photo E. Close-up of the PC board.



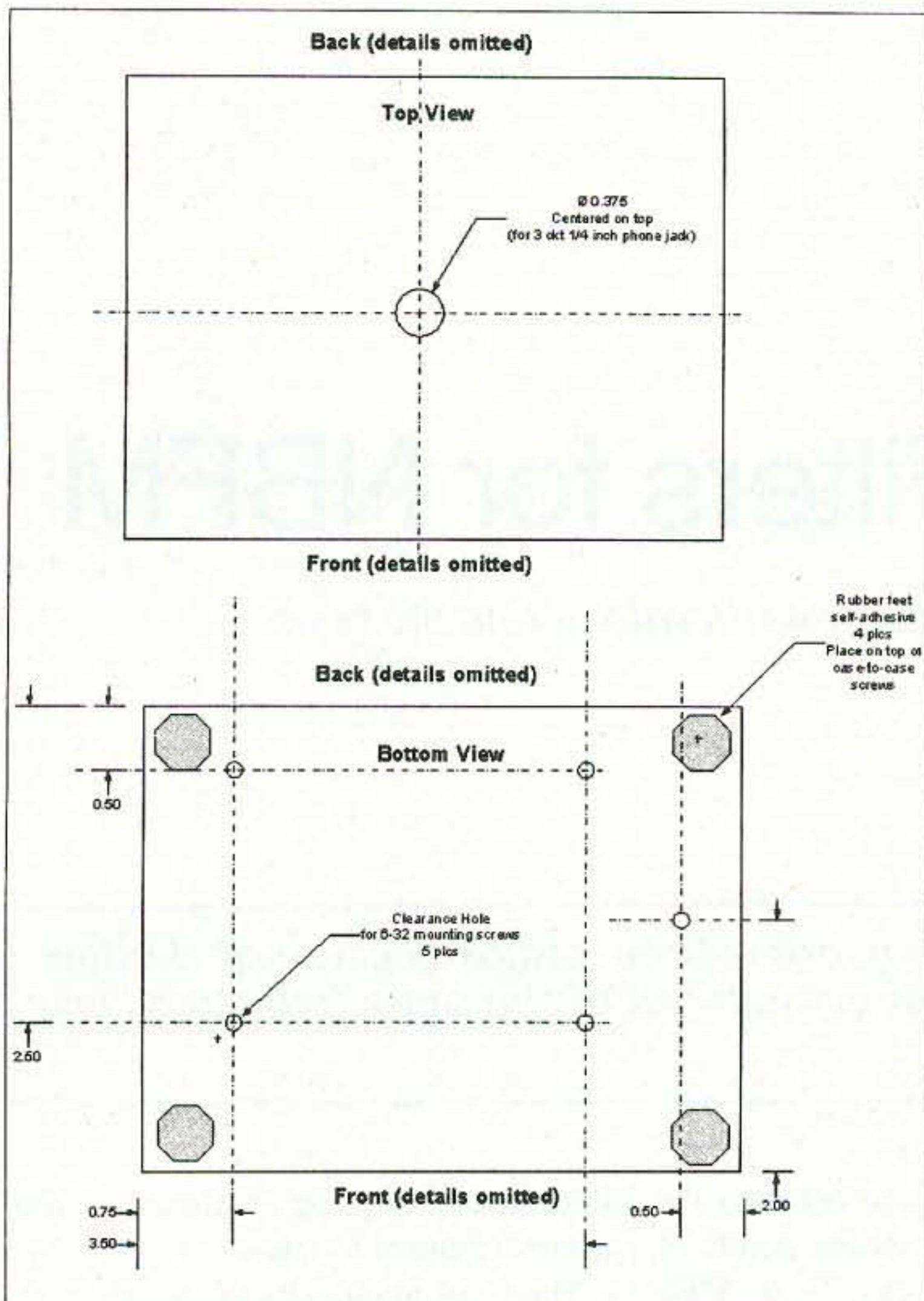


Fig. 7. Top and bottom layout.

The maximum capacitance is obtained by biasing D1-D4 at essentially zero volts, not the recommended minimum 1 volt. The lower bias won't damage the diodes, but manufacturing tolerances may prevent you from duplicating the maximum capacitance values I found.

this article, I'll identify sources for a few other uncommon parts.)

- The output transformer T1 should be trifilar-wound. Twist the three wires together, several twists per inch, and then wind T1. Follow the phasing connections as in the figure.

- The printed circuit board is drawn for the connections to come out through

## Constructing the tuner

I've prepared a printed circuit board layout for the loop tuner. If you use other building techniques, follow standard RF layout practices.

The construction is straightforward, with only a few areas of concern:

- I built the tuner in an LMB KAB-3432 die-cast aluminum box. A strong box is necessary because it supports the loop. RF shielding is important, so don't use a plastic cabinet.

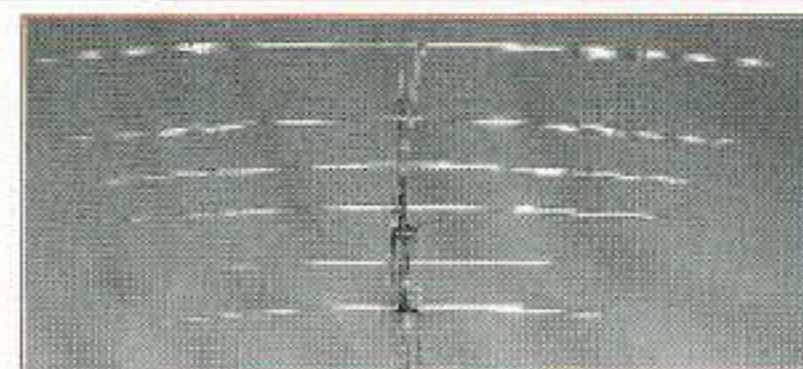
- MVAM-109 hyperabrupt varactor diodes are getting hard to find, so the NTE-618 may be substituted. (Later in

the output windings of T1. Solder the coaxial cable directly to the windings 3-Start and 3-Finish. Attach T1 to the board with glue after soldering the pins.

Next time: constructing the air core and ferrite core loops. 73

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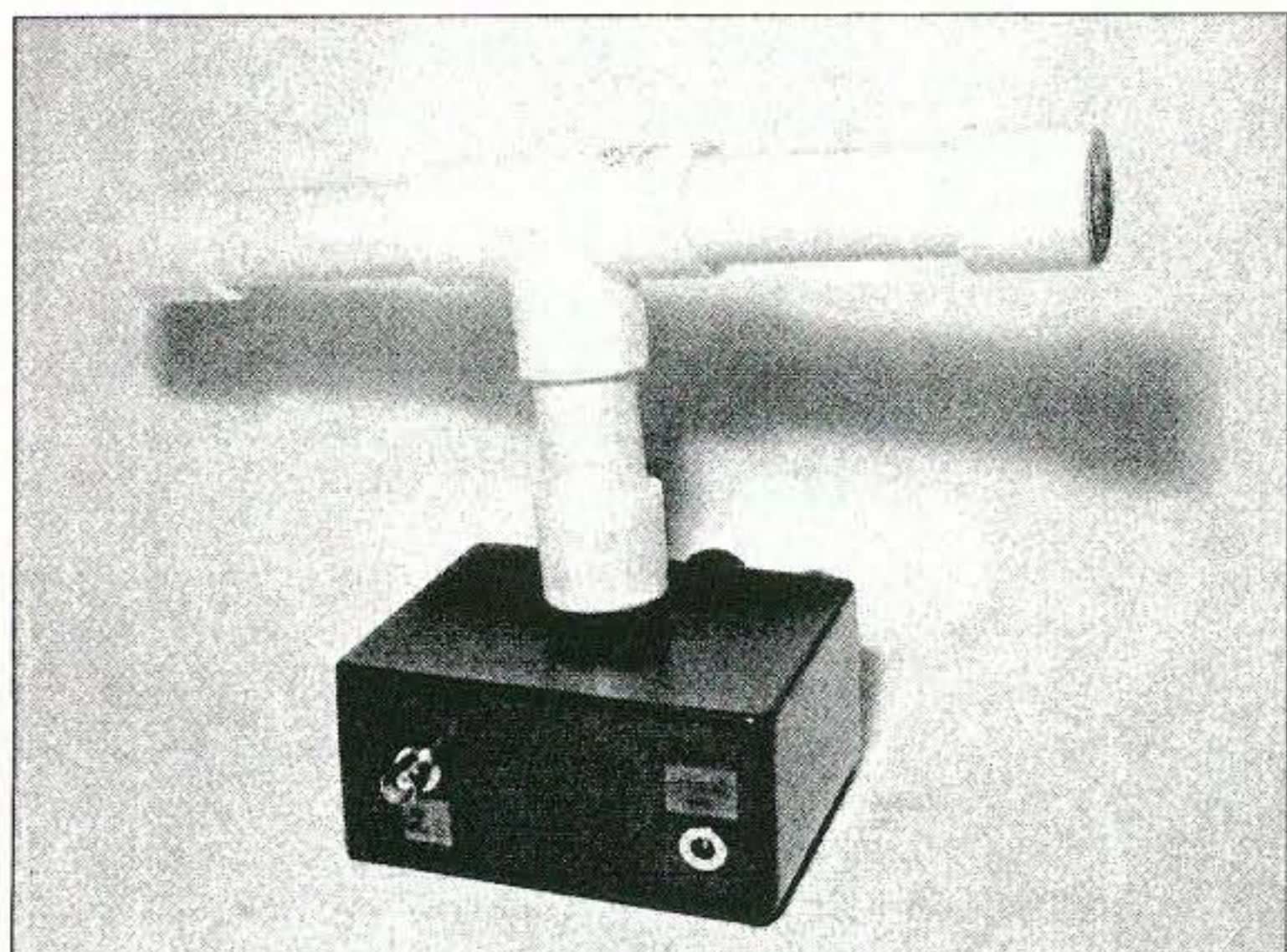


Photo F. Rear view of loop tuner with ferrite loop.

an optional 10-position header. I just wired directly to the PC board for this project.

- The connection between the board and the tip and ring contacts of J1 should be made with two wires twisted together. Keep this connection as short as feasible.

- Use coaxial cable to connect J3 (BNC Out) to

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# Ladder Crystal Filters for NBFM

*Some tricks of the trade from the OM who literally wrote the book.*

*Hams have used a ladder crystal filter in their home-brew radios because of the low cost to build one. Inexpensive microprocessor crystals, all of the same frequency, are used, along with some ceramic capacitors.*

There is no need to order specially made crystals of odd frequencies. **Fig. 1** shows a schematic of a typical 6-pole lower sideband ladder filter. A typical frequency response is shown in **Fig. 2**.

The series resonant frequency of the crystals will fall partway down the lower frequency skirt. The parallel resonant frequency appears above the high frequency skirt. The filter bandwidth, as measured at the 3 dB down points, therefore, will be somewhat less than the difference between the series and parallel resonant frequencies of the crystals used in the filter. Fortunately, this difference is wide enough for amateur SSB use. Many fine ladder crystal filters have been designed with bandwidths in the range of 2.2–2.7 kHz.

Ham radio NBFM receivers need much wider bandwidths, wider than

the frequency difference between the series and parallel resonant points of typical crystals in the 2–16 MHz range. A 12.5 kHz bandwidth is ideal for amateur VHF FM use. So what can be done?

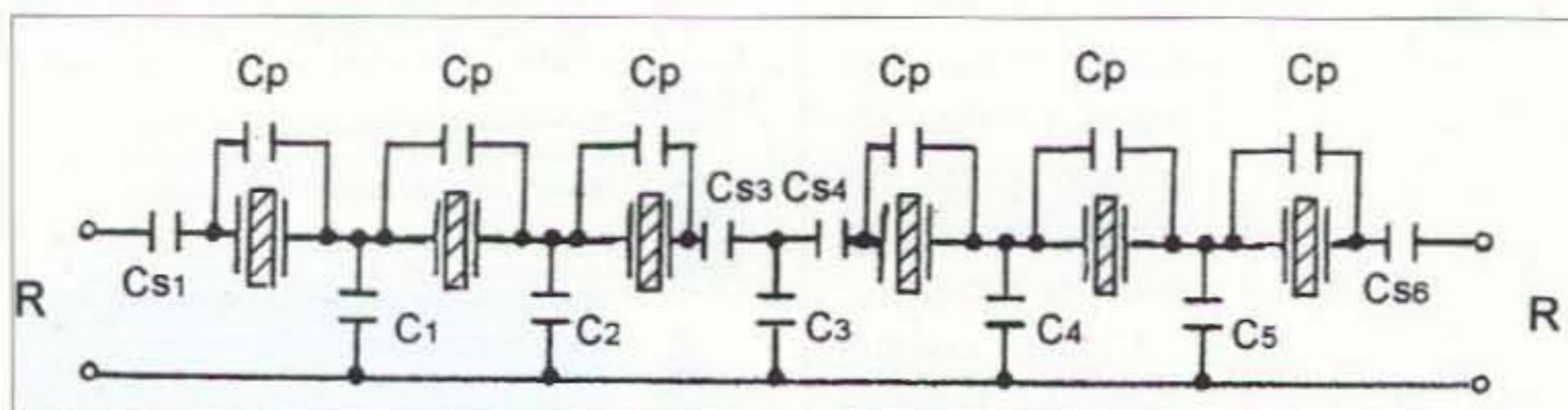
An equivalent circuit of a crystal is shown in **Fig. 3**. The series resonant frequency is determined by the motional capacitance,  $C_x$ , and motional inductance,  $L_x$ . The parallel resonant frequency is controlled by the series combination of  $C_x$  and holder capacitance  $C_h$ , along with  $L_x$ . The holder capacitance,  $C_h$ , in series with  $C_x$ , decreases the total capacitance, effectively placing the parallel resonant point above the series resonant point. As the holder capacitance is increased, for example by placing an external capacitor across the crystal terminals, the parallel resonant frequency is

decreased, moving it closer to the series resonant frequency.

Hayward points out in Reference 1 that the holder capacitance can be decreased by placing an inductor across the crystal terminals to “cancel out” the holder capacitance. He shows that a wider bandwidth filter can then be designed and built. A 3.5 kHz bandwidth 4-pole filter for AM use is described in his article. Can the technique be extended to 12.5 kHz and beyond?

The most general design equations for ladder crystal filters are given in Reference 2. A 10.7 MHz crystal, for example, will typically have a motional capacitance,  $C_x$ , of about 0.012 pF. If we assume we are designing a 6-pole Chebyshev lower sideband filter and that the holder capacitance is either 5 pF (typical), 2.5 pF (partially canceled), or 1 pF (nearly completely canceled), **Table 1** shows the maximum bandwidth which can be designed. Three different values for the shape factor,  $1/\text{rov}3$ , are shown.

The bandwidth values in **Table 1** can be used as a guide for selecting appropriate values for the shape factor  $1/\text{rov}3$ . Note that these figures are dependent on the actual series resonant



**Fig. 1.** Schematic of 6-pole ladder crystal filter — lower sideband.

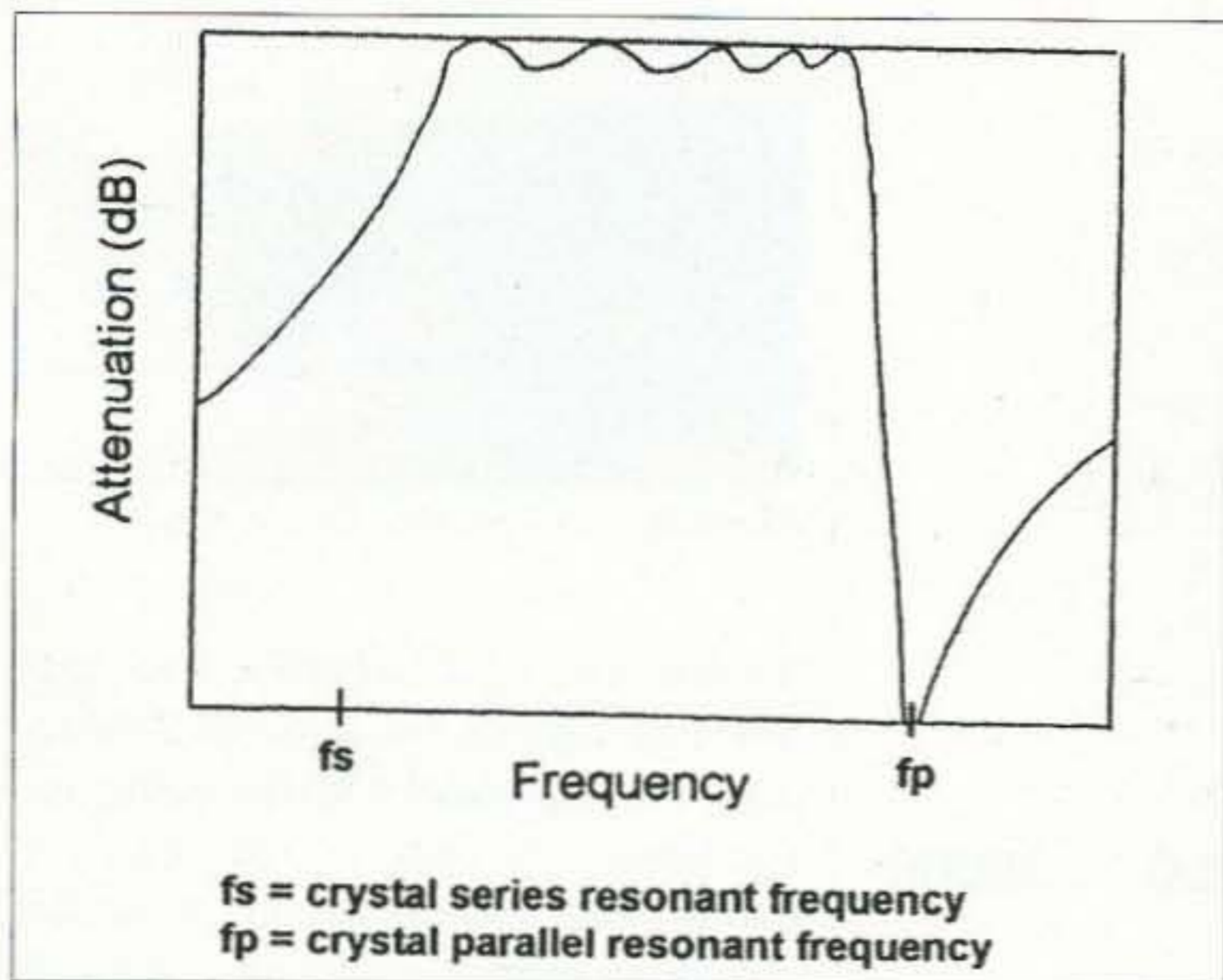


Fig. 2. Typical frequency response of circuit of Fig. 1.

frequency and motional capacitance of the crystals to be used. The figures also depend on the coupling coefficients of the filter type selected, e.g., 6-pole Chebyshev. See the appendix for more details.

### Let's design a filter for NBFM

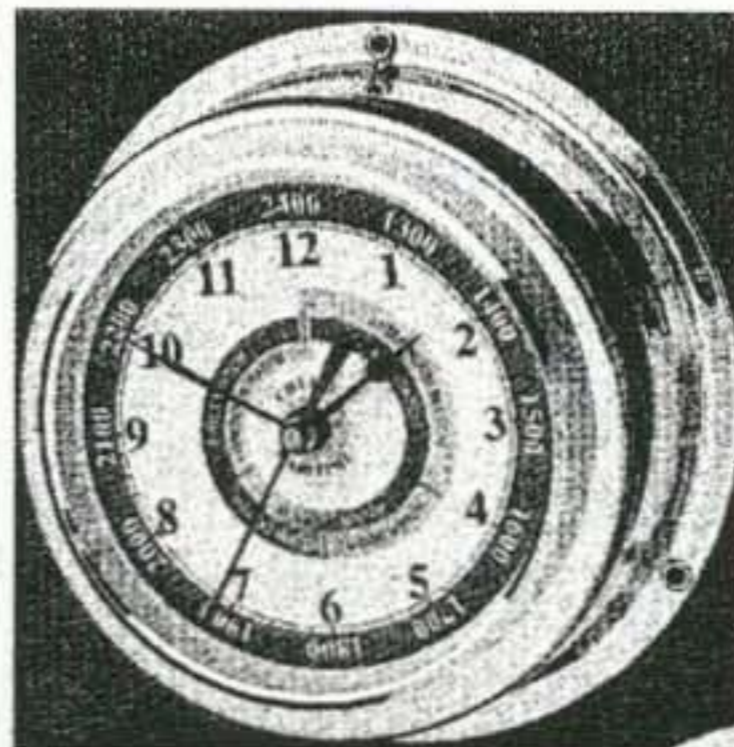
The first step an amateur takes in designing a ladder filter is to look in the junk box to see what crystals are there. I had exactly 6 crystals at 12 MHz left

		Ch (pF)		
		5 pF	2.5 pF	1 pF
Shape	5	4.0	8.0	20
Factor	7.5	2.9	5.8	14.5
1/rov3	10	2.26	4.5	11.3

Table 1. Bandwidth in kHz.

Component	Value
R	1441Ω
Cp	0.88 pF
Cs1, Cs6	13.5 pF
C1	10.1 pF
C2	13.5 pF
C3	14.0 pF
C4	13.5 pF
C5	10.1 pF
Cs3, Cs4	36.6 pF

Table 2. Component values for the ladder filter.



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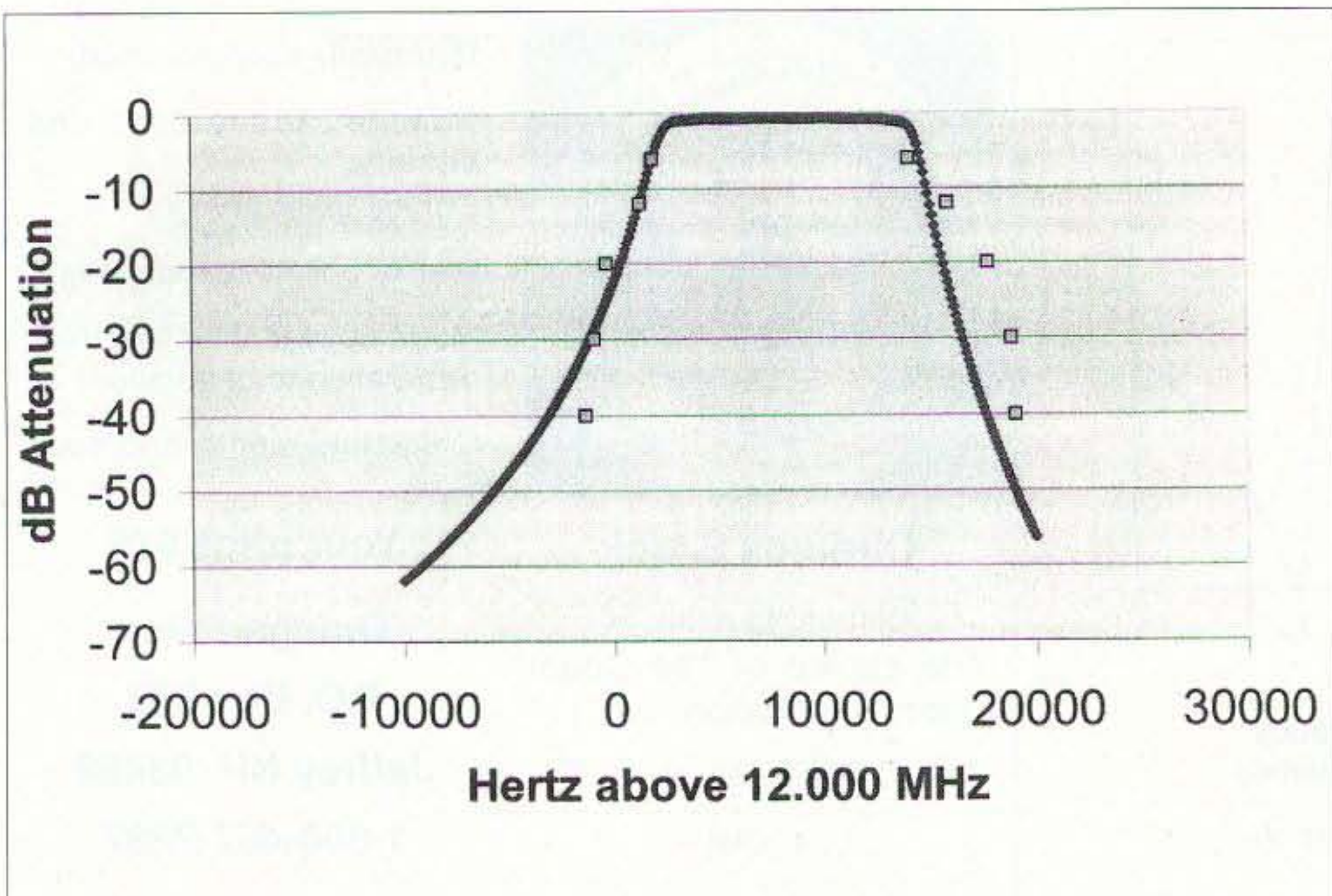


Fig. 3. Computed and measured responses of the filter of Table 2.

over from some earlier project. They were purchased from Digi-Key, part no. X428. They are 12.000 MHz series resonant in a HC49US can. This small can size is quite fortunate, as we will see in the construction of the filter. If you are going to buy the crystals, another good choice might be part number X423, a 10.738635 MHz series crystal in a HC49US can. The price for either crystal is \$1.56 each or 10 for \$12.96.

The crystal equivalent circuit must then be determined using techniques described in Reference 2. Sensitive RF voltmeter and step attenuator instrument kits used in making these measurements are available from Unicorn

Electronics, 1 Valley Plaza, Johnson City, NY 13790; 1-800-221-9454 or [www.unicornelex.com]. Test equipment for making very accurate measurements of capacitance and inductance is also described in Reference 3. For the 12 MHz crystals the equivalent circuit turned out to be  $C_x = 0.00952$  pF,  $L_x = 18.4769$   $\mu$ H,  $R_s = 20$  ohms,  $C_h = 3.73$  pF. Note that  $C_x$  was actually measured and then  $L_x$  calculated for exactly 12 MHz series resonance.

Design equations for a 6-pole .1 dB Chebyshev filter produced the component values shown in Table 2 for the circuit of Fig. 1.

The computed and measured response of this filter is shown in Fig. 3. For amateur NBFM such as used on the 2-meter and other bands, this is indeed a very fine response. The only problem is that the required parallel capacitance is less than the crystal's holder capacitance. An inductor will be required in parallel with each crystal to reduce the 3.73 pF holder capacitance down to 0.88 pF.

#### The inductor

An inductance of 47.2  $\mu$ H will resonate with the 3.73 pF holder capacitance at 12 MHz to completely cancel the capacitance. Since we don't want a complete cancellation, but merely a reduction from 3.73 pF to 0.88 pF, a slightly larger inductance will be

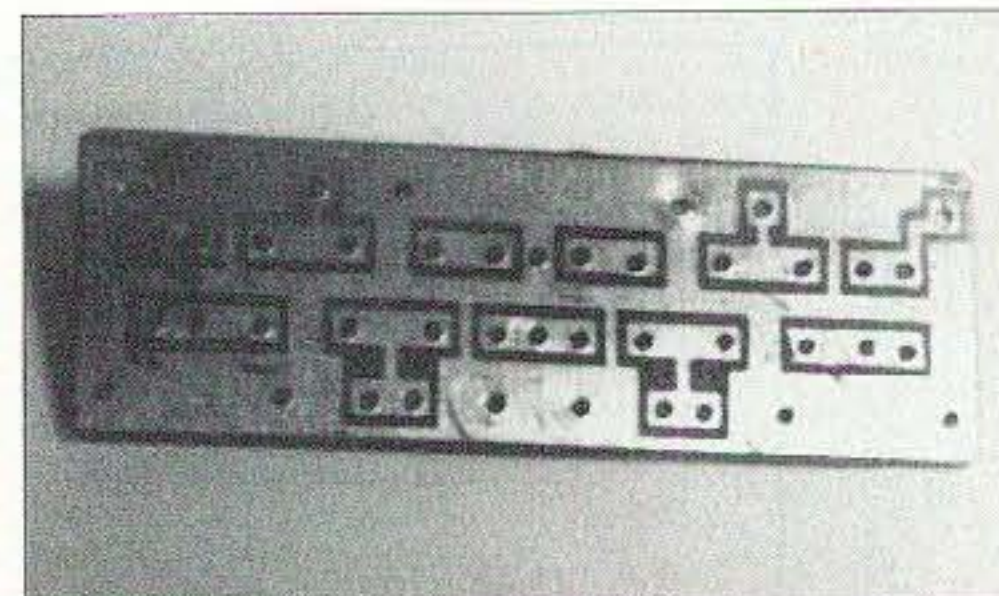


Photo B. Circuit board for the filter.

needed. Use of a larger inductor may not seem logical, but remember the inductor is in parallel with the holder capacitance. A larger reactance in parallel has less effect than a smaller one. The proper inductance value is determined after some calculating with the equation for resonance of an LC circuit.

$$f = \frac{1}{2\pi\sqrt{LC}}$$

An inductance of 64.4  $\mu$ H will be needed. This is provided by winding 28 turns of #24 copper wire on an FT37-61 ferrite toroid core. After winding, the turns are held in place with a coating of clear fingernail polish. Six identical inductors will be needed — one for each crystal.

The inductors may be checked using the instruments of Reference 3. Another way to check the inductors is to use an MFJ SWR analyzer. Connect an inductor in series with a 5.6 pF NPO capacitor and a 50 ohm 1/4 watt resistor across a BNC connector. Tune the SWR analyzer for minimum SWR and read the frequency. It should be about 8.4 MHz. The SWR will be about 3:1,

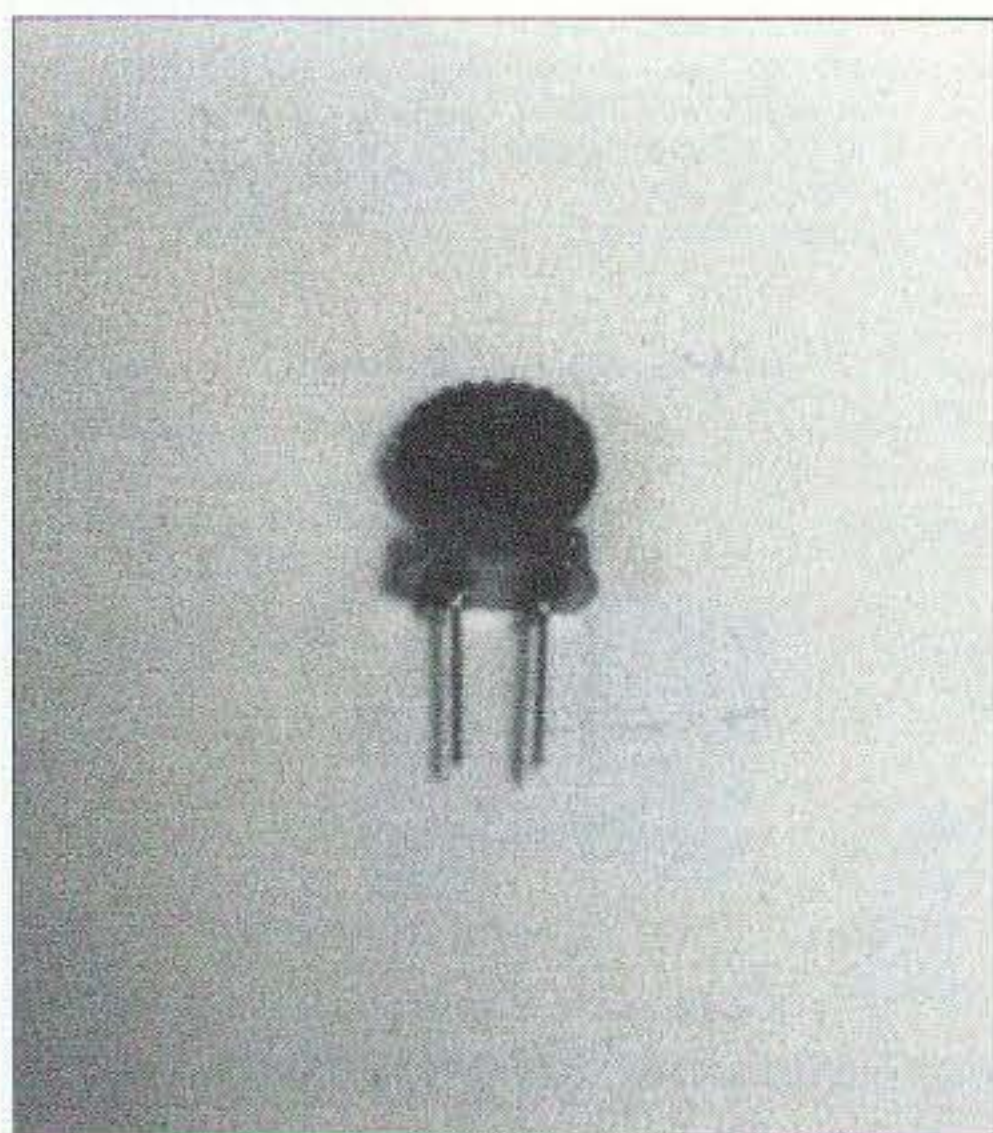


Photo A. Inductor connected in parallel with crystal.

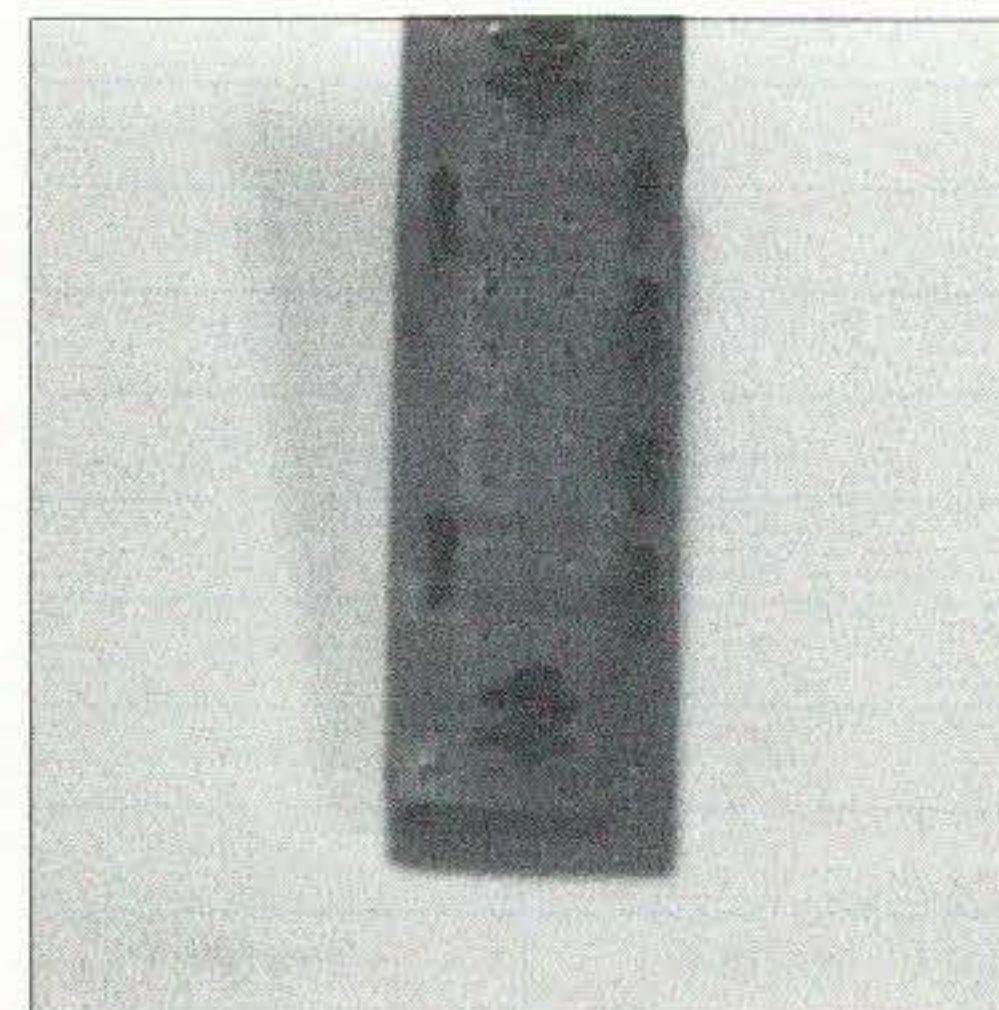


Photo C. Partially populated circuit board.

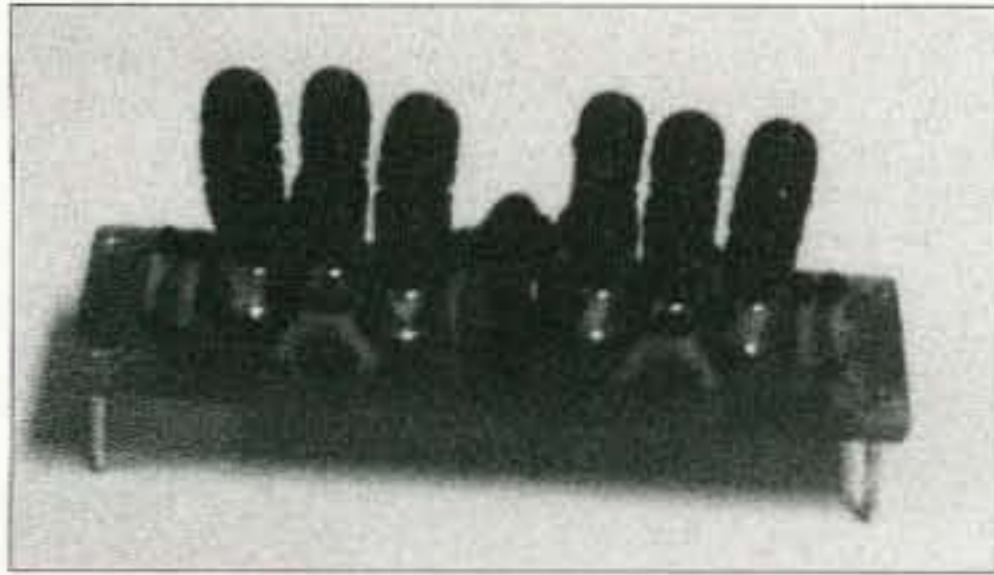


Photo D. Completed filter without cover.

indicating about 100 ohm series resistance for the coil. This converts to a Q of 32 at 8.4 MHz. The coils are then carefully connected in parallel with the crystals. See **Photo A** for details.

### Building the filter

All of the components for the filter are mounted on a 23/32-inch by 2-3/16-inch epoxy glass circuit board as shown in **Photo B**. Gold-plated pins for the filter terminals are mounted on 1/2-inch centers at each end. This allows the completed filter to be either soldered directly into a radio circuit board or else the filter can be plugged into two standard HC6 crystal sockets mounted 2 inches apart. An etched circuit board with gold pins attached and a black plastic cover are available as a kit for \$8.95 from Unicorn Electronics, part number 31-9960.

The capacitors are inserted first. **Photo C** shows a circuit board partially populated with ceramic NPO capacitors. The following values are used: For 10.1 pF, use 10 pF; 13.5 pF, use 10 pF and 3.3 pF in parallel; 14.0 pF, use 27 pF and 30 pF in series; 36.6 pF, use 33 pF.

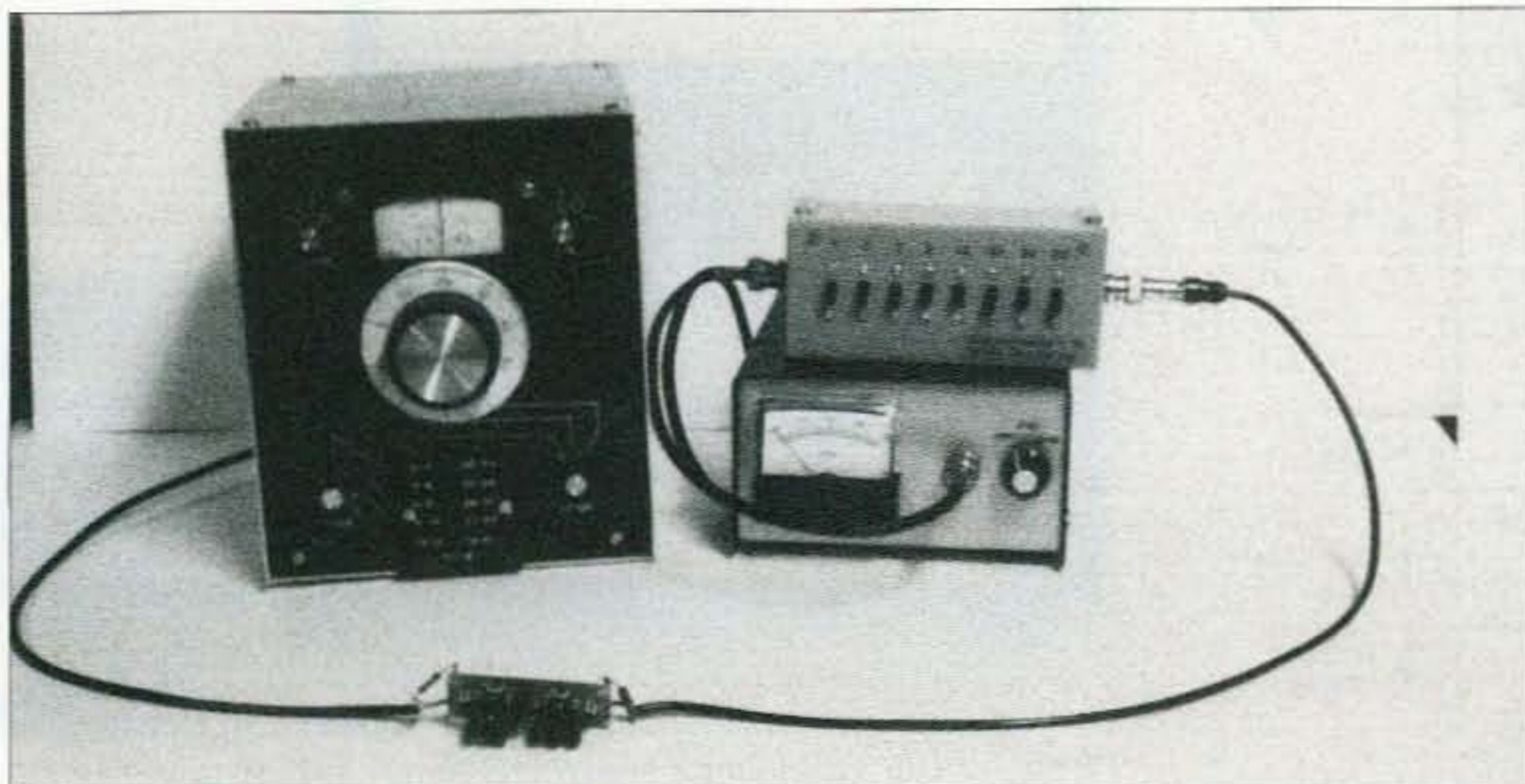


Photo E. Measuring setup.

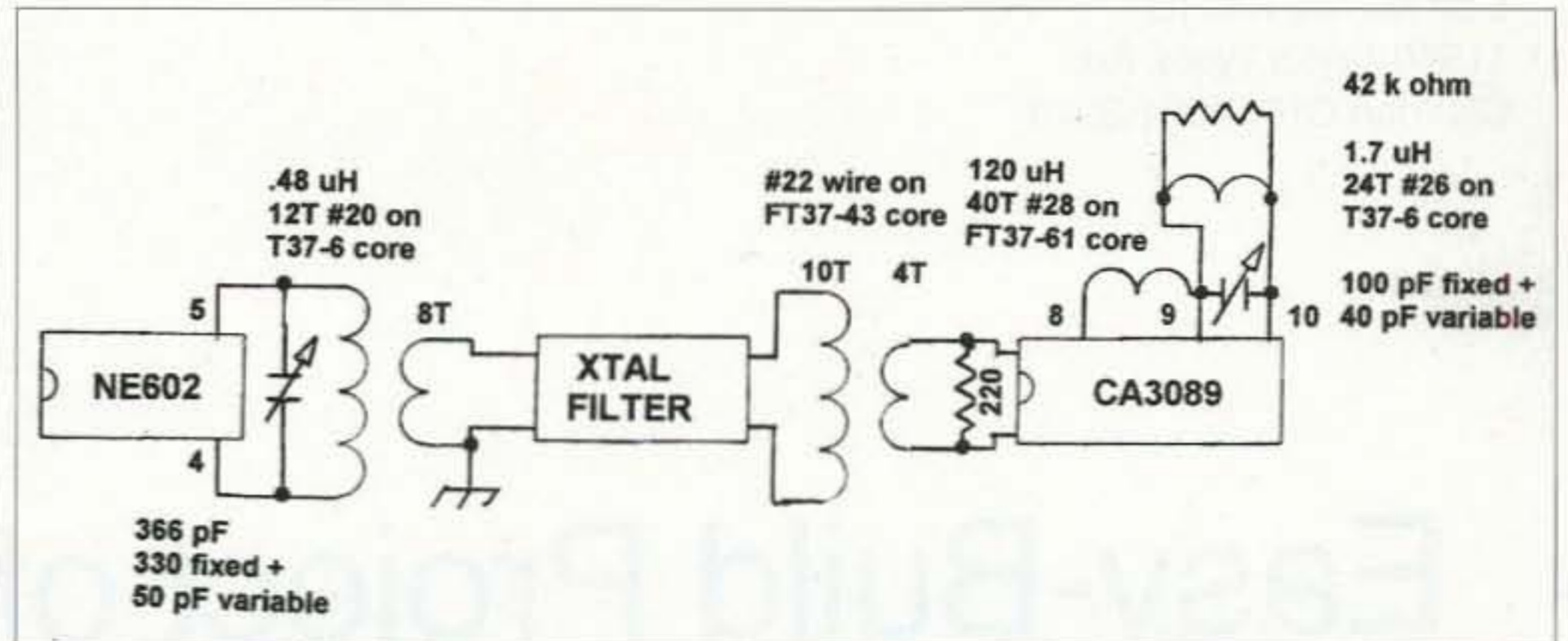


Fig. 4. Use of filter in a radio design.

Finally, the crystals with coils mounted on top are inserted. See **Photo D**. There will be just enough space inside the black plastic cover for these to fit if the crystals are in an HC49US holder. A standard HC49 holder with a coil on top would be too large for this cover.

For those who want to build narrow filters without parallel inductors, the circuit board and cover will work very nicely with standard HC49 crystals.

### Measure the passband

The filter must be properly terminated with 1441 ohms at both ends. A 1.2k ohm resistor in series with a 50 ohm generator at one end and a 1.2k ohm resistor in series with a 50 ohm RF voltmeter or step attenuator at the output will be satisfactory. A typical measuring setup is shown in **Photo E**. The measured results using this set up are shown as data points in the graph of **Fig. 2**.

### Using the filter in a radio design

This filter should be placed between the mixer and IF amplifier in your radio design. For example, in **Fig. 4** an NE602 mixer has a 3k ohm push-pull output. A high-Q tuned circuit provides rejection of spurs and images beyond the passband of the filter and also converts a 3k ohm push-pull to a 1441 ohm single-ended drive. At the other end, a broadband ferrite core transforms 1441 ohms down to a 220 ohm load placed at the input terminals of the IF amplifier-detector integrated circuit. This part has a very high gain and should not be connected directly to the high impedance output of the filter. A 220 ohm or lower value resistor is needed for stability of the integrated circuit.

Detection of narrow band FM at 10.7 MHz or higher requires a high Q inductor in the quadrature detector circuit. For 12 MHz, a T37-6 toroid core with 24 turns of #26 wire will have a Q of 190. Details of the detector circuit for a CA3089 quadrature detector are shown in **Fig. 4**. The circuit can also be used at 10.7 MHz by increasing the 82 pF fixed capacitor to 100 pF.

### References

1. Hayward, W., "Refinements In Crystal Ladder Filter Design," *QEX*, June 1995, pp. 16-21.
2. *Ladder Crystal Filters*, by John Pivnichny, MFJ, Starkville MS 1999. Also available from Barnes and Noble.
3. *Test Equipment*, by Guido Silva, Black Forest Products, Vestal NY 2001.

Continued on page 56

# Easy-Build Project of the Month

*How about this prototyping bench DC PS?*

*How many times have we needed to check out a component when building a small project or repairing a malfunctioning widget? Well, a few at least!*

This task, along with others, is the reason for developing a neat little power supply. My reason for designing this inexpensive DC power supply is for my prototyping activities. It is my opinion based on many years of being an electronics engineer that all circuits must be breadboarded to verify function and performance of the circuit — regardless of the builder's past experience and knowledge. Something we call Murphy's Law will always get you.

The "box" is small so that very little workbench space is occupied. This is definitely a most desirable feature of any piece of test equipment. There is no 120 VAC present in the box — again, a real nice feature. Let's take a closer look at what we have in terms of specifications.

The 120 VAC to low voltage AC is done with a wall converter transformer. This is the least expensive method of getting a safe 12 to 24 VAC

power source. The wall converters are UL- and CSA-approved and contain short circuit protection built into the case. This is quite a bargain at about \$3.00 each. In our case, we are looking for a converter that is in the 15 to 24 VAC range with a current specification of about 1.5 to 2.0 amps. This is in the neighborhood of about 10 VA or 16 watts. These devices are available from several sources including Hosfelt Electronics and Jameco Electronics.

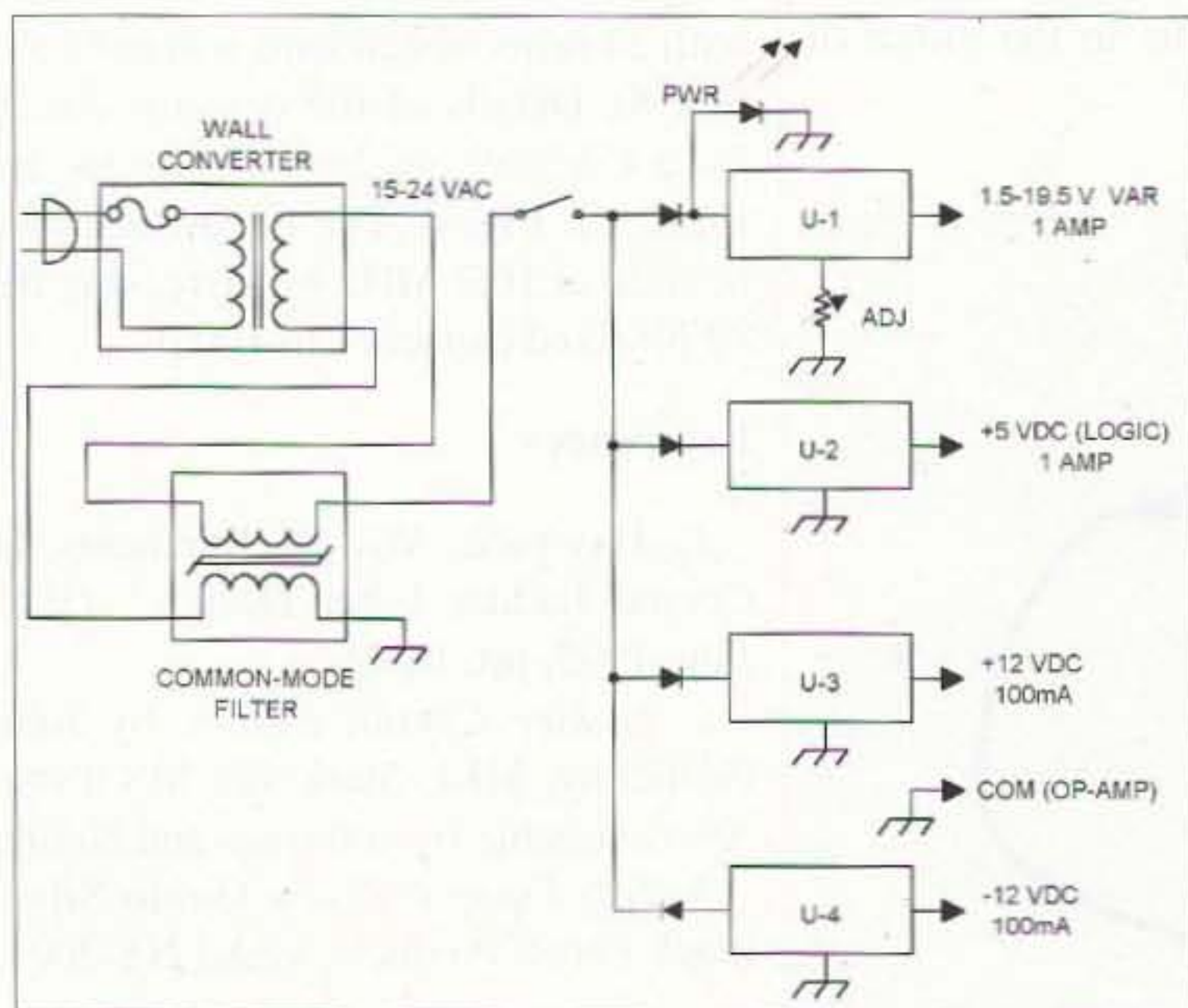


Fig. 1. Functional block drawing.

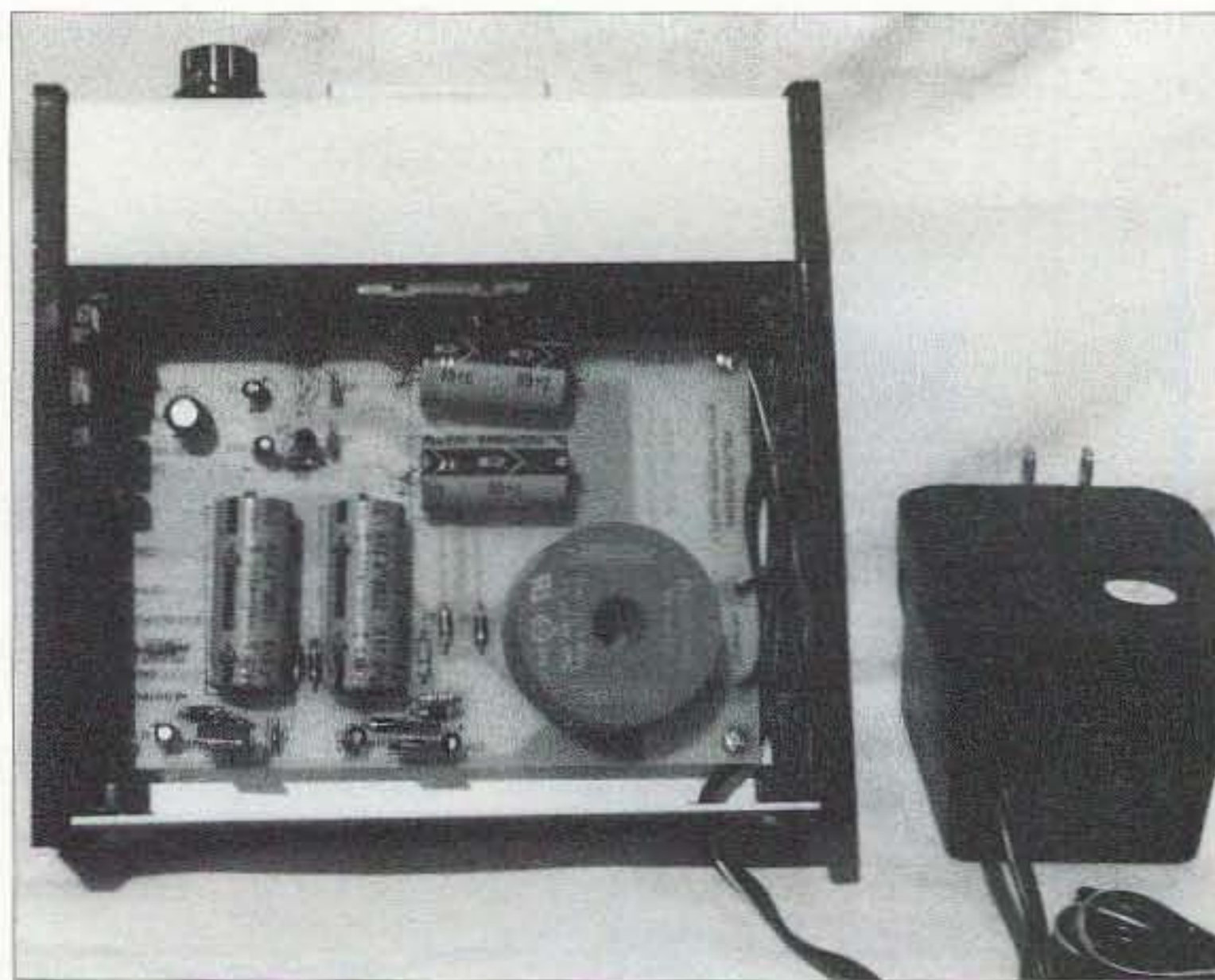


Photo A. The prototyping bench DC power supply, showing how the components are assembled inside the case.

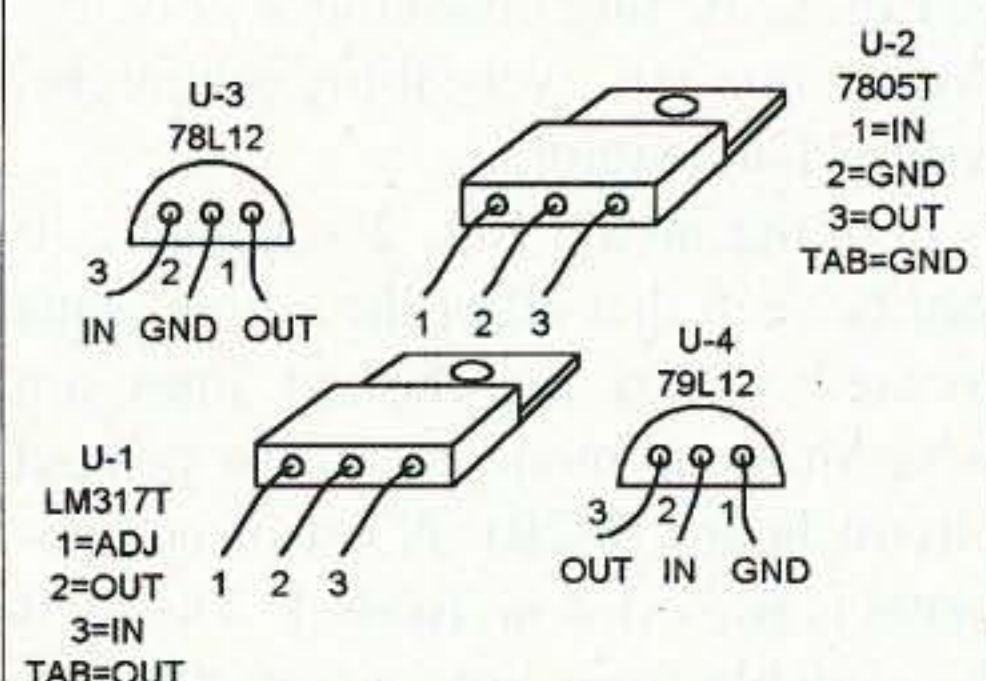
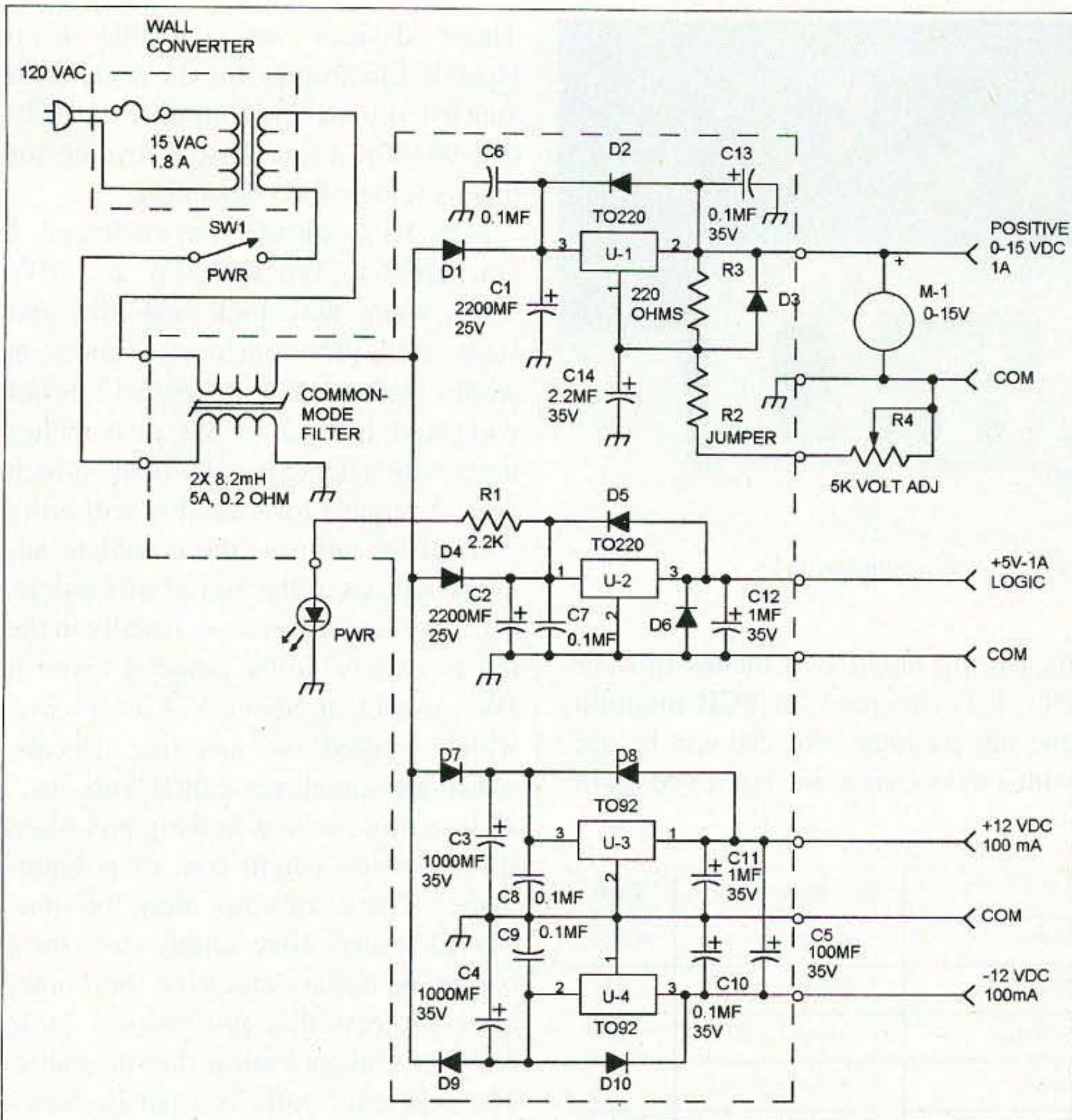


Fig. 2. Schematic.

Most do not have a center tap, so a little different approach has to be taken to get the plus and minus voltages.

Now that we have power to the enclosure, lets take a look at the functions and distributions in the box. Take a look at Fig. 1, which is a functional block drawing.

As can be seen, all operational amplifier and linear IC projects can be powered by this pair of voltages  $\pm 12$  VDC at about 100 mA. The 5 V at 1 amp supply is for all of those digital experiments and breadboard developments. There is the variable supply which provides the 0 to 20 VDC( $\pm$ )

DC test signal source, depending on which polarity you put to ground. The analog panel meter gives a pretty close indication of the voltage level, which can be adjusted by the panel-mounted trimpot. Of course, the voltage sources are all independent of one another and short circuit-protected. Since we are using the supply to develop circuits, a stable load-to-line regulation is needed and must be common-mode noise-free. The line-to-load regulation is done by the semiconductor manufacturer's well-designed monolithic IC regulator. The line filter design is up to us.

Now, the filtering is always a little bit of a problem but the good news is that common mode is where most of the potential problem exists. This is especially true with digital logic circuits. We want to keep noise from entering the 120 VAC line as well as keep AC line noise from appearing on the DC power supply outputs. We can take care of this with a 400 HZ low-pass common mode toroid choke. A company by the name of Pulse Engineering, Inc.,

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Photo B. This small, attractive box has a very professional appearance.

makes a good device which is rated at 250 VAC 5 amps with a 200 milliohm dual 8.2 mH inductor. This is a bifilar-wound encapsulated epoxy-filled unit

measuring about two inches in diameter. It is designed for PCB mounting and has a center hole that can be used with a nylon screw and nut if you desire.

Qty.	Name	Description	Source	Cost
1	T1	15 VAC 1.8A wall converter	Hosfelt 56-781	\$ 3.00
1	SW1	SPDT toggle switch (2-pos.)	Jameco 75969	1.15
1	L1	Dual 8.2mH choke (PE #96180)	Hosfelt 18-129	.35
10	D1-10	1N4004 rectifier diodes	Jameco 177640	.50
1	U1	LM317T adj. volt. reg. TO-220	Jameco 51334	.29
1	U2	L7805T 5V 1A volt. reg. TO-220	Jameco 51262	.29
1	U3	LM78L12 12V 100mA volt. reg. TO-92	Jameco 51203	.19
1	U4	LM79L12 neg. 12V 100mA volt. reg.	Jameco 51431	.22
2	C1, C2	2,200 $\mu$ F 35V electro axial cap 16x30mm	Jameco 93657	2.18
2	C3, C4	1,000 $\mu$ F 35V electro axial cap 13x26mm	Jameco 93649	1.38
1	C5	100 $\mu$ F 50V electro radial cap 8x11mm	Jameco 29962	.07
4	C6-9	0.1 $\mu$ F 50V mono cap	Jameco 25523	.52
4	C10-13	1 $\mu$ F 50V electro radial aluminum cap 4x5mm	Jameco 94160	.52
1	C14	2.2 $\mu$ F 50V electro radial aluminum cap 5x11mm	Jameco 93729	.07
1	R1	2,200 $\Omega$ 25W CF 5% resistor	Jameco 30314	.05
1	R2	Wire jumper	—	.00
1	R3	220 $\Omega$ 25W CF 5% resistor	Jameco 30470	.05
1	R4	5k linear pot panel-mt. 5%	Jameco 29196	.99
1	—	Knob 0.25 in. shaft	Radio Shack	.50
1	M1	15 VDC meter (Modutec used)	Flea market	2.00
7	J1-7	Pin jacks (Johnson)	Flea market	.70
1	PCB	Printed circuit board	FAR Circuits	12.00
1	ENC	Enclosure	Ten-Tec JW-7	14.00
1	G1	0.25 in. rubber grommet	Radio Shack	.05
1	LED	Red 5mm (T-1.75) 80mcd diode	Jameco 34745	.15
4	—	0.25 in. aluminum standoff #4 hardware	Jameco 133612	.68
Total				\$41.90

Table 1. Parts list.

These devices are available from Hosfelt Electronics for 35 cents each and listed under part number #18-129 (PE-96180). I purchased several for other projects I am designing.

Now let's consider the enclosure. I am partial to Ten-Tec's JW and MW series since they look real nice and stack well. The enclosures come in widths from about 4 inches to 12 inches wide and from 2 inches to 6 inches high, with a depth usually in the 6-inch area. A request for a catalog will bring you all the info — the complete address appears at the end of this article. The costs are reasonable, usually in the ten to twenty dollar range. I chose a JW7 model at about \$14.00 + S/H, which worked out just fine. Decals, which are sometimes called "rub-ons," make a professional-looking box when sprayed with a light coat of polyurethane. These rub-ons may be purchased at any office supply store for a couple of dollars and give the homebrew projects that professional look. Now let's take a look at the schematic. The schematic reflects what is shown in Fig. 1, the functional block drawing. As can be seen, every thing is straightforward and simple.

Looking at the Fig. 2 schematic, it can be seen that all of the components located within the dashed lines are what must be mounted on the printed circuit board (PCB). A list of components is provided in Table 1. The PCB is available from Fred KG9GX at Far Circuits, Dundee IL. Fred has graciously laid out the PCB using CAD and will provide PCBs at \$ 12.00 each plus \$1.50 S/H. The quality is good and it makes the project easy, eliminating any chance of incorrect wiring. An assembly detail is provided in Fig. 4. Make sure you observe polarity on the electrolytic and/or tan capacitors. The PCB comes with silk screen markings so that the placement of components should be easy. I highly recommend the PCB for this project.

The components are standard sizes and are available from several sources. The source and part numbers are provided along with the price I was charged at the time of building. When the PCB is complete and checked out,



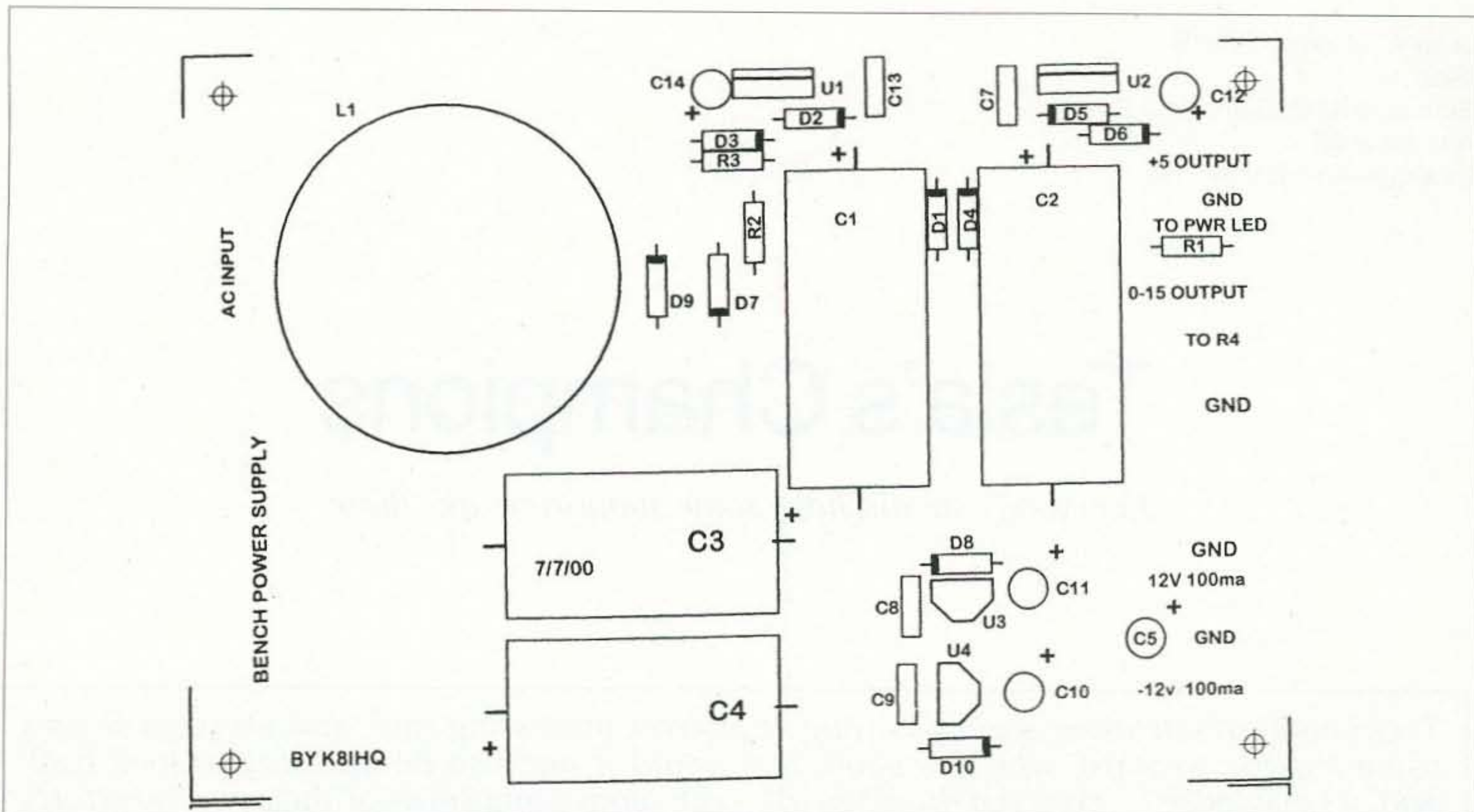


Fig. 3. Component layout.

it can be mounted in the enclosure using four 0.25-inch-high aluminum standoffs with #4 hardware. If the PCB assembly is mounted in the enclosure with U-1 and U-2 to the rear, attachment to the enclosure rear panel can be

done, thus providing extra heat sinking. Be sure to understand that U-1 must be insulated from the rear panel since it is "hot." This is usually done with a TO-220 insulator and some silicone grease. I did not find heat sinking

necessary, since I did not expect to come close to the 1 amp limits of the regulator IC.

One thing to be aware of is the

*Continued on page 56*

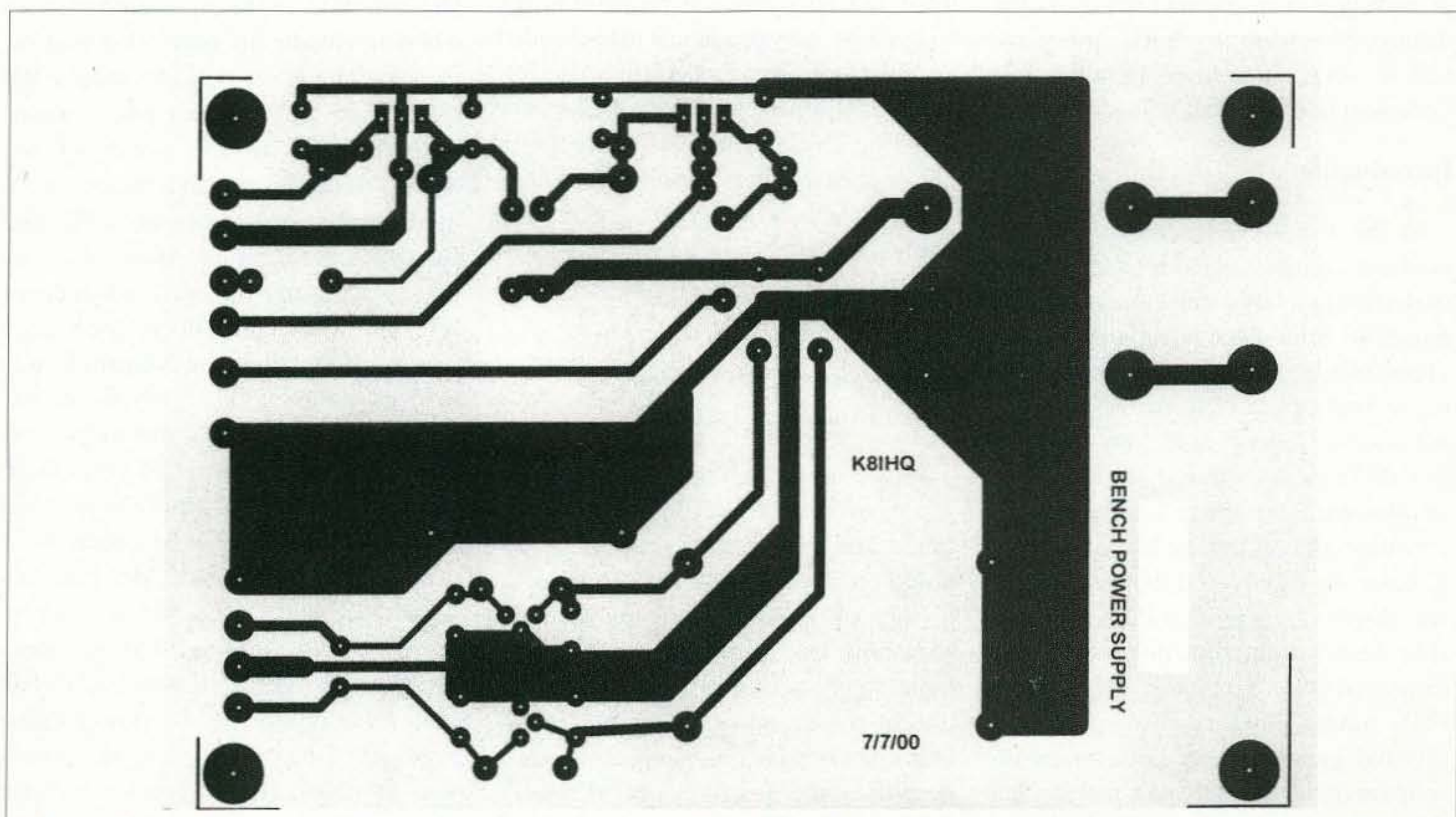


Fig. 4. PCB, foil side view.

John W. Wagner W8AHB  
Teacher  
Summers-Knoll Elementary School  
Ann Arbor MI  
[jwwagner@concentric.net]

# Tesla's Champions

*Everybody should have some supporters like these.*

*Technological advances are happening at an ever increasing rate, and we seem always to be looking forward, which is good, but would it not also be uplifting to look back and acknowledge — even pay homage to — the pioneering spirit of those whose efforts laid the foundation for all the technological advantages we enjoy today?*

Our schoolbooks, teachers, and professors seldom mention these pioneers ... if indeed the latter two know anything of their existence. Further, many historians and book writers have elevated the names of entrepreneurs and technologists for discoveries made by early pioneers, and if we are not more mindful, our historical heritage will be lost forever.

## Introduction

In the 1988–1989 school year, my students commissioned a bust of Tesla to donate to a large museum, any large museum. After discovering that the Division of Electricity and Modern Physics section of the National Museum of American History made no recognition of Tesla, we offered our bust. The Smithsonian curator promptly refused our offer, stating that he had no use for it. Later we discovered that the curator was displaying a bust of Edison alongside Tesla's induction motor. He also displayed photographs of the Niagara Falls power plant next to one of its original generators. A large brass inscription plate listed Tesla's patents, but there was no reference to Tesla. In the middle of the display stood a life-size

replica of Thomas Edison with the caption, "While the Niagara AC plant was being built by Westinghouse, Edison was busy with other important things." The caption did not explain what these "other important things" were, nor why this was relevant to the Niagara AC power plant. I then decided to enlist my third-graders to write letters, sell T-shirts, and raise money for donating Tesla busts to as many major universities and institutions as possible.

This article will tell my experiences in our nearly 20-year-long campaign to reintroduce Tesla to the academic community.

## Third- and fourth-graders vs. the Smithsonian Institution

I have a story to tell you about my successive classes of third- and fourth-grade students whose efforts are focused on preserving Tesla's memory in history. Along the way, my students somehow learn to write ... and enjoy their newly acquired skill. Is this not one of the grand purposes of school? Our class hero is Nikola Tesla because he is the underdog of electrical history, yet his scientific discoveries brought us the prosperity we enjoy today.

This is our incredible story of how my students are making their mark on history for Nikola Tesla. We are not talking about an obscure inventor lost in history, nor are we talking about a mad scientist who performed magic. Nevertheless, in the nineteenth century when he made his early discoveries, they may have seemed like magic. We are talking about a man whose major scientific gifts to the world (of AC power transmission and radio), more than anything else, caused a Second Industrial Revolution. How else can one explain the meteoric advance of science from the horse-and-buggy days of 1895, when the Niagara Power Project adopted his polyphase AC power system ... to his invention of radio ... to when, a mere 74 years later, man walked on the moon? It just had to be Tesla who "invented tomorrow."

Trust me, it was not Mr. Edison's light bulb that caused this revolution, as the Smithsonian Institution wants everyone to believe; it was Tesla's AC motor, his polyphase AC power transmission of electricity, and his invention of radio. His AC motor brought unprecedented mechanical power to industry; his AC power distribution

system made electrical energy available everywhere; and his radio communication system allowed us to communicate ideas with each other.

Is it not an absurdity that this great genius is virtually expunged from history in our country? It is more than that; it is a national disgrace!

### Tesla becomes our class hero

These students and others in my successive classes learn the true story of electrical history, not the politically correct version taught by a trusting but brainwashed educational system. When we learned that Nikola Tesla is the underdog of electrical history and is ignored by the Smithsonian, we made him our class hero and immediately started a campaign to secure his proper place in history.

### We acquire a bust of Tesla

After we learned the heart-wrenching story of Tesla's life and realized what a great man he was, we wanted to tell the world about him. We wrote many letters to important people asking for their support. Then a former student and her father approached me one day. She said she had persuaded her father, an accomplished sculptor, to create a bust of Tesla for our class, but we had to pay for the materials. The sculpture is bronze, mounted on premium-grade solid granite imported from India. It's appraised value is \$6,000. The plaque reads as follows:

NIKOLA TESLA  
1856-1943  
HIS NAME MARKS AN EPOCH

IN A SINGLE BURST OF INVENTION HE CREATED THE POLYPHASE ALTERNATING CURRENT SYSTEM OF MOTORS AND GENERATORS THAT POWERS OUR WORLD. HE GAVE US EVERY ESSENTIAL OF RADIO, AND LAID THE FOUNDATION FOR MUCH OF TODAY'S TECHNOLOGY.

### Writing letters

Cursive handwriting is normally introduced in the third grade. Now our

classwork had a purpose — writing letters to raise money for our Tesla bust. Many important people responded with generous checks to support our campaign. We even received a check from the president of Sony Corporation in Japan. (At the risk of appearing boastful, my students' letters ARE outstanding.)

### Rejected

When we offered our finished bust to the Smithsonian, Dr. Bernard S. Finn, Curator of the Division of Electricity and Modern Physics, refused us, claiming he had no use for it.

### Teacher travels to the Smithsonian to investigate rejection

When I visited the Smithsonian to learn why Dr. Finn had no use for our Tesla bust, the reason became indelibly clear. Please remember, at this time I was still naive about the Smithsonian's bias against Tesla — that is, until I saw a bust of Edison next to the invention that revolutionized the world — Tesla's rotating magnetic field device, which gave us polyphase AC and the AC motor. Tesla's U.S. patent number was on his invention, but I could not find any recognition for Tesla.

### A pathetically comical excuse

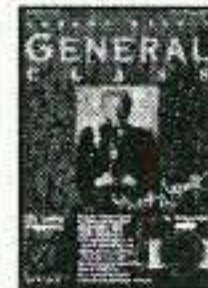
When I asked Dr. Finn why he had placed Edison's bust on display next to Tesla's invention, he said, "The sculptor was a phrenologist and wanted to examine the bumps on Edison's head; this makes our display authentic."

### Money buys history at the Smithsonian

The entire electrical display at the Smithsonian (including their Web site) focuses on Edison's brief business enterprise, which failed. This is not a story of invention, but of big business. Edison used Direct Current (DC), a technology invented and developed by others — before his time — as a means of powering his incandescent lamp. Big business and the gullible media have exaggerated this story so much

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that now everyone believes Edison is the father of our system of electrical power.

### Other evidence of deception and omission

I began looking through various Smithsonian publications, and what I found was astonishing. *The Smithsonian's Visual Timeline of Inventions Book* cites Rubik's cube, the electric toothbrush, and the pop-up toaster, but it fails to list the AC motor. Tesla is not even listed in the index. Further, they credit the invention of radio to Guglielmo Marconi: "1895 ... After reading the scientific writings of Heinrich Hertz, 20-year-old Italian Guglielmo Marconi invented radio communication." The Smithsonian ignores Thomas Commerford Martin's biography of Tesla published in 1894 describing Tesla's demonstration of radio transmission in 1893. The Smithsonian also ignores the U.S. Supreme Court's decision upholding

Tesla's patents and rejecting Marconi's patent for the invention of radio.

Dr. Bernard S. Finn is curator and first author of *Lighting a Revolution*, a Smithsonian publication. In his section titled "The Beginning of the Electrical Age," he names 43 contributors to the science of electricity. Mr. Edison's name is cited many times along with his photographs, but Nikola Tesla's name is omitted. Equally outrageous is the Niagara Falls power station picture of Tesla's AC generators on the last page ... and Dr. Finn's concluding remark: "When the Niagara Falls power station began operating in 1895, it signaled the final major act in the revolutionary drama that began in Menlo Park in the fall of 1879."

By this time the totally brainwashed reader is led to believe that our electrical world started with Mr. Edison at Menlo Park; then Edison finished electrifying America in 1895, by creating the Niagara Falls power station. Yet it was Tesla's U.S. patents that were used in that power plant's creation,

and Edison had no role in the project whatever. Edison actually fought the adoption of AC bitterly by waging his infamous "War of the Currents," culminating in his creation of the first electric chair. Yes, it was Thomas Edison and his crew who invented the electric chair to frighten people away from the use of Tesla's AC system of electricity.

### The students fight back

Education is the only way to combat the Smithsonian's wrongful depiction of electrical history, but we cannot hope to match the millions

of dollars industry and the Edison Institute spend promoting Edison's name. Nevertheless, I believe we can make a significant impact on many of our country's future physics and engineering students by donating busts of Tesla to our major universities.

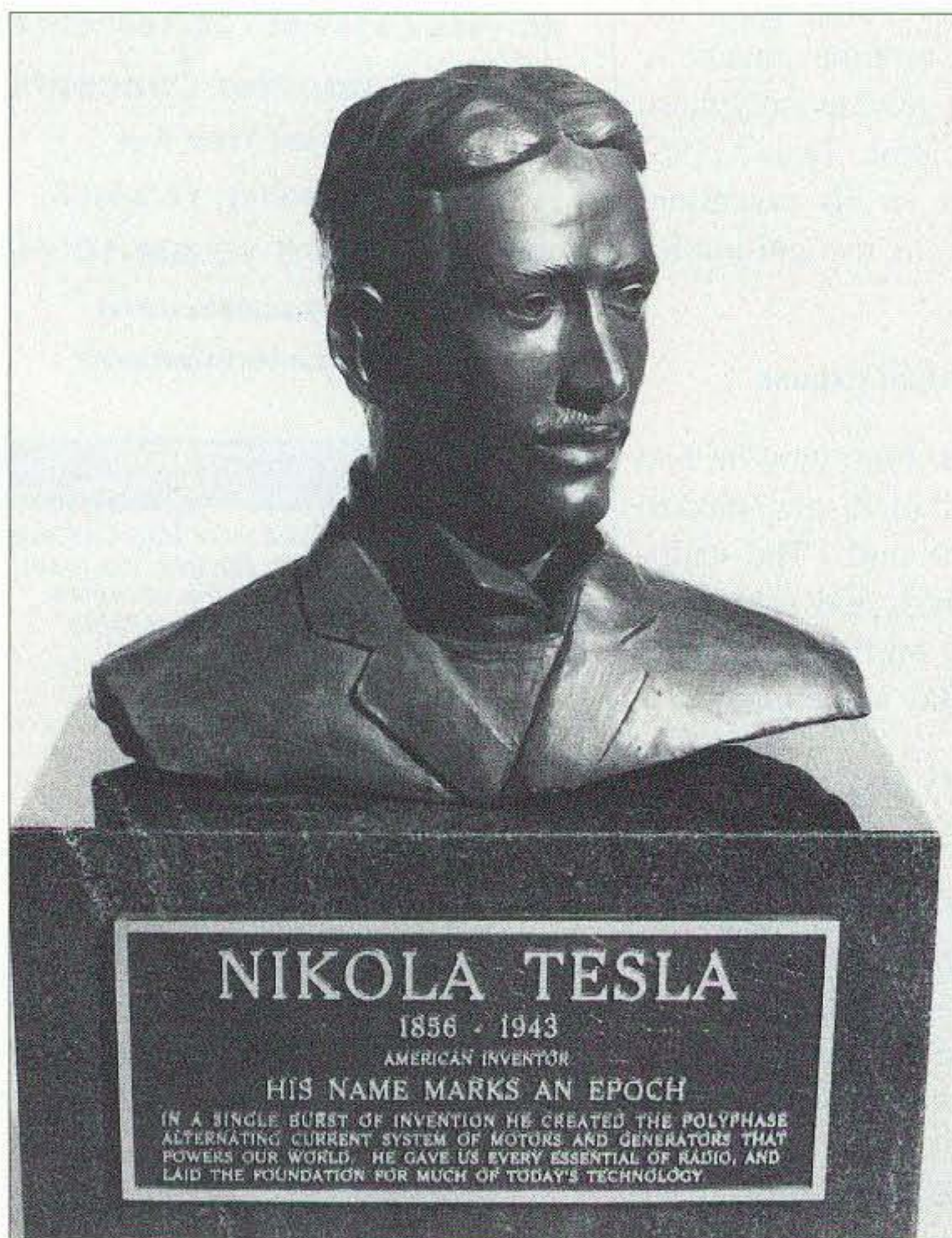
People universally recognize that a sculpture is an acknowledgment of one's greatness. Inasmuch as the academic community essentially forgot Tesla for a century, we believe a good first step is to reintroduce him to the students and faculty of our major universities.

My students intend to continue learning about Tesla, writing letters, selling T-shirts, and donating his bust to major U.S. universities. Soon we will also have 18" x 24" framed educational posters to donate to selected schools. For Tesla T-shirt ordering information, contact me via E-mail at [jwwagner@concentric.net]. So far we have donated busts of Tesla to ten major universities: Harvard, Yale, Princeton, MIT, Caltech, University of Michigan, University of Wisconsin, University of Maryland, Purdue University, and the University of Illinois — all made possible by donations and the sale of our T-shirts, but we need continued support from all who understand and appreciate our efforts.

### Official statement from Smithsonian Institution

Some selections from the PBS (Public Broadcasting Station) interview with Bernard Finn (Curator, Div. of Electricity and Modern Physics, National Museum of American History, Smithsonian Institution) regarding Tesla's legacy can be found on [<http://www.pbs.org/tesla/dis/finn.html>]. It is also interesting to include a few of Dr. Finn's comments, also presented on the PBS Web site on Tesla, regarding John Wagner's claims [<http://www.pbs.org/tesla/dis/responses.html>]:

QUESTION: John W. Wagner claims that the Smithsonian has deliberately minimized Tesla's contributions to electrical science. According to Wagner: "Its curator essentially credits Edison for our worldwide system of



**Photo A.** This valuable bronze bust of Nikola Tesla, appraised at \$6,000, is being donated to major universities by W8AHB and students in his classes.

electricity. He also credits Marconi for the invention of radio. This is a deliberate assault on factual history and needs to be challenged." Is Wagner's claim correct? What might the motivation be for the Smithsonian to credit others with Tesla's inventions?

FINN: ... John Wagner has made several statements about the historical role of Nikola Tesla, about the Smithsonian's treatment of Tesla, and about Mr. Wagner's communications with the Smithsonian. Not surprisingly, my views are somewhat different from his.

John W. Wagner's rebuttal to Bernard S. Finn's remarks: I believe Mr. B.S. Finn is a fine gentleman. He is also skillful with words; I was almost beginning to believe him. Nevertheless, close examination of his rebuttals reveals more than a casual reader would notice. Please consider the following analysis:

FINN: There is little question but that Tesla was a genius, whose fertile mind generated a number of ideas at the cutting edge of the electrical technology of his day.

WAGNER: Dr. Finn creates the impression of giving praise for Tesla's work. Nevertheless, close examination of his statement shows that he does not cite any of Tesla's accomplishments. Instead, he states that Tesla "generated a number of ideas at the cutting edge of electrical technology." In short, Dr. Finn lacks specificity — not only in his letter but in his displays.

FINN: Tesla was a loner. He had difficulty working with other engineers — whether in explaining his ideas to them or in considering their criticisms.

WAGNER: Many great historical figures were loners. Galileo, Copernicus, Van Gogh, and Goddard were laughed at and even persecuted for their ideas, yet they persevered in their singular direction. Did this make them any less worthy of recognition?

FINN: He had difficulty working with other engineers — whether in explaining his ideas to them or in considering their criticisms. The unfortunate consequence of this was that his impact on practical technical developments was severely impaired.

WAGNER: Dr. Finn fails to consider the opposite ... that the engineers created the problem by their faulty comprehension of his work. Dr. Finn also fails to explain exactly how "practical technical developments were severely impaired." Again, specificity is lacking.

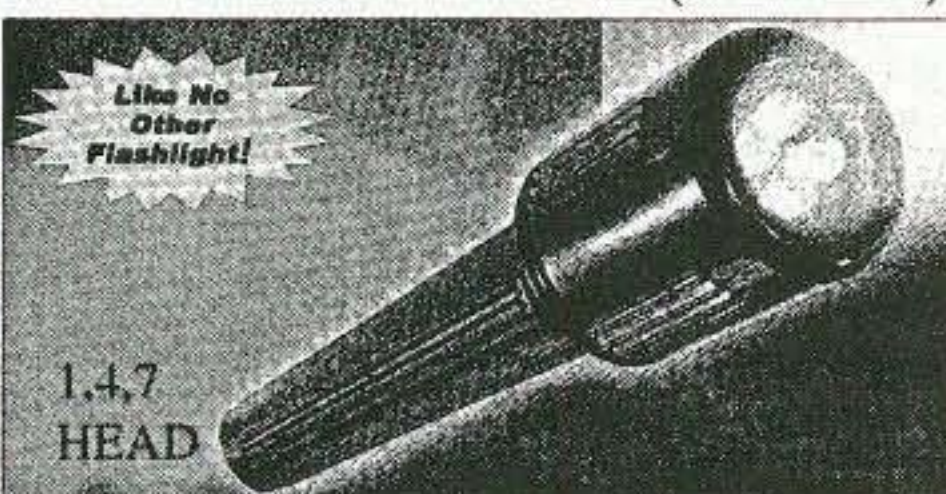
FINN: This does not make him less interesting; indeed, for those of us who

are concerned with the roots of creativity it makes him, if anything, more so. But it does mean that we should be careful in what we claim were the consequences of his activities.

WAGNER: We are in agreement. Tesla was a more interesting scientist

Continued on page 28

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## Tesla's Champions

*continued from page 27*

than many of his contemporaries, and he was also at the root of creativity. Indeed, "we should be careful in what we claim were the consequences of his activities." The scientists who comprised the Electrotechnical Conference in Munich were no doubt mindful of this admonition when they elevated his name to stand alongside only 14 other great discoverers worldwide, a recognition outside the scope of Mr. Edison's ability ever to achieve.

FINN: Tesla's concept of the rotating field was clearly innovative and was recognized as such by George Westinghouse when he negotiated to purchase the patents in 1888-9. But to claim, in Mr. Wagner's words, that "he created the polyphase alternating current system of motors and generators that powers our world" ignores contemporary European systems that relied on the work of Pacinotti, Brown, Dobrowolsky, Wenstrom, and also Westinghouse engineers who, with Tesla's help, translated those patents into practical electrical "technology."

WAGNER: Dr. Finn is correct in stating that "Tesla's rotating magnetic field was clearly innovative," but to compare his work with Westinghouse engineers and other technologists is like comparing DNA to crankshafts. While acknowledging that George Westinghouse recognized Tesla's great discovery and bought his patents, Dr. Finn fails to acknowledge that Thomas Edison fought the adoption of the rotating magnetic field principle, the central part of Tesla's polyphase AC system. Further, he does not explain why Mr. Edison's failed entrepreneurial experiment in promoting DC technology is the vanguard of the Smithsonian's electrical display.

FINN: ... It also ignores the complexity of the history of electric power systems. A starting point might arguably be the development of the self-excited dynamo in the 1860s (Siemens, Wheatstone) which was efficient enough to make lighting and power systems (both AC and DC) practical, especially with better magnetic design in the 1870s (Gramme and others). That

made it feasible for arc lighting, incandescent lighting, street railways, and other applications to become widely available. The AC transformer in the mid-1880s (Gaulard, Gibbs, Deri, Blathy, Zipernowski) made possible long distance transmission (though this could also be done, with less efficiency, for both AC and DC using motor-generator sets). Multiphase AC operation, with which Tesla is associated, made transmission more efficient; it also gave us an AC motor. More recently, development of means for transforming DC has meant even more efficient means of long-distance transmission at very high voltages."

WAGNER: Dr. Finn continues to identify evolutionary anomalies that occur throughout all scientific investigations. They do not remain unmodified very long because they are not practical. Therefore, it is only logical to ignore the complexities of interim evolutionary phases that occurred in electrical investigations; the only place they belong is in laboratory notebooks. Tesla's polyphase AC system has been the standard of the world for more than 100 years. Dr. Finn's statement that Tesla was "associated" with multiphase AC operation is another example of an understatement. Tesla *created* the "multiphase AC operation," which is still in use today. Further, it was Tesla's AC motor that provided the real impetus for the explosion in industrial development throughout the world. Dr. Finn has not acknowledged this fact, nor has he evaluated its effect on civilization. While Messrs. Gaulard and Gibbs are credited with the invention of the transformer, they did not envision, nor did they receive patents for an entire system of polyphase AC transmission from the power station to its ultimate destination.

FINN: Incidentally, Edison's role in this particular sequence is modest, being confined primarily to the design of a more efficient DC generator.

WAGNER: Mr. Edison's role in power technology was not even modest; it did not exist! Zénobe T. Gramme and Friedrich von Hefner-Alteneck had perfected the DC generator in 1872, long before Edison borrowed

their technology to make his Pearl Street generating station. Later, Tesla made improvements in DC transmission when he worked for Edison. Then when Edison failed to compensate Tesla financially for his work in this area, Tesla left Edison's employ.

FINN: Tesla is given credit by Mr. Wagner for "every essential of radio." This statement is presumably based on his patents for basic tuning concepts. Eventually the U.S. Supreme Court held that these, together with patents of John Stone Stone and Oliver Lodge, anticipated those of Marconi. But Tesla was ineffective in promoting any system of his own; and although it is intriguing to think that his work may have had a significant impact on others, good historical evidence of that is lacking. Starting from the experiments of Hertz, it was Marconi, Stone, De Forest, Fessenden, Braun, among others, who developed practical radio technology. They were aware of some of the details of what Tesla was doing, but, as far as we are able to discern, they came into their own basic ideas independent of him. We can therefore marvel at Tesla's early understanding and articulation of some important concepts, but should beware of extending him credit for everything that followed.

WAGNER: Dr. Finn's interpretation of my phrase, "every essential of radio," is flawed. In my first article on radio (December, 1995, *73 Amateur Radio Today*), that phrase was clarified by another phrase, "embryonic commencement of our present day technology." I made a clear distinction between science and technology. Dr. Finn's analyses and focus is usually based on technology. I disagree with Dr. Finn's portrayal of Hertz, linking him with known technologists. Dr. Hertz's work is clearly in the realm of science. Before technology can take over, an "embryonic commencement" must first be established. Maxwell, Lodge, Stone, and Tesla's work was also in the realm of science, not technology. It was their work that created that embryonic commencement of what

*Continued on page 57*

# Make Your Own VHF DX!

*Need a neat club activity?*

*It's one thing to wait for band openings to happen — and on VHF, they can be a long time in coming — but it's quite another to create your own. Why wait for an opening to happen?*

**T**he Weathersfield Radio club participated in several band openings of both kinds, but the most fun happened when we created our own. Here are a few of the options we explored.

The first DX we got involved with on a proactive basis was aeronautical portable operation (no, not “mobile,” since we did not use mobile radios operating from on-board power with an antenna mounted to the vehicle, but “portable,” as in a hand-held transceiver with an independent power supply and its own antenna). With Rolf N9BRL volunteering his piloting skills and Cessna, I took both a two-meter and a 220 MHz HT up to about 3,500 feet. With just one watt and a rubber duck antenna, contacts were made into Chicago and northwest Indiana on simplex, while flying over the south central portion of Wisconsin.

Propagation and signal strengths were similar to what is experienced in base-to-land-mobile operation, but with a lot less power and antenna at one end. To confirm the propagation characteristics we noticed, we have since worked other aeronautical stations since then, with similar results —

another station coincidentally also flying a Cessna from Chicago to south central Wisconsin; a ham who was a passenger on a commercial jetliner at 5,000 feet landing in Kentucky (he had a window seat facing Chicago, and came in full-scale); and

the business jet that was owned by Amateur Electronic Supply in Milwaukee, Wisconsin.

In comparing two-meter to 220 MHz operation, Ken N9HXD and I noticed a very similar range between the two bands, with Ken quantifying it at about



**Photo A.** Lighthouse parking lot in Evanston IL. The elevation here is 15 to 20 feet above Lake Michigan. The building used to be the residence of the light keeper and family but is now a gallery for an art museum. Lighthouse can be seen at extreme left.

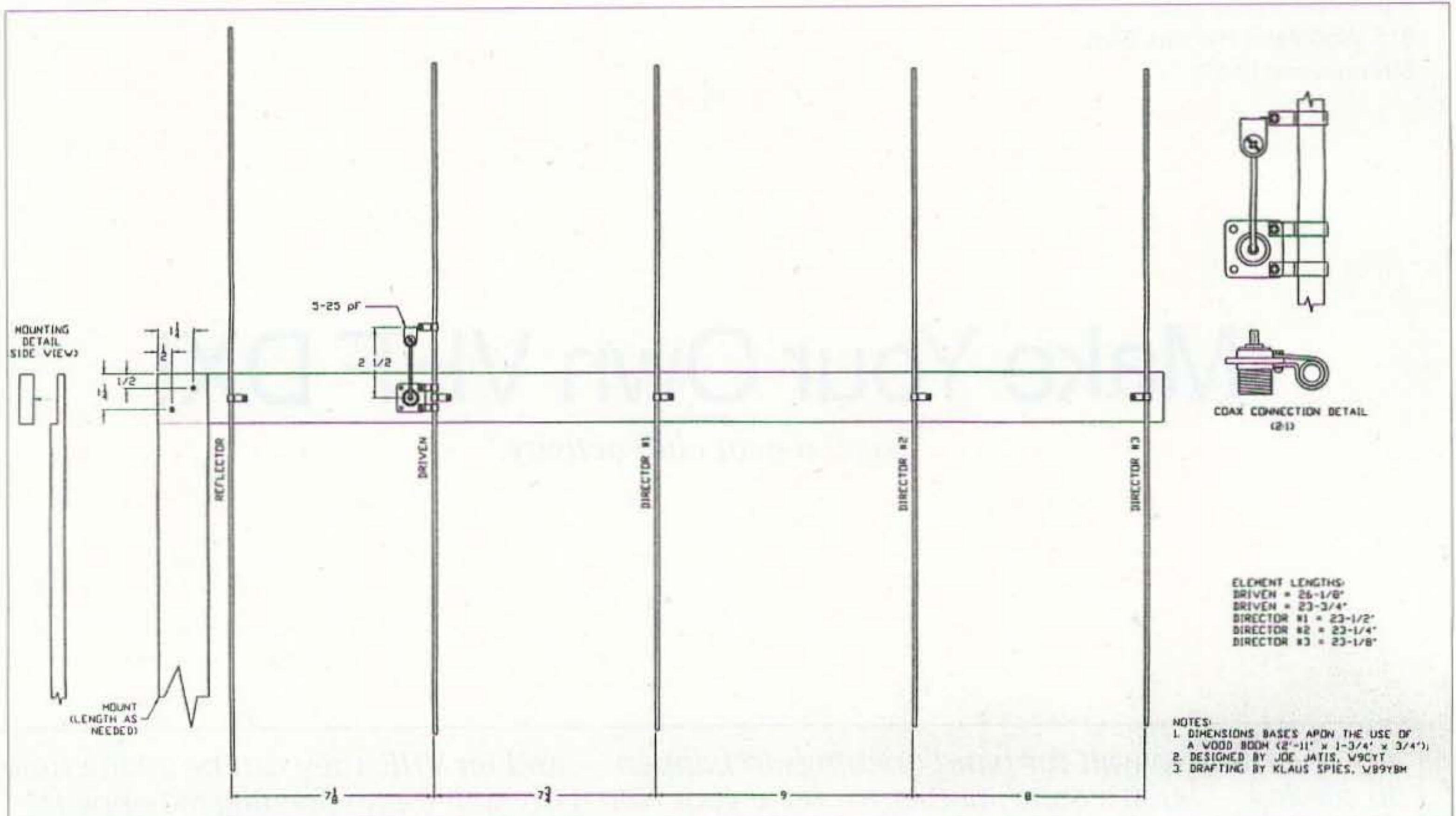


Fig. 1. 220 MHz beam. Dimensions based upon the use of a wood boom (2'11" x 1-3/4" x 3/4"). Designed by Joe Jatis W9CYT (drafting by author).

a ten percent shorter range on 220 MHz. Since the repeater density on two meters is such that it does not take much of an increase in range to access multiple repeaters — even minor openings have been known to cause problems in areas like Chicago — it was decided to concentrate our tests on 220 MHz.

One final test involving two meters involved an attempt at DXing from the observation deck of the Sears Tower, in Chicago. With Ken running a 220 MHz HT with a rubber duck and low power, he was able to access repeaters in Michigan, Indiana, and Chicago. Klaus was running the same type of equipment (Icom HT with a rubber

duck antenna) on two meters, and found the only accessible repeater was in a northwest suburb of Chicago — it was hard to get repeaters even in downtown Chicago. After a brief discussion, it was realized that the glass used in the observation deck was most likely the culprit: To attenuate the bright glare of sunlight on a clear day, a slight tint had been added to the glass. This tint, we assumed, was probably in the form of some type of metal halide crystals embedded in the glass, similar to the metal halide material



Photo B. Test vehicle on station.

223 MHz, 5 elements, 0.125 inches	
at 0.000	13.16 in.
at 7.125	12.375 in.
at 15.0	11.66 in.
at 24.0	11.625 in.
at 31.825	11.56 in.
Gain = 7.47 dB	
Front-to-back = 12.25 dB	
z = 41 ohms	
swr = 1.0	
Gamma match = 2 inches 0.125 in. tube + 17 pF cap	

Table 1. Long-boom 5-el specs.



used in black and white film, and this was shielding incoming and outgoing RF.

One debate that's taken place in the club has been: Which helps range on VHF the most, antenna height, or simply getting the antenna height above the majority of the "ground clutter"? It seems that for every two people who are asked that question, there are twice as many answers — or opinions. We've managed to get a bit of proof for both. The proof of the second took the form of a mini-van, with a magnetic base and rubber duck antenna on the roof. The HT was driving a 15-watt amplifier. With this arrangement, it was possible to get from the Loop in Chicago into a northwest suburban repeater full quieting. Other tests seemed to confirm that this antenna did as well as a 5/8-wave antenna mounted at half that height (on the trunk of a car).

Proof that it's height and not just clearing ground clutter that helps range came in the form of a field test done in the parking lot of the lighthouse in

Evanston, Illinois. The parking lot is a good fifteen to twenty feet above Lake Michigan, and we went yet another ten feet above that to clear ground clutter (pedestrians, vehicles, etc.). For added advantage, we used a home-brewed five element 220 MHz beam made by Joe W9CYT/SK. Dave N9ZAZ ran the numbers through a computer program and calculated that the antenna had just slightly over 7 dB forward gain, with about 12 dB front-to-back ratio. With an Icom IC-38A running at maximum (although rated at 25 watt output, it was measured at 30), there was about 120 watts coming out of the front of the antenna.

In spite of all of these advantages, we were unable to get into our favorite repeaters in Michigan. On the plus side, though, we took advantage of the clear shot across the lake by shooting a signal down the coast southward into Indiana, and worked Bud N9WXY through KB9KRI/R on 224.12 MHz. We were not quite as successful toward the north into Wisconsin. Pointing the beam inland, we were able to access the

Crystal Lake, Illinois, repeater on 224.70 MHz with the radio in the 5 watt position, which we calculated as 40 to 50 miles (in this case, I wonder if a lack of ground clutter killed our signal across the lake, because it certainly helped while we were pointing the antenna inland!).

### Conclusion

While we may not have been able to find out what the exact methodology is for DX — a combination of the two mentioned? — the answers to our questions certainly seem to take second place to the fun of expeditions — all while proving that we don't need to haul a truck load of gear with us to do it.

### Final notes

Thanks to Christel Spies (as yet unlicensed) for help in the lighthouse expedition. Also, to Joe W9CYT, who passed away before he could take part in a 220 MHz expedition — although I'd like to think Joe joined us in spirit. I hope we did okay by you, my friend. 73

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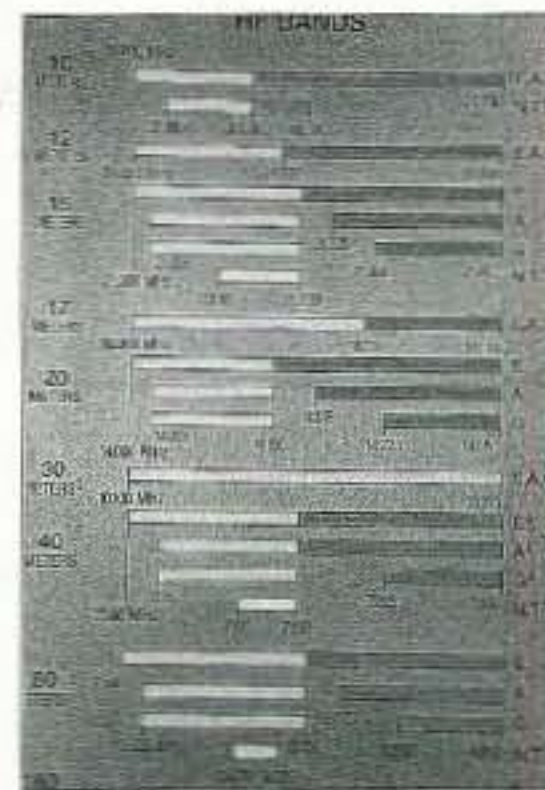
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# The 21st-Century Scrounger

*The end products justify the means — or something like that.*

*There are many ways to save money on electronics parts for your projects, but this article presents an interesting new approach.*

If you buy a 16-ounce drink at just about any restaurant, it doesn't cost twice as much as an eight-ounce drink. Similarly, it is cheaper to purchase a 100-aspirin pack than it is to buy two 50-aspirin bottles. There are two main reasons for this, one of which is of interest to electronics hobbyists.

First, it actually costs less for larger sizes because the total overhead is less for the manufacturer. With the drinks, for example, the restaurant has to pay only for one cup instead of two, and it takes less of the employee's time to fill a single cup, and so on. The second reason that larger sizes are less expensive

is that, in some cases, it is a marketing "gimmick" to get buyers to purchase more of something than they actually need. For example, there are not many nutritionists who would state that people need to drink 64-ounce "Big Gulps." The restaurants make money because people buy more than they need.

The first explanation is the one that is interesting to hobbyists. We can use this fundamental law of economics to our advantage when it comes to obtaining parts for our projects.

## An example

Let's start with something of an example. Suppose you decided to build your own alarm clock. You'd need to purchase a number of parts, the main ones being an enclosure, four 7-segment LEDs, a power cord, a transformer, and maybe a microprocessor to drive the entire device. **Table 1** shows how much it would cost to purchase those basic items from a national electronics distributor.

The main reason the cost is so high is that the electronics distributor has to do a lot of work to fill your order. Also, both the distributor and the original

manufacturer have to make a profit. The parts would be much cheaper if you would purchase a hundred or even a thousand pieces of each part you needed. The distributor's overhead would be less for each piece and he might even reduce his profit per piece a little to get a larger sale.

If you decided to really mass-produce this alarm clock, you would not even go through the distributor, but could purchase parts directly from manufacturers. This takes the distributor's profit out of the picture completely, further reducing your cost.

To obtain cheap electronics parts, an ideal way to do it would be to get the same type of cost as the larger manufacturers without having to buy in the same volumes. It is strange, but there is one way to do this: Buy their end products!

## Cheap electronic devices

When I say "buy their end products," I'm not at all implying that you should always purchase finished goods instead of building your own projects. This, of course, would go against everything electronics hobbyists attempt to achieve. We build things to challenge

Part	Cost
Plastic enclosure	\$3.34
7-segment LEDs (4 @ \$1.57 ea.)	\$6.28
Power cord	\$1.58
Transformer	\$7.65
Microprocessor	\$4.98
Total	\$23.83

**Table 1.** The basic parts needed to build an alarm clock, along with their associated costs if purchased from a national electronics supplier.

us and to get a sense of pride from constructing something. And many times, we build projects that have features not generally supported by current products on the market.

So why do I say "buy it"? Because so many electronics devices are so cheap these days, I've found it useful to purchase commercial products and then to disassemble them for their parts. It takes some work to do this, and there are some problems associated with it, but in general there are many more advantages than disadvantages.

Go back to the alarm clock example above. Instead of buying all the parts separately, you can purchase a complete alarm clock and disassemble it. It's a simple matter to keep the parts you need and then toss the rest. Looking at the difference in price between **Photo A** and the total parts cost of **Table 1**, you save about \$15 — even more when you add in the shipping and handling costs.

The alarm clock is just one example. If you look in the advertising supplements of most Sunday newspapers, you'll find an array of electronics devices that can be disassembled for useful parts. To give you a flavor for this, several examples are given in **Photo A**.

Need a low-speed, high-power 120 VAC motor? Buy an electric mixer and take it apart. Need a high-speed 120 VAC motor? A new hair dryer might be a way to go. Need a small speaker? Buy a cheap pair of speakers or even a "baby boombox" and disassemble them. When you're all done you will have paid about the same as buying the part via a distributor, with the added benefit of having all the other parts on the unit that can be saved for your next project.

## Enclosures

Of all the parts I've obtained with this method, the ones that are the most beneficial are the enclosures. For some reason, buying low-volume enclosures is an expensive proposition. Another drawback is that the end results of such enclosures don't look very professional. Going back to the alarm clock example, I'd much rather display my own clock design in an enclosure

from a scrapped clock than in one of Radio Shack's blue plastic boxes.

There is also the ability to get enclosures with just the features you'd like. If you need a keypad for a project, buying a calculator or a phone for the enclosure might make sense. Many of my projects are powered by batteries, so I'm always looking for good enclosures that have integrated battery storage compartments.

Here is another example. If there is anyone out there thinking about building a project that interfaces with the telephone system, perhaps you could look at using the shell of an answering machine as an enclosure. In most cases these enclosures would have a notch all ready cut out for the phone cord. They are also likely to have an opening for a DC power input — this could be used or not, depending on your project.

Here are some other tips for purchasing and using enclosures obtained via this method:

- Make certain you buy the enclosure first, and then design your project around it. This is the best way to make certain all your parts will fit into the box.
- Estimate a project's size on the high side if you're not sure how much room you'll need. I don't remember

ever having to start a project over because there was too much empty space in an enclosure.

- If you've ever taken something like a remote control apart, you know that most of the switches are just rubber cups that close two traces directly on the PC board. This is difficult to do with homemade PCBs. To get around this, you can place a flat PCB-mount switch in the switch's location.

- Most cases are plastic and their markings are generally painted on. To remove the markings for your project, try a solvent like paint thinner. If a marking will not come off, try strategically placing a label over it instead.

- Small holes can be covered with labels, too. Suppose you built a project from an IR remote control enclosure, but only needed one switch input. To cover the other 20-or-so holes, try another label. This one should be large enough to cover the entire face of the project — you'll find it looks much nicer than 20 separate labels.

There is one other twist on this method of obtaining parts that should be discussed — used electrical equipment. We focused in this article on disassembling new devices to get parts only because it is much easier and more meaningful to get the cost associated with these devices. All the same



**Photo A.** All the items shown here are good sources for cheap parts.

can be applied to used equipment. In fact, in some respects used equipment makes it even easier to get useful items. The reason is that most of today's devices are being built with surface-mount technology, making it difficult to desolder useful chips from the board.

### Music to your project

Once you get the hang of this type of parts "shopping," one thing is certain — you'll almost never purchase ICs to make any kind of sound. The reason is that there is an unimaginable quantity of sound chips on the market, and it is much easier and cheaper to obtain them by disassembling purchased items. In this case the phrase "purchased items" means one of two things: cards and toys.

Musical cards have become such a big hit that for about four bucks you can spice up your projects with every type of music from *Jingle Bells* to Elvis' *Love Me Tender*. Most cards come with the sound generation chip, a small piezo-electric buzzer as a speaker, a switch, and a small 1.5- or 3.0-volt button cell. All of these parts are salvageable, although in most cases you'll probably only use the first two.

Toys are even a more fertile ground for parts to recycle. Back in my day, the only soundmaking toys were See

'n Says, which were simple mechanical devices. Today's kids have toys that make all kinds of noises, and except for a few like the See 'n Says that are still sold, almost all of them use electronics to generate the sounds.

Here is a small sampling of what I found in my son's toy box relative to making sounds:

- A plastic camera that says, "Smile, please," when the shutter button is pressed.
- A car key chain holder with a four-button remote control that makes the sound of an engine starting, an angry sounding horn, an alarm, and the horn gently "tooting."
- A fire engine with horns and sirens.
- A space shuttle flashlight with three distinct phrases, such as "Watch out, we're entering the meteor field!"
- A telephone with dial tone, touchtone dialing, busy, and ringing sounds.
- An electronic book about trucks, with a variety of phrases such as "Ten-four, good buddy!"

There are many, many other sounds out there. When it comes to sounds, whatever noise or song you are looking for, the old adage is definitely true: Seek, and you shall find. Also, be sure to remember the advice of the last section — cheap toys can generally be found at garage sales.

### Drawbacks

As with anything that sounds this good, there are some downsides to this method of obtaining parts. First, many of the integrated circuits (ICs) used in today's electronics devices are not marked with part numbers, or in some instances even with the name of the manufacturer who built them. Even if a part is marked, it may well be a custom IC and hence there would be no way to obtain a data sheet for the part. All this makes it very difficult to get useful chips via this method.

The problem is not just limited to ICs. Many parts tend to be unmarked, and hence hard to use elsewhere.

Another difficulty is that special care must be taken to use an existing enclosure. Your PCB may need very specific mounting spaces in order to

work. Also, switches, connectors, and display devices all need to line up with their associated features on the enclosure — this can greatly limit your flexibility in designing the PCB. One way around this problem is to be sure to use the PCB that came with the enclosure as a layout template. As long as your board matches the production board, it will fit in the enclosure.

Finally, many of today's electronics are not assembled with good, old-fashioned screws. Many have complex arrangements of tabs and groves, generally with an ample dose of glue or melted plastic to keep everything together. All of this makes it difficult to get into a device, let alone use the enclosure for something else. To this day, I have not found a good DC power adapter. When I find one held together with screws I'm going to put a five-volt regulator in there to power my projects. Keep watching — I'll write about it to give you the details.

### Last words

We electronic hobbyists like to build things for ourselves. So even if it takes \$25 in parts and 25 hours of time to design and build an alarm clock, it is worth it to us. We're not necessarily "in it" for the money, but rather other things — like the pride that comes with being able to say: "I built it myself."

To some, using a production clock enclosure for their own clock project might not seem like the "do-it-myself" attitude. But how is this any different than buying a rectangular enclosure from the parts distributor? The point is that you should use the best (and cheapest) enclosure that is suited for your project. It's like everything else in this hobby: You need to use the best part for the application. This should not detract from your ability to proclaim with pride: "I built it myself." 73

Part	Production Device(s)
7-segment LEDs	Alarm clock
Solar cell	Solar-powered calculator
120 VAC motor	Hair dryer, mixer, fan
120 VAC push-buttons or sockets	Computer power center
Voice recording IC	All-digital answering machine, Radio Shack "talking" picture frame
Laser diode	Laser pointer used for presentations
Stepper motors	Portable CD player, used floppy drive, old printers
Numerical LCD	Calculator
Alarm sounds	Children's toys
Musical ICs	Musical greeting cards

**Table 2.** Here is a list to keep for future reference. Whenever you need a part from the first column, consider buying the device from the second column to obtain it.

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# Travels with Henryk — Part 6

*Portuguese hospitality at its best.*

*My first and so far only visit to mainland Portugal was quite short. I did not even bring a radio with me. But on the other hand, I was fortunate to meet some outstanding amateur radio operators of Portugal.*

I phoned Jose CT1BOH (Photo C) who lives in Lisbon, the capital city. Jose is one of the best contest operators in the world, having spent some ten years traveling to exotic places and winning contests, breaking records both on CW and SSB. He is in his early thirties, but already by the age of 8 he was a competent radio operator. Born in Africa in a ham family, he grew up with amateur radio sounds in the background. His father was CR6RC, later to become CT1RB. When the family moved to Portugal, Jose was too young to get a license and had to wait several years.

Jose was very helpful and arranged a small meeting of a few local hams at the home of another Jose, CT1AOZ (Photo A). There were Arlindo CT1EGW and Luis CT4NH and Rui CT1AIC and Jose CT1BOH and of course the host, Jose CT1AOZ. Luis CT4NH has a well-equipped station and is quite active, mainly on SSB.

Rui CT1AIC lives in the same block of flats as Jose CT1AOZ but is mainly interested in digital modes. He was the first one in Portugal to transmit packet radio emissions.

Jose CT1AOZ (Photo B) has a

modest station, and because he lives in an apartment, his antennas are modest, too. Yet, he is quite successful in contest and DX-chasing. Readers who are a little older might remember Jose from his African activities as CR6HH in Angola and CR7JO in Mozambique. He moved to Portugal 21 years ago.

Another active amateur radio operator who moved to Portugal from Africa and whom I met was Santos CT1DVV (Photo F). He lives some 150 miles north of Lisbon in the historical city of Coimbra. Not exactly in the city; a few



Photo A. A group of amateur radio operators get together in Lisbon.

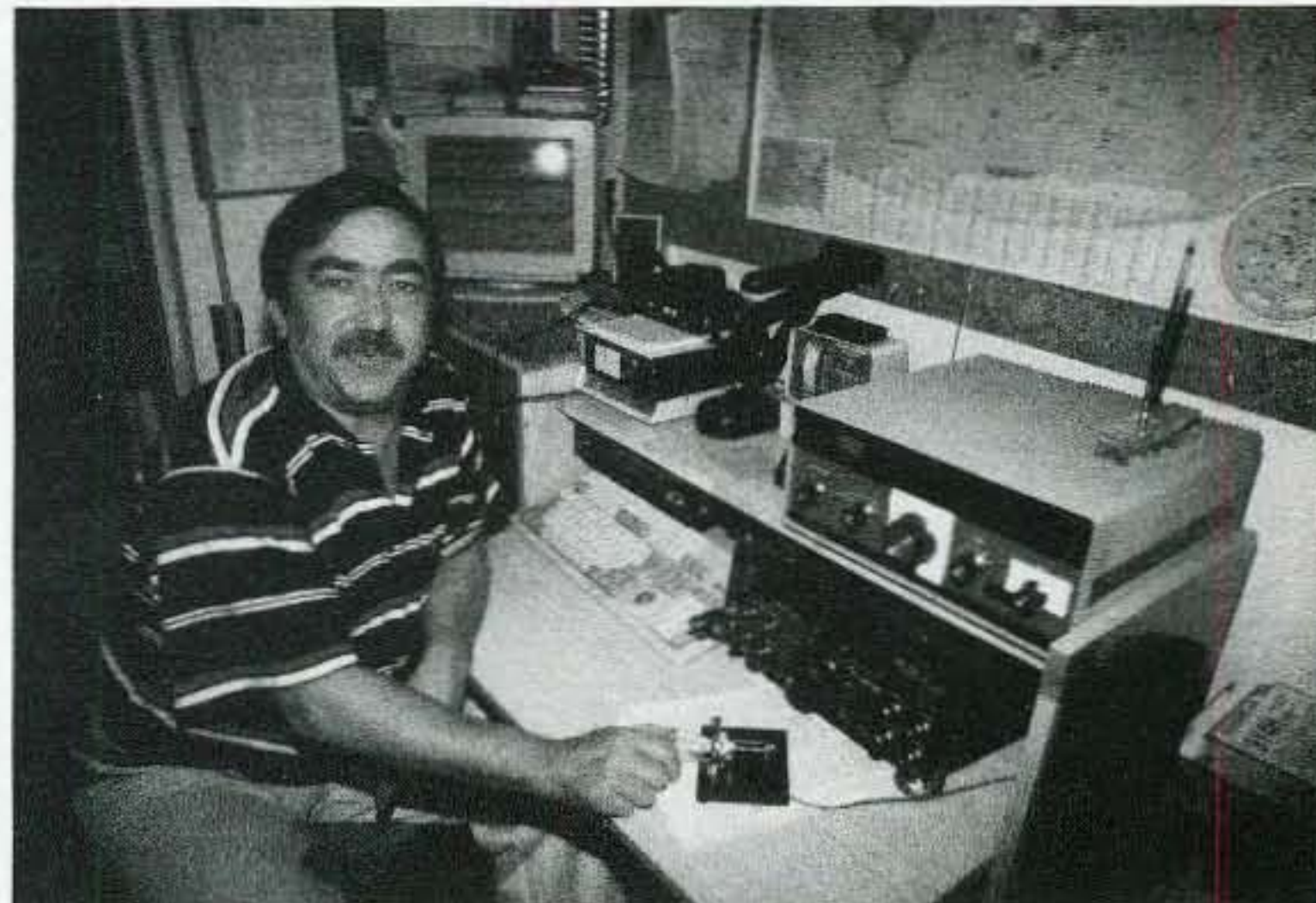
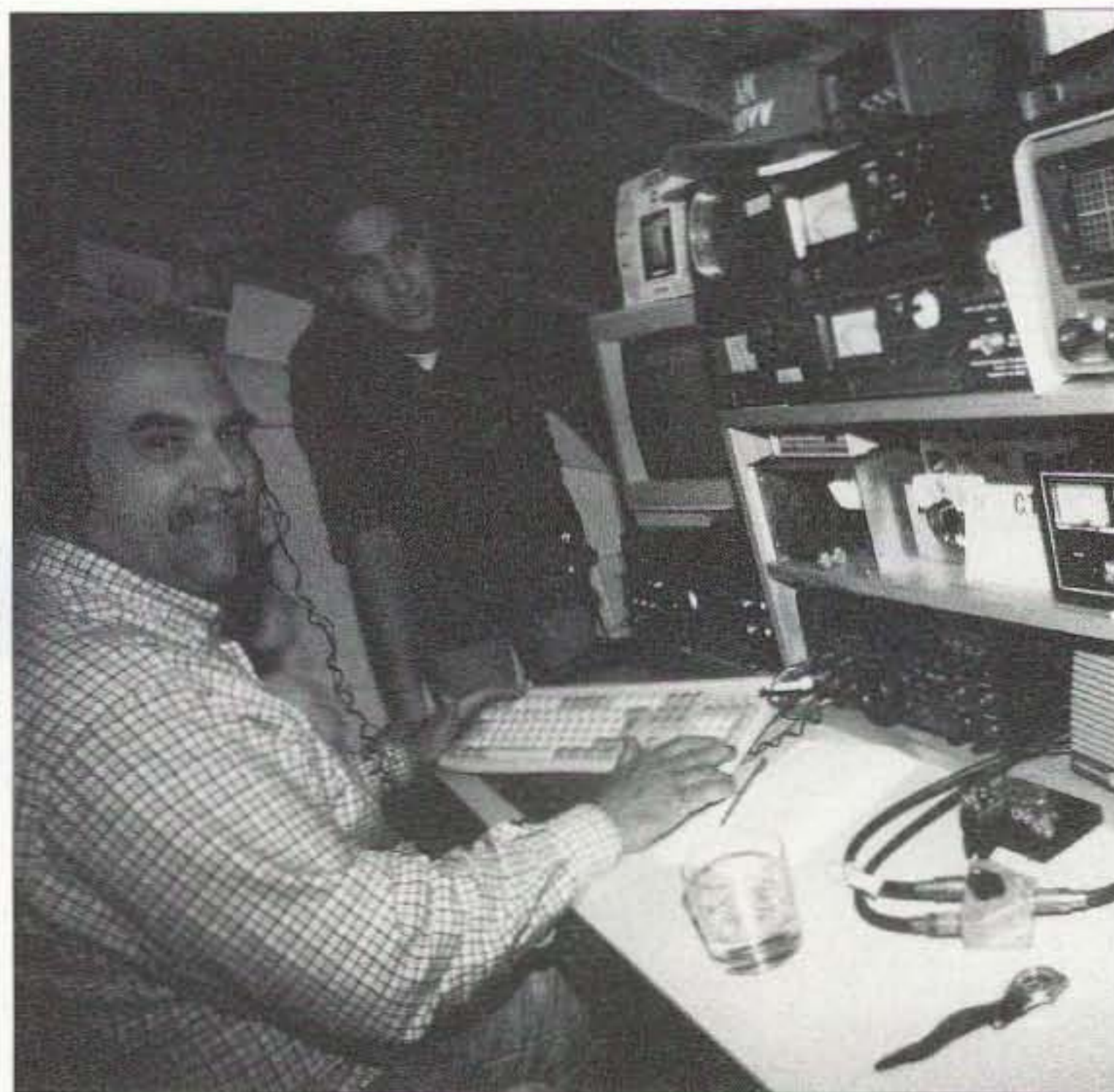


Photo B. Jose CT1AOZ in his shack in Lisbon.



*Photo C. Jose CT1BOH is one of the best contest operators in the world.*

years back he moved out of town in order to be able to build large antennas and do serious contesting. He is very serious, and the antennas are impressive (**Photo E**). His station is in almost all major contests. Santos' son, Antonio CT1ESV, shares this hobby and the station (**Photo D**). They usually use the callsign CT8T in contests. Many foreign visitors have been here and have guest-operated this outstanding station.

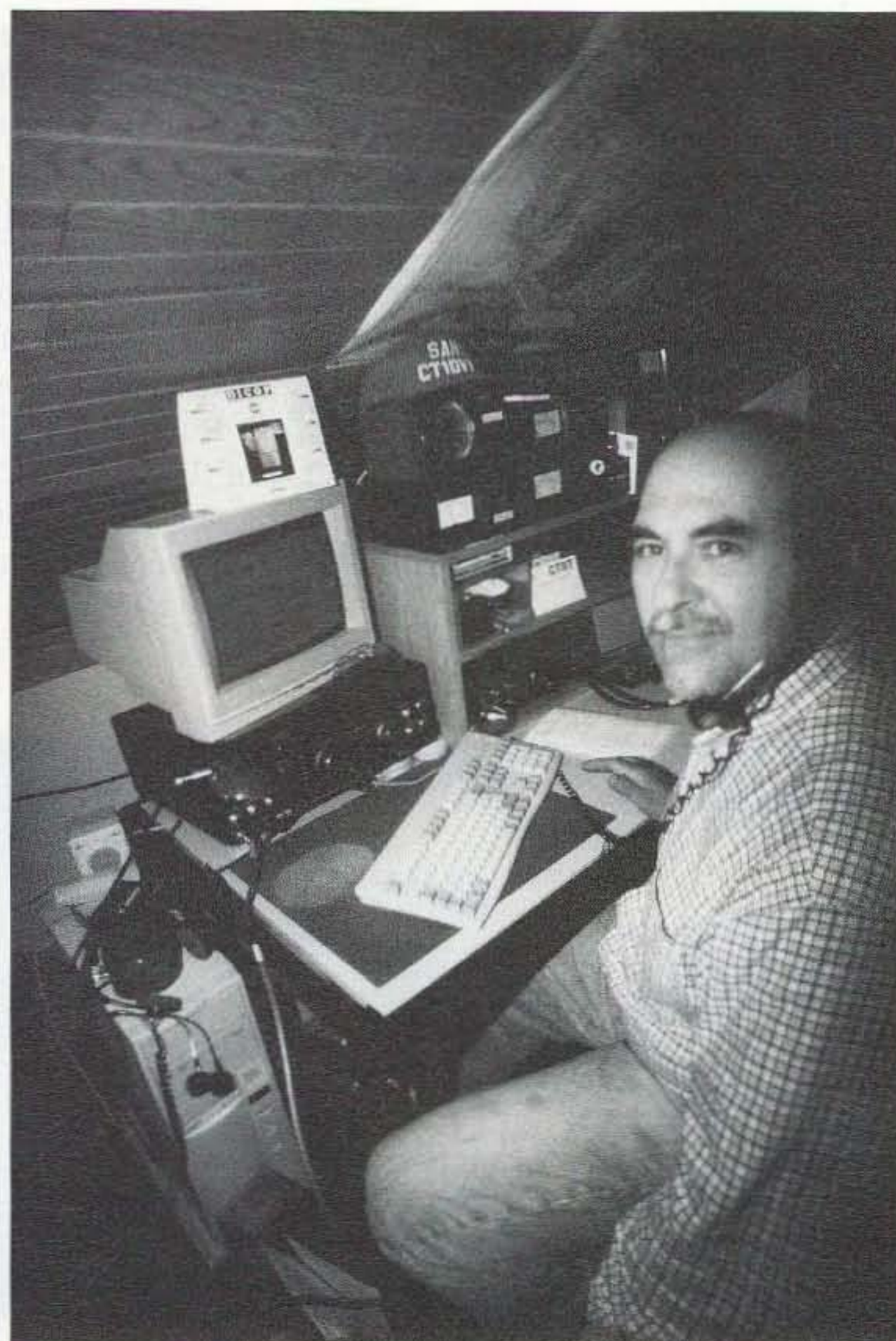


*Photo D. Santos CT1DVV, who lives in Coimbra, shares this station with his son Antonio CT1ESV. You may have worked them in contests as station CT8T.*

*Continued on page 57*



*Photo E. CT1DVV owns some impressive antennas.*



*Photo F. Contester Santos working as CT8T.*

# What Amateur Radio Means to Me

*Do you feel the same way?*

*I retired in August 1999. I had worked in the camera and photo supply business for 47-plus years. My customers were among the wealthy and famous across the southeastern United States and southeast Texas. An example is that I sold a Canon Elph 370Z to Gene Cernan, retired astronaut and the last man on the moon.*

I worked five years in Charleston SC, 11 years in Atlanta GA, five years in New Orleans LA, and 27-plus years in Houston TX. The best thing about New Orleans was that I met my wife Elsie there.

The interaction with 100 to 200 hundred customers a day both in person and on the phone, with fellow employees and the business owners, was important to me — it was what I lived for. At all these locations except Charleston, I was a store manager or had the title of “Marketing Manager.” Did I miss this when I retired? You bet I did! I was so depressed that I sought professional counseling. That was a big mistake — they kept me coming back for more sessions and more tests. In effect I was a “cash cow” that they didn’t want to lose.

My wife was the one who suggested amateur radio! She ordered from ARRL the 1997 edition of *Now You Are Talking*, and a *Pocket Code Tutor*, and a practice key from MFJ. That was what it took to get me started. I went to a VE session thinking that it would be a teaching session, not knowing that they were there to give tests. I took the Novice test and the Technician test, and not surprisingly, failed them both.

I decided that the only thing to do was to study on my own, not knowing that most of the amateur radio clubs had classes for new hams! I passed the Novice but again failed the Technician test. I ordered ARRL’s *RF and You*, and with the information passed the Technician test. I passed the General test the first time I took it. I filled out a comment sheet in the back of the General manual and mailed it to the ARRL. They used a quote from it on the back of their new manual. I took a code class given by the Brazos Valley Amateur Radio Club, after which I could read and send 5 words per minute. The only other test I need to pass is the Extra class.

My station has

a Yaesu FT-814 transceiver, antenna tuner, and table microphone, and a Bencher key. Most of the other items are by MFJ. Power supply, antenna,

*Continued on page 57*



*Photo A. John R. Endsley, Jr. KD5IDU.*

## Great Gift Idea!

*Check out this LED super-system.*

*Here is a \$55 4-LED pocket white light system that may be an ideal gift for a friend or yourself on your next outing. It is especially useful in providing various types of lighting for just about anything you might encounter out on the road.*

The power-on mode illuminates four intensely bright white light-emitting diodes that can project a beam visible to the end of a football field. I was utterly amazed at how four little light-emitting diodes, barely taking any juice out of three common AA alkaline batteries, could concentrate a beam of light you would get with a big old heavy flashlight.

For map reading, the mode button gets you into a dim mode that adjusts 15 different intensities down to a faint glow. They do this by multiplexing the four LED lights — a subtle on and off of the lamps so quick that your eye cannot detect the microsecond off between on pulses. As you get down to relatively dim for in-vehicle map reading, you can still drop the intensity by one after another LED going out.

The little LED-Lite offers some attention-grabbing blinking, strobing, and pulsing patterns, and this might be a great way to draw attention if you decide to leave the light on to mark a specific object or overhang hazard on your next camping trip. It also has a neat circuit to automatically dim down the lights after a couple of minutes, and finally shut down the entire light system if you want a gradual time-out.

Another interesting mode is an extremely bright SOS distress signal. At first I thought this was a little hokey, but after I played with it at night, I saw its value by how intense the SOS signal was, and how easily it was recognized by three dots, three dashes, and three dots. It signals at a rate that almost anyone with basic Boy Scout training could read as a distress signal.

The LED-Lite system is submersible, and it keeps out water down to 100 feet. Yet if you ever needed to change the three common AA batteries, a little jeweler's Philips screwdriver is all that is necessary to remove the four screws and snap out and in the AA cells. If you use heavy-duty alkaline AA cells, the very brightest mode continues to pump out the lumens for over 50 continuous hours before things begin to get dim. If you regularly run the light in a normal light mode, you could leave it on for 200 hours continuously. Down at a very low light level, such as a level for reading a map out in the wilderness, the LED system is multiplexed almost always off, and you could get over 2,800 hours of usable map-reading light! This is one of the features of the white light-emitting

diode — when switched to less brilliance, there's no energy-consuming resistor in series with the lights, but rather the lights are multiplexed mostly off; and while you can't see that the light is cycling on and off, the view is dim light output and hundreds if not thousands of hours of useful map-reading lumens.

If you put a little plastic float on the lanyard that might hold the light, it won't sink in fresh water. In salt water, it is neutrally buoyant. A special lithium AA battery would keep it floating face up, to serve as an overboard marker in case of a boating accident on a lake or river. But best of all, think 100% submersible.

LED-Lite Company, based out of Chula Vista CA, continues to dazzle us with all sorts of unique LED-Lite products. But for the road and camper, their newest four-LED white light with dimming and flashing capabilities, plus underwater operation, is going to be quite popular. You can buy it direct from LED-Lite, 2400 Fenton St., Ste. D, Chula Vista CA 91914, tel. (877) 309-0530. You will *not* believe how much light comes out of such a very small package when you first turn it on, and it cycles up extra white bright. 73



# CALENDAR EVENTS

Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the October issue, we should receive it by July 31. Provide a clear, concise summary of the essential details about your Calendar Event.

## JULY 6

**OAK CREEK, WI** The South Milwaukee ARC Inc. will hold its 34th annual "Swapfest" on Saturday, July 6th, at the American Legion Post #434 grounds, 9327 S. Shepard Ave., Oak Creek WI, from 6:30 a.m. until at least 2 p.m. CDT. Free parking. A picnic area and limited free overnight camping are available. Admission \$5 per person, includes "Happy Time" with free refreshments sometime during the day. For a free flyer with map, write to *The South Milwaukee Amateur Radio Club Inc., P.O. Box 102, South Milwaukee WI 53172-0102*. Talk-in on 146.52 simplex and on many of the local repeaters.

## JULY 12, 13, 14

**BRYCE, UT** The 2002 Rocky Mountain Division ARRL Convention and 2002 Utah Hamfest will be held July 12th to the 14th at Ruby's Inn, Bryce UT, near Bryce Canyon National Park. For more info please visit [[www.utahhamfest.org](http://www.utahhamfest.org)].

## JULY 14

**KIMBERTON, PA** The Mid-Atlantic ARC will present their annual Valley Forge Hamfest and Computer Fair, Sunday, July 14th at the Kimberton PA Fire Company Fairgrounds, Route 113, south of the intersection with Route 23. The hamfest will be held rain or shine. Sellers will be admitted at 7 a.m. and buyers will be admitted at 8 a.m. Admission is \$6. Unlicensed spouse and children of licensed amateur radio operator will be admitted free of charge. Lots of great door prizes will be available. Many dealers will be there selling amateur radio and computer gear. Demonstrations of various types will take place. Inside tables with electricity are \$10 each for 1 to 4 tables, \$8 each for 5 or more in addition to admission. Please E-mail Rick Miskinis N3AGS, at [[reservations@marc-radio.org](mailto:reservations@marc-radio.org)] or call him at 610-825-9590. Outdoor tailgate spaces are \$6 each in addition to admission on the day of the hamfest. Food and beverage sales are to be done by authorized vendors only. For additional hamfest info, please E-mail MARC at [[Hamfest-info@marc-radio.org](mailto:Hamfest-info@marc-radio.org)], or write to MARC, P.O. Box 2154, Southeastern PA 19399-2154. Info is also available on the club Web site at [<http://www.marc-radio.org>]. Talk-in on 146.835(-)

MHz and 443.800(+) MHz PL 131.8. Watch for signs which will direct you to the site.

**PITTSBURGH, PA** The North Hills ARC will hold its 17th annual Hamfest on July 14th, 8 a.m. to 3 p.m. at the Northland Public Library, 300 Cumberland Rd., Pittsburgh PA. The location is approx. 10 miles north of Pittsburgh on McKnight Rd., (Truck Route 19). At the 3rd traffic light after Northway Mall, turn left onto Cumberland Rd. Northland is on the left at the top of the second hill. From points north, take Route 19 south toward Pittsburgh. Follow the signs for McKnight Rd., and at the 4th traffic light turn right onto Cumberland Rd. If on Perry Highway, turn left onto Cumberland Rd. at the Sunoco. Talk-in and check-ins will be on 149.09 W3EXW, the North Hills ARC repeater. Free admission. Free parking. One free automobile-sized space per tailgater; each additional space \$5. Handicap/wheelchair accessible. Refreshments will be available. For more info contact *Joe Springer, 2601 Clare St., Glenshaw PA 15116*, or phone 412-486-1681. More info is also available on the Web site at [[www.nharc.pgh.pa.us](http://www.nharc.pgh.pa.us)].

## JULY 20

**CARY, NC** The Cary ARC will sponsor its 30th Annual Swapfest 8 a.m. to 2 p.m. at the Herb Young Community Center at the corner of Chapel Hill Rd. and N. Academy St. Exit 290 off I-40 onto Chapel Hill Rd. about 2.1 miles to N. Academy St. Advance tickets \$4, \$5 at the door. 6 ft. tables available for \$10 each. Limited power. Sellers can set up on 6:30 p.m. the day before, or 6 a.m. to 8 a.m. the day of the fest. VE exams begin at 10 a.m. Talk-in on 145.390. For tables or tickets, SASE to Cary Amateur Radio Club, Box 53, Cary NC 27512. You can find more info at [[WWW.QSL.NET/N4NC](http://WWW.QSL.NET/N4NC)].

**TEXAS CITY, TX** The Tidelands Amateur Radio Society Hamfest will be held July 20th, 8 a.m. to 3 p.m. at the Doyle Convention Center, 21 Street at 5th Ave. North, Texas City TX, one block south of the Jack in the Box. Free parking. Air conditioning. Swap tables, major vendors, VE exams, CW contest, forums and much more. Advance registration by mail is \$3 per person, \$4 at the door. No E-mail reservations. Swap tables \$5 each. SASE if you need confirmation. All entrants must pay the registration fee in addition to any table rental fees. Registration for VE exams is at 9 a.m. Walk-ins are welcome. Test sessions are

also held every 3rd Saturday in LaMarque TX, next door to the Fire Station at 1109 Cedar Drive. Registration starts at 8 a.m. in LaMarque. Contact [[tidelandshamfest@aol.com](mailto:tidelandshamfest@aol.com)] or [[aa5op@aol.com](mailto:aa5op@aol.com)].

## JULY 21

**SUGAR GROVE, IL** The Fox River Radio League will hold their Annual Hamfest at Waubensee Community College, Rte. 47 at Waubensee Dr., Sugar Grove IL (5 miles NW of Aurora). Directions: From Chicago take I-88 west past Aurora to "To Route 30, 47-Sugar Grove" exit (Rte. 56). Take 56 to "Galena Blvd. Aurora" exit. Turn right (west) on Galena Blvd. to Rte. 47. Turn right (north) on Rte. 47 and go about 2 miles to Waubensee Community College. Use north (2nd) entrance. Go to Erickson Gym parking. Campus map at [<http://www.wcc.cc.il.us/map/sgmap.html>]. Note: Eastbound I-90, no exit at Rte. 47; Westbound I-88, no exit at Rte. 47. Talk-in W9CEQ rpt. on 147.210(+600) PL 103.5/107.2. Outdoor flea market open from 6 a.m. Free with paid admission. Sales of food and beverages are not permitted. Indoor exhibits open at 8 a.m. Set up Saturday at 7 p.m., Sunday 6 a.m. to 8 a.m. Advance tickets \$4, \$5 at the gate. Make check payable to Fox River Radio League and send with an SASE to Fox River Radio League, P.O. Box 673, Batavia IL 60510-0673. VE exams at 10 a.m. Bring original license, copy of license and photo ID. The appropriate fee is required and exact change would be appreciated. Contact Maurice L. Schietecatte W9CEO, c/o FRRL, P.O. Box 673, Batavia IL 60510. Tel. 815-786-2860, or E-mail to [[w9ceo@arrl.net](mailto:w9ceo@arrl.net)]. Indoor tables are \$12 per 8 ft. table. Limited number of tables with AC power. Bring extension cord. First come, first served. Overnight camping available at Bliss Woods, Kane County Park, 5 min. from the hamfest. 630-466-4182. No reservations. First come, first served. Sorry, no overnight camping at the hamfest site. The Web site is at [<http://www.frri.org/hamfest.html>].

**WASHINGTON, MO** The 40th Annual Zero Beaters ARC Hamfest will be held July 21st, 6 a.m. to 2 p.m. at Bernie E. Hillerman Park. There will be a ham radio and computer flea market, technical sessions, ham radio demonstrations and more. Free parking. Free admission. Talk-in on 147.24(+) rpt. Watch for

green on white hamfest signs. VE exams registration starts at 9 a.m. Walk-ins welcome (limit 60). Bring original license and a photocopy. For info SASE to *ZBARC VE Exam*, P.O. Box 1305, Washington MO 63090.

#### JULY 27

**CINCINNATI, OH** The OH-KY-IN ARS, Inc. will sponsor their 5th Annual Hamfest at Diamond Oaks Career Development Campus, 6375 Harrison Ave., Cincinnati OH. This facility is located just east of I-275 and I-74. Take I-74 to the Rybolt Rd./Harrison Ave. exit (exit #11). Go east on Harrison Ave. Diamond Oaks is located on the right (south side) of Harrison Ave., less than one mile from the I-74 exit. Special seminars, transmitter hunts, indoor vendors (setup Friday 5 p.m.-7 p.m. and Saturday 6 a.m.-8 a.m.), outdoor flea market (setup 6 a.m. Saturday) — first space free with admission ticket. Additional spaces \$3 each. Indoor vendors bring your own extension cords. Electricity not available outdoors. VE exams at 8 a.m. Walk-ins accepted. Refreshments, free parking, handicapped parking available. Talk-in on 146.670(-) and 146.925(-) rptrs. Admission is \$5 in advance, \$6 at the gate, age 12 and under free. Indoor vendor tables (6 ft. with free electric) \$10 each. Contact *Lynn Ernst WD8JAW*, 10650 Aspen Place, Union KY 41091-7665. Phone 859-657-6161; E-mail [wd8jaw@arrl.net]. Web [www.ohkyin.org]. Expected attendance 650-750.

#### AUG 11

**BAYVILLE, NJ** The Jersey Shore ARS will host their Hamfest August 11th at the Bayville Fire House, Route 9, Bayville NJ. Talk-in on 146.910 MHz PL 127.3, and 443.350 MHz PL 141.3. Setup starts at 6 a.m. and the doors open to the general public at 8 a.m. Admission is \$5. Tables reserved in advance are \$15 each, first come basis, includes one admission. Contact *Bob W2CE* at 732-657-9339 or [hamfest@jsars.org]. VE exams registration is at 11:30 a.m.; testing starts at 12 noon.

#### AUG 16, 17, 18

**ESCONDIDO, CA** The ARRL Southwestern Division Convention for this year will be held at the California Center for the Performing Arts, August 16, 17, and 18. Exhibits will be set up in the ballroom. Free parking for both exhibitors

and attendees. Secured hotel rooms at excellent rates at hotels within a three-mile radius of the convention site. Drawings all day Saturday August 17th, each hour 9 a.m. to 5 p.m. To request information, please contact Nancy Paine KD6WUL, Exhibits Chairwoman, at 619-466-4216; or John Hudson III WB6HYQ, Convention Chairman, at 619-525-4291. E-mail [npaine@earthlink.net].

#### AUG 17

**OAKLAND, NJ** The Ramapo Mountain ARC will hold its 26th Annual Ham Radio and Computer Flea Market on Saturday, August 17th, at the American Legion Hall, 65 Oak St., Oakland NJ 07436. Talk-in on 147.49/146.49 and 146.52 simplex. Vendors' setup starts at 6 a.m. The event is open to buyers 8 a.m. until Noon. The kitchen opens at 7 a.m. Donations \$4. Spouse and kids admitted free. Inside tables \$10 each. Tailgate space \$8 per space. Please contact *Steve Oliphant N2KBD*, 10 Glen Rd., Ringwood NJ 07456-2331. Phone 973-962-4584, fax 973-962-6210, Club E-mail [rmarc@qsl.net]. Visit the Web site at [www.qsl.net/rmarc].

#### AUG 24

**LAPORTE, IN** The LaPorte ARC will hold their LPARC Summer Hamfest August 24th at the LaPorte County Fairgrounds, State Rd. 2 West of LaPorte, 7 a.m. to 1 p.m. Admission \$5, Table \$10, outdoor tailgating \$2. One admission included with table reservation. Talk-in on 146.52 and 146.61(-) PL 131.8. For info contact Neil Straub WZ9N, P.O. Box 30, LaPorte IN 46352. Phone 219-324-7525. For table reservations E-mail to [tables@k9jsi.org]. The Club Web site is at [www.k9jsi.org].

#### AUG 25

**DANVILLE, IL** The Vermilion County ARC will hold their 2002 Hamfest August 25th at the Vermilion County ARC clubhouse, Woodbury Hill Rd., Danville IL. For more info contact *Terry Powell KB9REE*, Vice President, V.C.A.R.A., P.O. Box 80, Catlin IL 61817-1007. Phone 217-446-1379, or E-mail [KB9REE@YAHOO.COM].

#### AUG 31

**ALAMOGORDO, NM** The Alamogordo ARC will host their 18th Annual Hamfest August 31st, 7 a.m. to 3 p.m. at the Otero County Fairgrounds in Alamogordo. Admission is free. Talk-in will be on 146.800 with 100 Hz tone. Tables are \$5. Open to all vendors and private sellers or groups. Plenty of tables and space. Limited power is available, let us know. VE exams. Road Runner forum (3939 group) MARS forum (all services). There will be a banquet at 6 p.m. Please pre-register for this. Each 50th ticket eligible for a drawing for a free ticket. Pre-registration contact is

Ms. June Richmond K5BHE, 1109 Monroe Ave., Alamogordo NM 88310. Phone 505-437-0298. Other contacts are Rick Norton KB7SQF, Club President. E-mail to [rick@nmex.com], or phone 505-443-6190; or Tom McDaniel KD5FCJ, Club Secretary, 505-437-1976. RVs can park overnight at the fairgrounds parking lot for free Friday and Saturday. No hookups.

#### OCT 5

**WARSAW, MO** The Twin Lakes ARC will sponsor the Warsaw MO Hamfest Saturday, October 5th from 9 a.m. to 4 p.m., at the Warsaw Community Bldg., one block west of the square. Talk-in on 147.300 on the Warsaw rptr. Setup is at 5:30 a.m. Admission \$2 at the gate. 8 ft. tables \$10 each (hurry, only 30 available). Breakfast and lunch will be served on site. For more info call *Gene* at 660-438-8650, or E-mail to [gpo@advertisenet.com].

### SPECIAL EVENTS, ETC.

#### JULY 13, 14

**FULTON, NY** The amateurs of the surrounding area, using the callsign NB2M, will operate from 1300Z July 13th through 1800Z July 14th, to commemorate the 100th Anniversary of the linking of the communities of Oswego Falls on the west side of the Oswego River and Fulton on the east side, to become the City of Fulton, New York, on February 2, 1902. Both communities had been in existence for about 100 years prior to that date. Operations will be near the center of the General portions of all bands plus 6 meters through 440 (subject to propagation). A full-size certificate will be available in return for a QSL card and an SASE to *Brien Mathews KA2AON*, 82 Peat Bed Rd., Hannibal NY 13074.

**LAKE CHELAN, WA** Special Event Station W7H will be on the air from the shores of Lake Chelan from 00:00 UTC on July 13th until 23:59 UTC on July 14th. The Lake Chelan Radio Club (K7SMX) is sponsoring this event to commemorate the "World Hang Gliding Championships" being held over 10 days at this location. Listen for W7H on or near the following frequencies: 3.875, 7.250, 14.275, 21.325, and 28.450 MHz. Send an SASE for a special QSL, or \$4 for an 8 1/2 x 11 inch unfolded certificate to *Lake Chelan Radio Club*, P.O. Box 1445, Chelan WA 98816-1445. For more details visit the club Web site at [http://www.lakechelanradioclub.com/].

#### JULY 19, 20

**SANDUSKY, OH** The Sandusky Radio Experimental League, W8LBZ, will celebrate its 70-year anniversary with a 24-hour operating marathon, starting at 8 p.m. EDT July

*Continued on page 57*

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## Converting Surplus: A 1296 MHz 1 Watt Amplifier

*This PC board was obtained in surplus material from satellite telephone equipment for a 1661 MHz frequency transmit upconverter. Conversion attempts were made to see if it could be re-used in the amateur band of 23 cm 1296 MHz as nearly as is. My partner in soldering iron crimes, Kerry Banke N6IZW, worked out the details.*

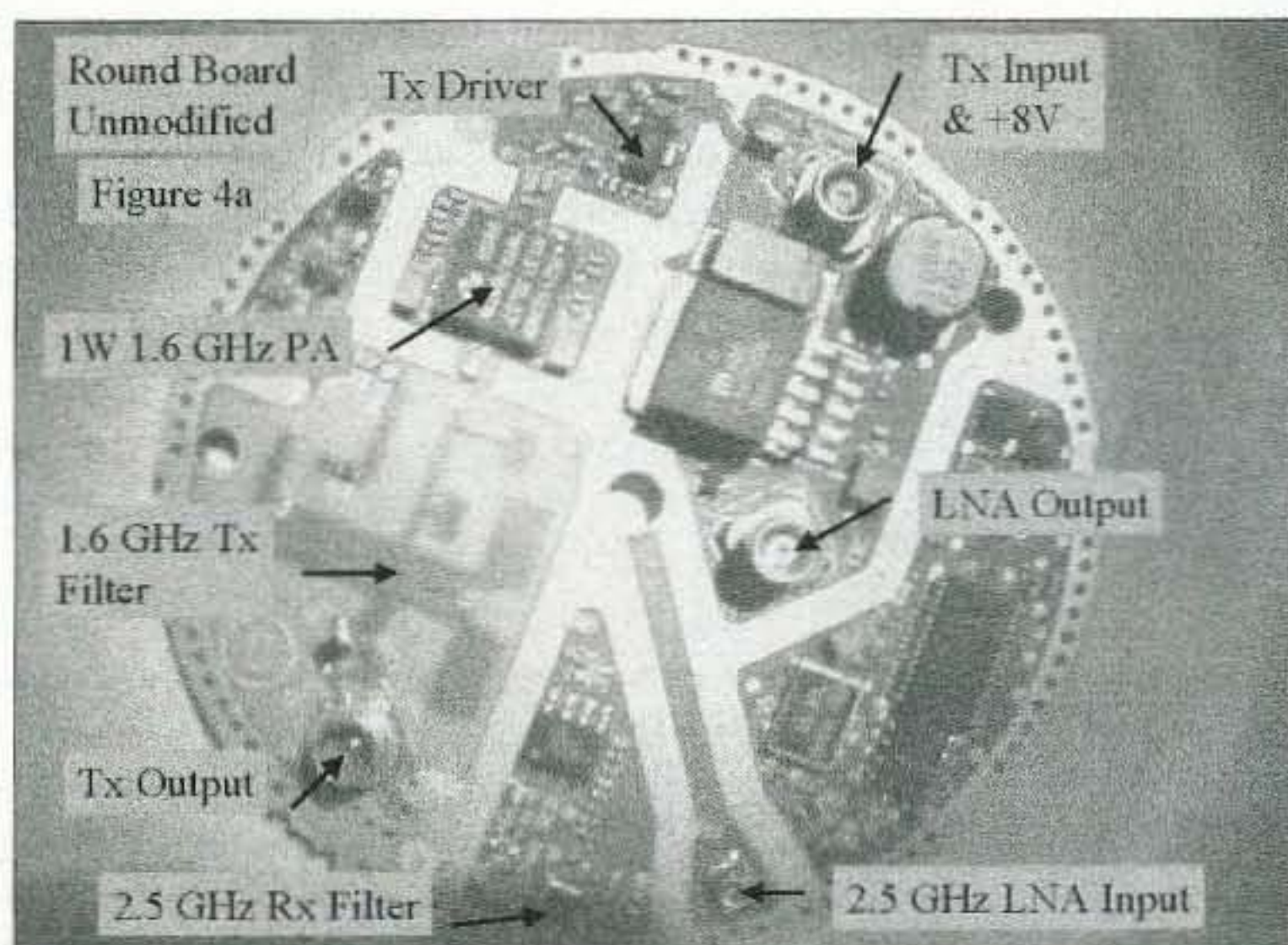
With some easy modifications, “under the magnifying glass” the conversions proved to be quite simple, allowing operation in the 1296 MHz lower frequency amateur band. This was quite fortunate, as the device in question, being a monolithic construction device much like an MMIC amplifier, did not have internal frequency limiting factors preventing use at 1296 MHz. In other words we wanted to remove RF amplifier filters, making direct connections to the device, rather than attempt retuning of the stripline elements. If it had been discrete, then device pruning on the PC board would be a natural course to follow in conversion (i.e., “snowflaking”).

In **Photo A**, the 1-watt device is labeled

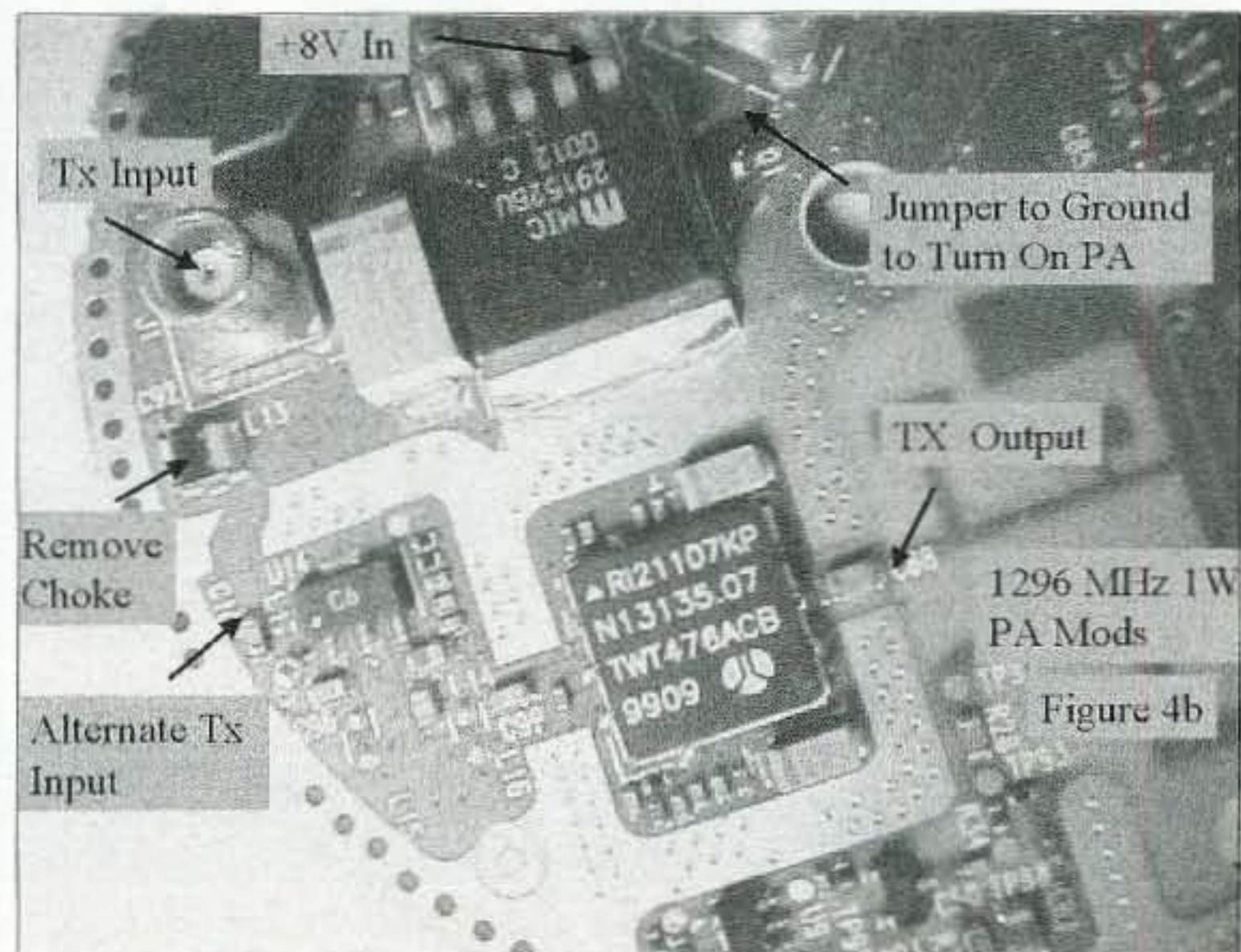
TWT476ACB and is driven by a transistor labeled C6. Miniature coax connectors connect the input and output of the power amplifier circuit. DC power, RF input drive, and RF output flow through these connectors in the unmodified state. The connectors can be removed in the conversion. With the exception of the power supply circuits the major components of the power amplifier circuits reside on the left side of **Photo A**. The 1.6 GHz filter that resides on the lower left side of **Photo A** will be disconnected in the conversion.

The modification of the amplifier can be started by turning on the control line enabling the amplifier in the transmit mode. This is done by grounding transistor Q1's

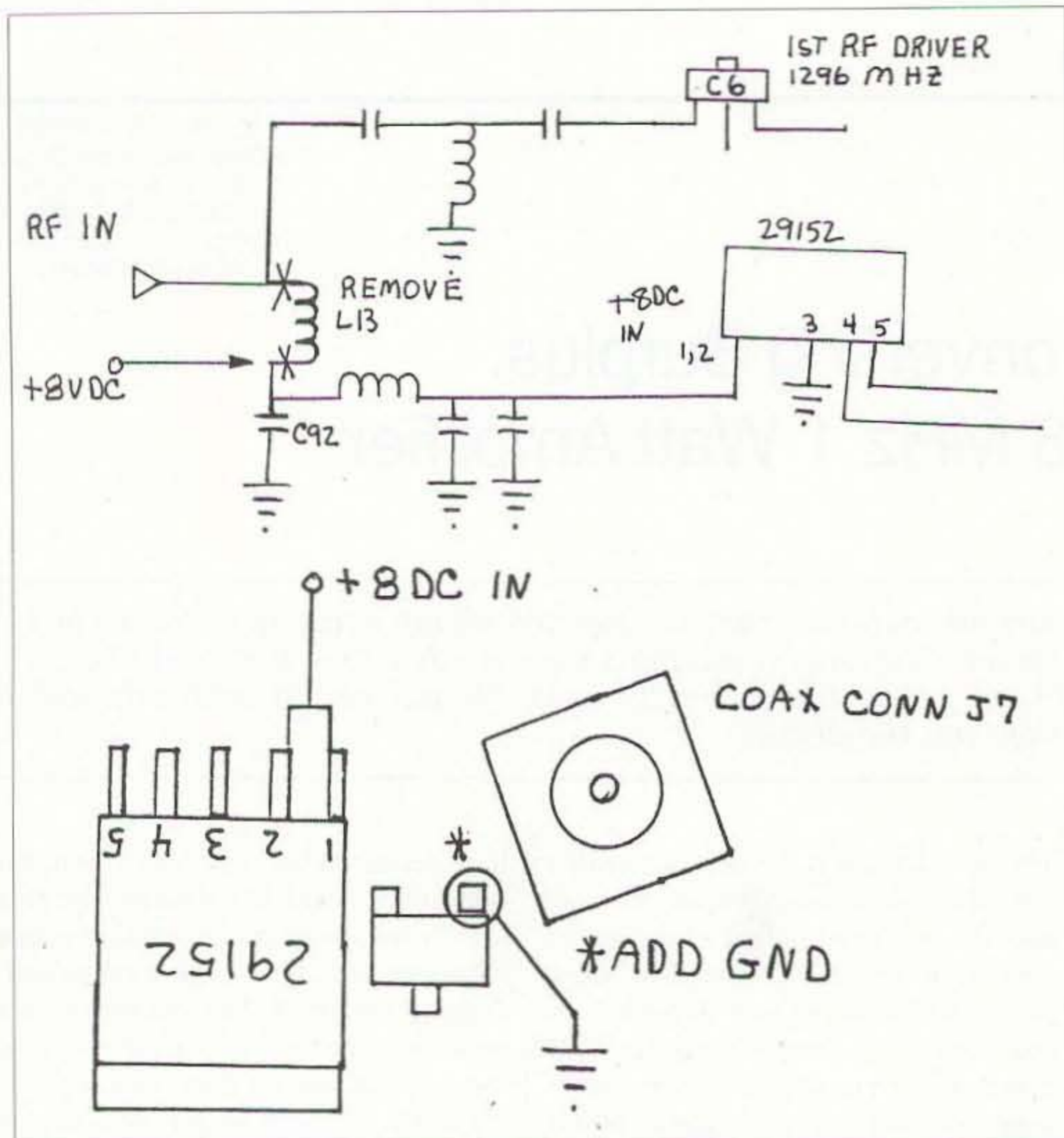
trace nearest to the coax connector in the center of the board. Either run the wire lead to PC board ground or tie to the nearby coax connector body for a close good ground. Length is not critical. This transistor resides between the power regulator pin where we input +8 VDC and the coax connector near the middle of the PC board. Because this connection is quite tiny, a small strand of wire is best used to make this connection. See **Fig. 1** for details on DC power input changes and transmit keying lead identification. I stripped a short section of AC lamp zip cord and extracted one strand of gauge #30 or so. Fine wire to be sure. I tack soldered to the transistor top right pin nearest the center coax connector and ran the wire



**Photo A.** Shown here is a full board picture of a surplus satellite telephone receive transmit amplifier control PC board. Normal frequency of operation is 1661 MHz, and this is convertible to 1 watt amp at 1296 MHz. (Photo by N6IZW)



**Photo B.** Close-up of amplifier showing connections made to PC board for amateur use of the 1 watt amplifier chip. (Photo by N6IZW)



**Fig. 1.** The modification connections for DC power input and transmitter turn on RF input and output connections.

to the closest ground connection, the coax connector shell.

Next, remove inductor L13 positioned next to RF input coax connector J1. Cut the



**Photo C.** The test and evaluation setup. Nothing complex, just the drive source for low power tests with the Wavetek 2001A sweeper set at 1296 MHz zero dB RF drive for first cut test. Detector is the Bird model 43 power meter. Line terminated into a 50 ohm DC to a 12 GHz 40 watt coaxial termination.

coax connector trace that was connected to one side of L13 and attach a small diameter coax cable (center conductor) to C107, which was part of one trace connecting L13 (now removed), and ground the coax braid. Scrape the green masking and cut to suit on the trace connecting to C107 for center of coax termination point. DC power attaches to pin #1 of the regulator 29152BU (bottom left is pin #1 with chip writing right-side-up). This will be the +8 volt DC input for transmit amplifier. If you want DC filtering on the +8 volt input DC lead, tie to the other side of L13 the inductor removed as above.

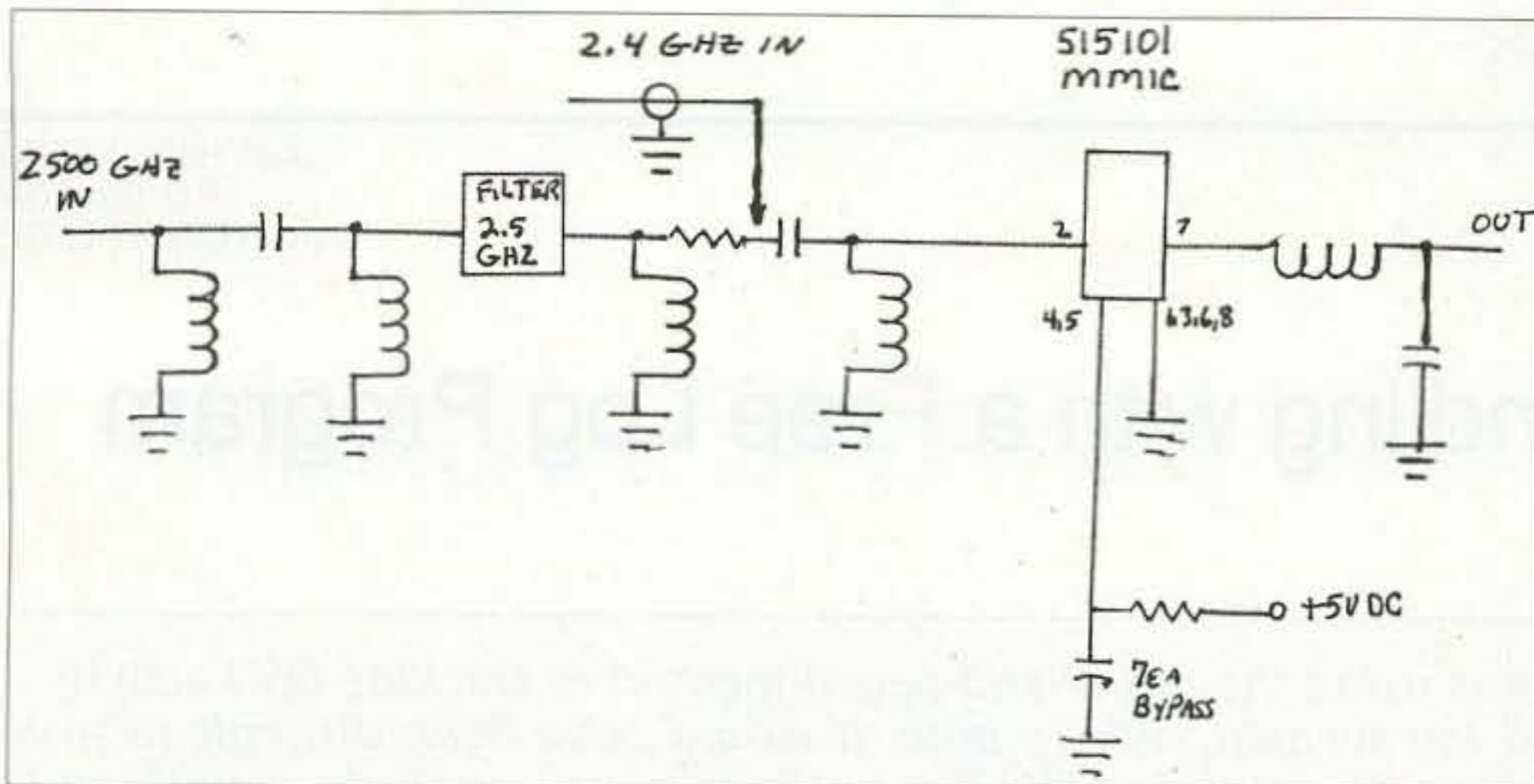
If you follow that, in original condition coax connector J1 adjacent to inductor L13, provided both input DC voltage of +8 volts and RF input drive for the amplifier chip. Removing L13 and tying the input RF to the coax center conductor on the PC board trace previously occupied by the inside of L13 provides RF to the amp. The other side of the L13 connection on the PC board is tied through the inductor marked 100k and on to pin #1 of the power supplies device.

Output RF power connections are made to capacitor C88. But first cut the filter trace about 1/8th of an inch beyond C88 on the output of the power amp chip. Again, scrape off the green masking to allow soldering the coax center conductor to the capacitor and trace extension. By cutting the filter 1/8 of an inch beyond C88 towards the filter, this effectively disconnects the filter from the circuit. Remove sufficient filter input trace to remove filter from the circuit.

### Testing the power amp

Check out of the amplifier is quite simple. Just adjust the drive level at 1296 MHz and DC power input limited to +8 volts DC and check power on a suitable power meter. In my setup, I used a Bird thru-line wattmeter with appropriate slugs for 1296 MHz frequency. I like the Bird wattmeter for amplifier experiments because it can survive a large, unexpected power surge to the meter and still function. Say, for example, the amplifier goes into oscillation and the power output soars beyond what is expected. When things calm down and prove what is expected, another meter may be better suited for precision readings. For precision readings in the tenths of a dB, a Hewlett Packard 432 wattmeter with a 478A thermistor power head and 30 dB attenuator are quite exact as to power readings.

Using the Bird model 43 wattmeter with a 5k slug (5 watts 1.1 to 1.8 GHz) and applying 1296 MHz at zero dB, the amplifier produced a quarter of a watt. Increasing the



**Fig. 2.** Describes an additional onboard 2.500 GHz low noise receive preamp chip that is easy to convert to a 2.400 GHz low noise preamp for use with AO-40.

drive to the signal generator's maximum power output of +4 dB made the amplifier produce one half watt. Current was just over 600 mA as read on the power supply amp meter. Switching to my RF sweeper, a Hewlett Packard 8620 which can produce +17 dB output, I inserted a fixed 10 dB attenuator in series with an adjustable 0-10 dB attenuator for final power adjustment evaluation. See **Photo C** for setup of equipment used to test the amplifier. The long square device in foreground is a variable 0 to 10 dB microwave attenuator for power drive tests.

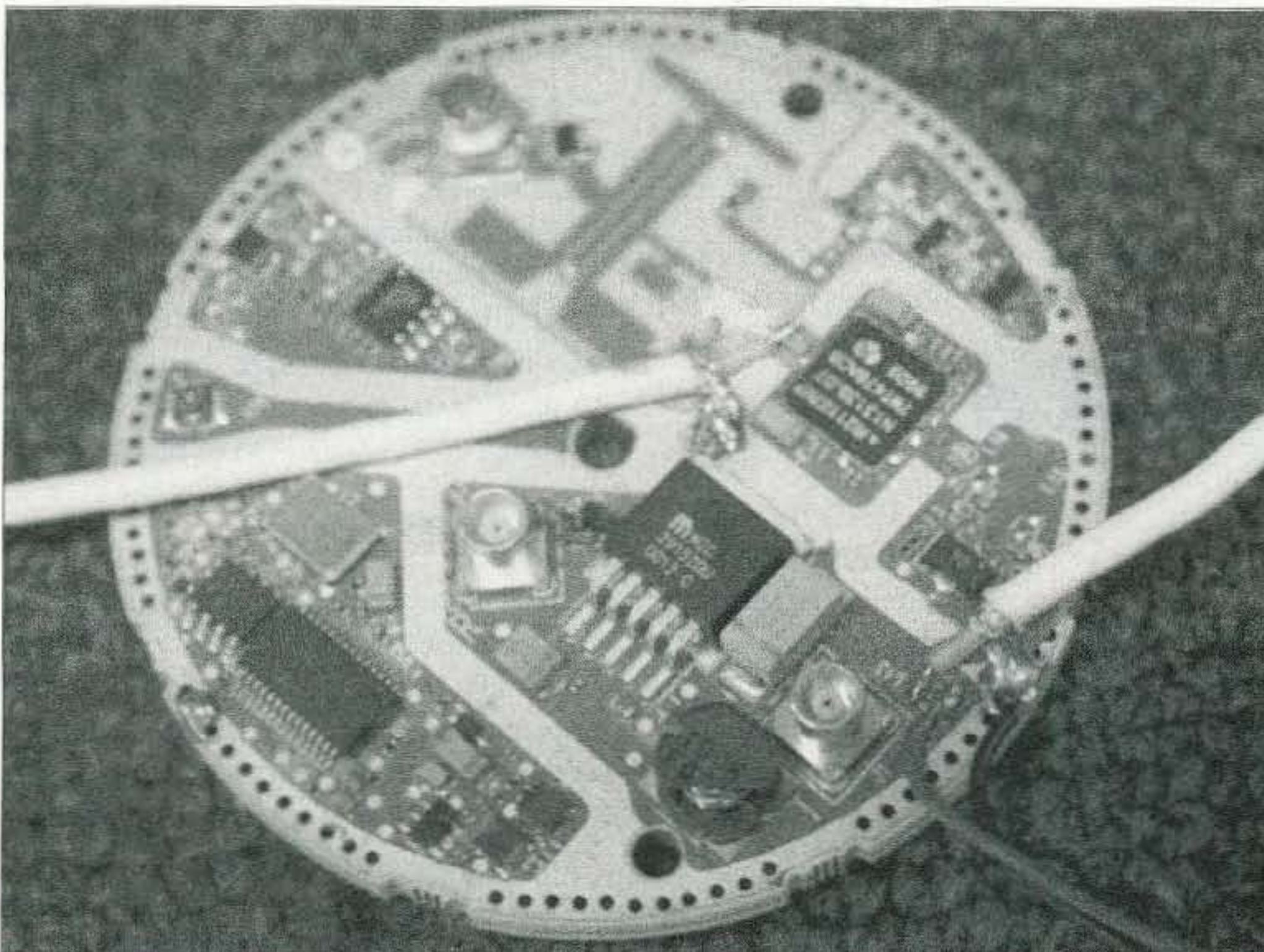
DC power reapplied and RF drive slowly increased from 0 dB to just a few tenths over plus 5 dB drive, the amplifier power was

indicating a full 1 watt saturation output. Total device current draw at +8 volts DC was 1 amp. I left the power supply in a full keydown condition for just over 1 minute and then shut down the system. Feeling the amplifier chip, it was noticeably hot, but not over so. For SSB operation the duty cycle will be much lower than this full keydown test of CW operation and I do not believe a heat sink will be needed for SSB operation. Add a package to shield the amplifier and connect the coax connectors used in this project, and that pretty much finishes the conversion of the amplifier portion of the PC board.

There resides on this same PC board an RF amplifier, an LNA for 2500 MHz. It's

shown in the photo for the full round PC board. It's the little pie-shaped outline circuitry. The little square chrome part is a 2500 MHz filter that needs to be bypassed for operation at 2400 MHz. RF input is pin #2 of the LNA chip. It is fed by a series chip capacitor that ties to pin #2 with coax for RF input. Preamp output is tied to capacitor C85 with the preamp coax connector. I use a short section of miniature copper hard line .040 scrap that has an SMA connector attached to it for connection. Other suitable miniature coax sections will work here also. Just make sure it's a microwave miniature coax cable. Don't even think of trying a coax not microwave-rated like RG-58 or something like that — too much loss even at 2400 MHz and too large in dimensions.

Well that's it for this month. I hope this easy-to-modify 1296 amplifier chip conversion does the trick for those of you contemplating construction of 1296 MHz equipment in the home shack. Junk box construction is quite a bit of fun and is enjoyable provided you can locate some key component to use in your project. Let's get stimulated and do some homebrewing for one of our Above and Beyond microwave frequencies. As with all the material I present, I will make the amplifier board available for \$18 postpaid U.S. destinations. For this and any other suggestions or questions please drop me an E-mail at [clhough@pacbell.net]. I will be glad to answer questions regarding this project or other amateur-radio-related items. **73**



**Photo D.** Full board modification coax in/out and DC input leads. Board wired for full turn on when +8 VDC applied. Keying transistor wired to ground to turn amp on. Switching for receive and transmit external relay controlled.

Say You Saw it In 73!

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## Simple File Handling with a Free Log Program

*Prior to the digital revolution, I was using the paper-and-pencil method of tracking QSO activity. The marvel of the computerized log seemed very remote. It would have been difficult to pry the cost of a dedicated program out of my tight little fist in those days just to do something I thought I could do as well by hand.*

Then along came a revelation: After using the early PSK31 software, there suddenly appeared a new freeware program called Logger that had a purported marvelously easy method of tuning the PSK31 signal. Simply click on some little bump on the screen and you would start to see print on the monitor.

As the name of the program implies, the main function of the software was logging. What a novel discovery. After playing with the PSK module, I started experimenting with the log portion of the software. There was a learning curve, but it was an attainable skill. This was the beginning of my ability to spot calls that I had worked previously, and much more quickly than with the paper log.

There are a number of logging programs available, mostly at a price. They are all good. Some are specialized and directed toward certain users such as contestors. Most log programs are exceptionally effective in chasing some or all of the many

awards available for working states, countries and counties, etc.

Logger does a multitude of these jobs adequately for what we may call Average Joe Ham. I assume that is my classification, being neither an avid contest nut, nor a real DX hound. My participation in these areas is limited partly by time and mostly by lack of skill and persistence, so I really like to ragchew, and therefore my logging needs are answered well by such software.

Don't get me wrong. I play briefly at contests and do take the challenge to see if I can be heard by the rare DX station, but, though a real thrill, I do not persist. I think I am accidentally going to qualify for a few awards one day just by sheer numbers of contacts. But I will never in this lifetime qualify for any of the biggies like DXCC.

As contesting goes, recently I became aware that a contest was in progress. After I spent the better part of an hour to get set up, I entered the fray and was forced to stop after an hour or so, and then resume the next

is because it is so easy. Fill in a few blanks during a QSO and hit the Magic Key at the end, and it is recorded.

When I recently got the Win98 setup running, and had the immediate stable of necessary programs installed, one of the next priority programs to install was the latest version of Logger. I already had a program in place which contains an integral log program, MixW 2. And that log was finally up-to-date after some transfer hassles I will explain in due time.

Next question: Why did I want a second log program? Well, that is just after-the-fact reasoning on my personal agenda. The last time I experienced a problem with a lost log, I happened to recall there was an earlier log file sitting in an old computer in ADIF format as it had been exported from Logger. It was in a virtually useless file system, much of which was in a corrupted state, and only accessible by copying it to a floppy using DOS commands.

But I got it and was glad it was available. That file imported very nicely into the MixW program and from there I was able to pick up the pieces and restore the log to as near 100% as I can tell of its prior state.

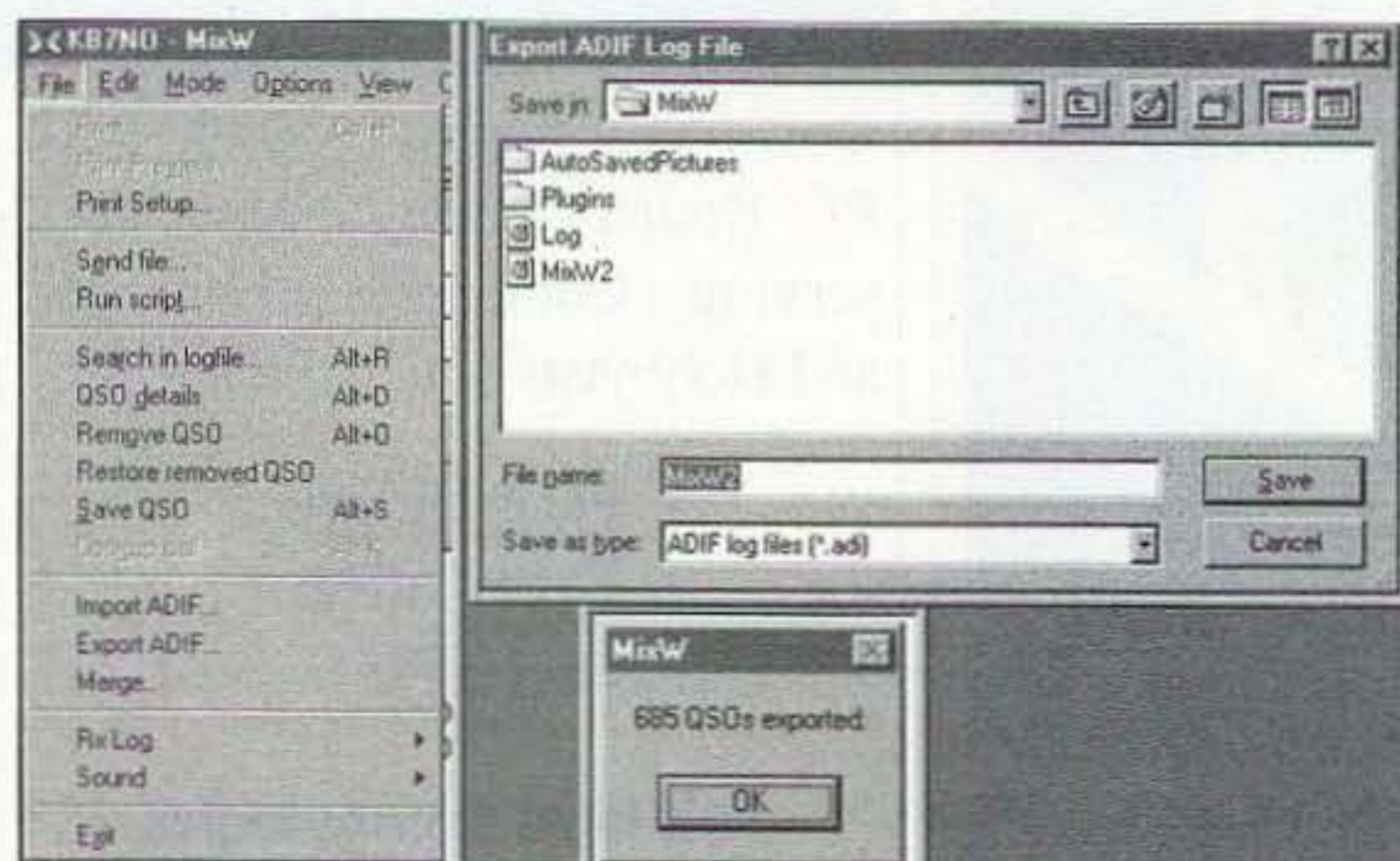
### Import/export

That is where I want to impart a few thoughts for the day. I talk to a lot of hams who have these remarkable computerized logs and the words "export" and "import" are just about as scary as a dark figure lurking in an alley.

Now, I have to admit, there are a lot of different types of log files and a lot of programs that treat these files differently. The process of converting, importing, and exporting between programs seems intimidating at first. The secret comes together

day for about a half hour, and that was it. I logged about eleven QSOs and it was fun. Time is a definite limiter for me. And, by the way, there are programs geared specifically for contesting, which is another topic beyond the scope of this article.

So why does Average Joe Ham need a computerized log? The very first and best reason



**Fig. 1.** MixW log export — This is a composite shot of the three windows you will encounter when you export your log from this program as outlined in the article. The exported ADIF log is the one labeled "MixW." This part is guaranteed painless.

quite easily when you have programs that virtually do the job for you.

Without dwelling on instances when I have experienced failure in file imports, I will tell you about two programs (minimum) that will swap log files almost (got to have a small qualifier) flawlessly. That is, Logger and MixW. I will get to several others, but I want to concentrate on two in this computer that really work and I can explain how easily you can do this.

I have found Logger to be very cooperative with a number of pieces of software when importing logs. Any program that will export in ADIF format can transfer logs to Logger. Though it is not necessary to know, you should be aware that ADIF is an acronym for Amateur Data Interchange Format, which is an accepted standard for log programs.

One other note: Logger, when running in the background with IZ8BLY programs for MFSK and other modes, will automatically record the QSO info when you click the Log button in those programs. This means you can get all your contacts recorded in one place even if you use a number of programs for your digital chores. Of course, you can manually enter SSB QSOs in real time just as well.

### Demo time

Let's start by converting and exporting a log file from MixW. Referring to the composite shot of MixW screens, you start by clicking on the File menu. Then click on Export ADIF, and you will have a Window pop up, for which you should record the address. Most likely, yours will work just as shown in the illustration and the ADIF file you save will simply be in the MixW directory or "folder" as they say in Window-ese. If it goes somewhere else or if you have Logger on another drive, you will want to know where to hunt later. So just be forewarned.

Clicking on the Save button on that pop-up window will initiate a process that goes surprisingly quickly. When the file has been compiled, usually in less than a minute, a small window will display the message that a certain number of QSOs have been exported. That's all there is to it.

In my case, I have both MixW and Logger configured to use the same serial port. Just to relieve tension between the two programs, I shut down MixW and bring up Logger, although I find the Logger program will run after clicking on a pop-up box that announces the port is not available. I mention this because the conflict may be genuine on your computer, so do

not be surprised if it is necessary to only have one program running at a time.

With Logger up, click the Utilities box and a box will pop up as illustrated in the Logger screenshot. Here, more than one "click" is necessary to complete the process of importing. In other words, new windows do not materialize each time you perform an action.

When you click Import, a Window does pop up that is labeled "File Import Utility." Then you click ADIF and the name at the top of the little window changes to "Importing ADIF Format File."

Then, you have to direct the program to where you saved the previously exported ADIF file. Usually, all there is to this is addressing the "tree" display and clicking as necessary to get to the location of the file you wish to import. In the case of MixW and many of the programs we use, the program will be located in the "Program File" directory. Once you have manipulated the tree around to the program file directory, select that and the programs will be displayed, and you can select your program where the file was saved.

Once you are this far, you are practically home-free because Logger homes in on any file in the selected program's directory that it can identify as an ADIF file. Now all that remains is to choose the file you saved and double-click on it. Another little window pops up giving you a choice that is self explanatory and once past that window the file is automatically imported.

Following the import, a window pops up with way more information than I want to display in a screenshot. However, this window helps you make a complete success of your file transfer. You are informed about the number of successful records imported and that a file has been created holding the

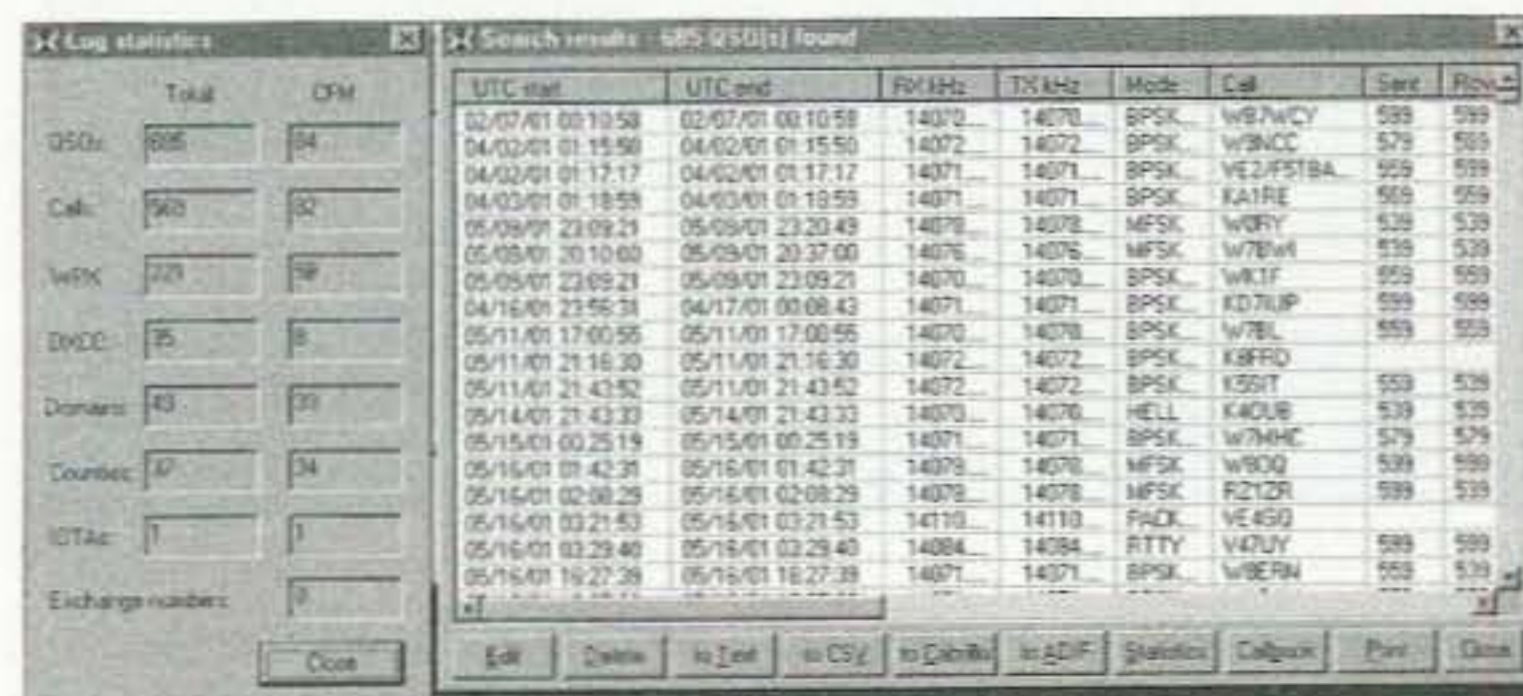


**Fig. 2. Logger import** — These are the windows referred to in the article concerning importing an ADIF log into Logger. The "tree" referred to in the article is shown to the right. This may be the only place, if you are unfamiliar with file structure, that will offer resistance. In this case, the highlighted MixW directory or folder is where Logger will seek an ADIF file and post any of these files it finds to the immediate left window. See article for procedure.

unsuccessful imports. If you will pay attention to the instructions concerning this file you will be able to correct errors as they are outlined in plain language in the "bad" ADIF file.

Note the "plain language" reference. When I made an import of over 600 records, the program created an external within the Logger directory with about 20 unacceptable records and for each one of them there was a line of text spelling out what needed to be fixed so they could be imported from this file. Double clicking on this "bad" file brought it up in the standard editor, Notepad. I won't go into the details, but the program practically takes you by the hand to get over these little hurdles.

Both of the programs I mention here have statistical summaries available to give you an overview of where you stand in your hunt for awards. They vary quite a bit in their format and detail. I included screenshots of a partial view of these summaries from each. When you see how valuable these statistics can be for award hunting, you may suddenly



**Fig. 3. MixW status window** — The log can be scrolled through, edited, searched, or, as in this case, a statistical summary can be called up. Logging is not the primary purpose of this program but is adequate for many of us.



**Fig. 4.** Just one of the Logger awards tracking displays. You can see some of the depth available in this program for specific tracking of your progress.

decide tracking for awards is something you are interested in.

I find there are commercial programs that go into quite a bit more detail for record keeping and summarizing. When you get serious about tracking your progress and feel you can justify the expense, there is quite a choice of log programs available. Each has its own following and the devoted users swear the one they use is the best.

There are probably no bad log programs out there once a user becomes used to the one he has. If you decide to go that route one day, you will likely have had the opportunity to talk to a number of users and looked over the specifics to such an extent that you can make an educated decision.

commercial software. For many, this package is more than adequate, so give it a try, or if you have tried it and thought it strange or complex, take another look. You may be surprised once you get into using it. It sure beats the paper log.

### Something I overlooked

Recently, I received a message about some ideas that I have not explored in the digital ham's software arsenal. There is more soundcard software available and in use than what I have told you about. The folks who are working with EME and high-speed CW are enjoying some remarkable success. There is a Web site for those who

In the meantime, Logger is available and it works. And it is free for the download. Free is quite a selling point for many of us. You can get your records organized and perhaps you will never find the need to upgrade to

would like to take a look-see at: [<http://ham.te.hik.se/homepage/sm5bsz/index.htm>]. There is more going on than we can keep up with.

### All about taking one giant step backward

You have probably wondered where the installation of the antiquated Windows 98 into the "modern" computer that had come equipped from the factory with the Millennium Edition (Me) of Windows was leading. When we last visited the deep recesses of the laboratory, Igor had just struck a mighty blow to the hardware and all was lost.

### Some actual learning takes place

However, after the fashion of the really well written

fantasy tale, the mad scientist managed, with what seemed his last gasp of living breath and it works. And it is free for the download. Free is quite a selling point for many of us. You can get your records organized and perhaps you will never find the need to upgrade to

That is somewhat how it worked. The computer had failed to a point where it would not boot and seemed to suffer an especial aversion to being connected to its monitor. I hate to put this in print, but some part of this was no more explainable than the laboratory spoof alluded to above.

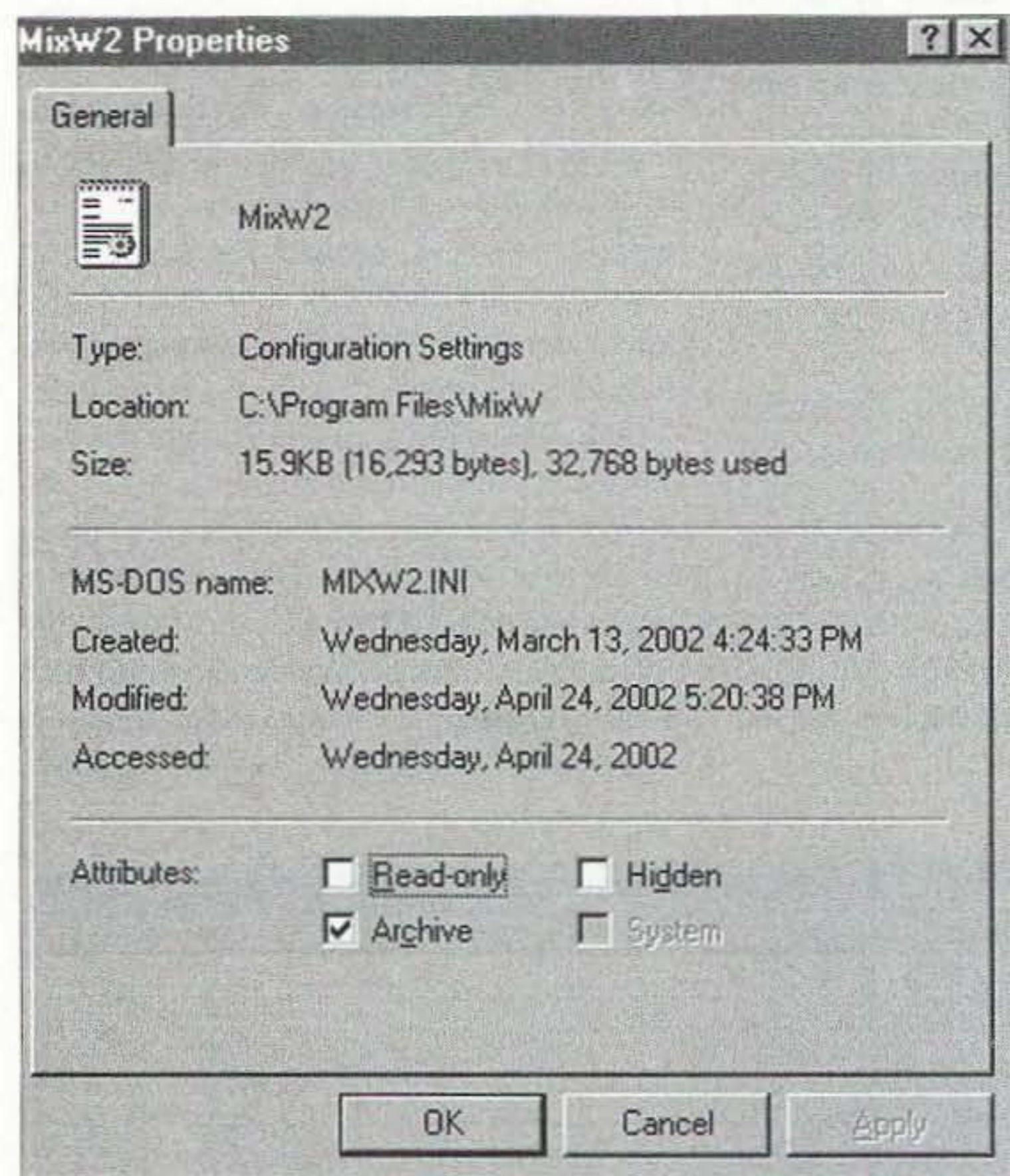
Here is how it was resolved. It appeared, owing to the displayed symptoms, that significant damage had been suffered by the hardware innards of this machine. One of the items I was qualified to test, the power supply.

So when I was in a calmer state and the time was appropriate, I removed the lid and scanned the inner workings, stuck my fingers on a few boards and connectors to see if anything was simply mechanically askew. Nothing evident, so on with the test. There are plenty of leads from the power supply to power about anything I might fit in the case and the supply is marked as to what voltages to expect where. All checked as specified.

I was reasonably certain that up to this point I had not yet cured this ailing machine. Next step was to shut it down and retrieve an older monitor for which there apparently was not a proper driver on the hard drive. With this installed, the machine began to gasp a bit and then regain consciousness. I doubt if I will ever understand what I saw.

On the monitor was a message that no keyboard (or was it mouse?) was detected. Next step, power down and install mouse and keyboard. The monitor then began to display some strange multiples of a desktop. The strange display was a welcome sight and I chalked the peculiarities up to the wrong driver sending unfamiliar information to the monitor. But it had booted!

Trying to contain my enthusiasm, I carried the various pieces back into the shack and disconnected the interim setup from the monitor that belonged to the afflicted computer and "Presto!" The machine fired up as if there had never been a bad day. The programs that were installed before the failure were all working just as they had at that time.



**Fig. 5.** Windows properties — This was one of my major lessons learned the hard way (see text) after changing the operating system. Text and program data files were coming off the CD I had stored them on with the Read Only box checked. Refer to the text concerning the problems this caused. I would have been smart to have simply saved many of these small files to floppy. But I would have missed out on education!



if this machine could continue to cooperate in the manner I desired. I didn't keep a log of this activity, but I did put a note in the station log concerning a first QSO after a restored file and that was three weeks ago. So it is looking like the Most Revered Computer God is smiling on me.

Now there was at least one area I can tell you about where I learned something worth mentioning. I believe I alluded to the fact I had not been able to install the log from the CD where I had saved it before formatting the hard drive. I think I have learned the reason for that, a little late to save bunches of excess entries, but perhaps of value to some of you.

At the time I was planning to save the more highly valued contents on the hard drive, I put anything I thought I might need on a CD and followed the various instructions. All went fairly well as far as downloaded ham program files went. They simply have, thus far, installed in their normal manner.

But I could not get some of the stored word processor files such as what I am writing today to respond correctly when I went to open them. They would open with a message that they could not be rewritten and then saved in their original file, even after the file was residing on the hard drive. Plus, there was this problem with the individual files in the ham programs such as the log files and the macros.

After a lot of calisthenics including manual entry of a few hundred contacts, I started to rewrite the macros that were apparently corrupted. To make me a little more uneasy, I had trouble getting the macros to "stick." That is, I would rewrite them and do something else in the program and the macros would default back to some unexplainable state unlike what I had just written.

After a bit more experimenting, I found I could rewrite a macro file only after I deleted the offending file from the macro file and replaced it with all new under a new (but the same as it had been before) name.

You would think I would have awakened before this, and I am sure a few of you know what was going on. Something clued me to take a look at the attributes of some of these uncooperating files. In Windows, it is pretty easy to locate the file for which you seek info and right click it, and then choose "Properties." (See screenshot.)

The particular Properties screenshot I made for this article is one of those critical areas in most programs, the \*.ini file. My MixW 2 program had a few things it was not doing properly until I allowed the

program "to talk to" the INI file by unchecking the Read-only box. After doing so, things got back to normal. That is, among other items, the screen display would return to where it was on shut down and the "hint of the day" would update automatically.

These files, word processor documents as well as program files such as log files and macro files, were all marked "read only." These files need to look to the program like a file that can be written to as well as read.

I have a fairly simple mind, but this was just too simple for me to have realized in the beginning. All that is really necessary in this case is to locate the files in question and uncheck the Read Only boxes and they

start to work normally. The lesson? Saving to a CD is a bit different from saving to a floppy disk. I am not sure what needs to be changed in the process, but unchecking the offending box is one after-the-fact fix you may want to keep in the back of your mind for reference one day.

### Programs start to act normal again

As I have stated previously the reason for the change "backward" to the Win98 is there are beginning to be a number of ham programs that will not run properly on the

*Continued on page 58*

Source for:	Web address (URL)
MixW2 Soundcard pgm for PSK31, RTTY - more + New modes - MTTY - FSK31	<a href="http://tav.kiev.ua/~nick/mixw2/www.nvbb.net/~jaffejim/mixwpage.htm">http://tav.kiev.ua/~nick/mixw2/www.nvbb.net/~jaffejim/mixwpage.htm</a>
Free MMHam site - MMTTY -MMSSTV	<a href="http://www.qsl.net/mmhamsoft/">http://www.qsl.net/mmhamsoft/</a>
Free VK7AAB - SSTV-PAL - PSK-PAL	<a href="http://users.origin.net.au/~crac/">http://users.origin.net.au/~crac/</a>
Much ham info w/SSTV downloads	<a href="http://www.conknet.com/~kb1hj/index.htm">www.conknet.com/~kb1hj/index.htm</a>
TrueTTY - Soundcard RTTY w/PSK31	<a href="http://www.dxsoft.com/mitrtty.htm">www.dxsoft.com/mitrtty.htm</a>
Pasokon SSTV programs & hardware	<a href="http://www.ultranet.com/~sstv/lite.html">www.ultranet.com/~sstv/lite.html</a>
PSK31 - Free - PSK31 & much PSK info	<a href="http://aintel.bi.edu.es/psk31.html">http://aintel.bi.edu.es/psk31.html</a>
Interface for digital - rigs to computers	<a href="http://www.westmountainradio.com/">www.westmountainradio.com/</a>
Soundcard interface info-includes Alinco	<a href="http://www.packetradio.com/psk31.htm">www.packetradio.com/psk31.htm</a>
Interface info for DIY digital hams	<a href="http://www.qsl.net/wm2u/interface.html">http://www.qsl.net/wm2u/interface.html</a>
WinWarbler info and DXLab Suite	<a href="http://www.qsl.net/winwarbler/">www.qsl.net/winwarbler/</a>
MFSK - related tech info - how it works	<a href="http://www.qsl.net/z11bpu/">www.qsl.net/z11bpu/</a>
Throb - - Lots of info	<a href="http://www.lsear.freemove.co.uk/">www.lsear.freemove.co.uk/</a>
Download Logger / Zakanaka	<a href="http://www.qsl.net/kc4elo/">http://www.qsl.net/kc4elo/</a>
PSKGNR - - Frontend for PSK31	<a href="http://www.al-williams.com/wd5gnr/pskgnr.htm">www.al-williams.com/wd5gnr/pskgnr.htm</a>
DigiPan - PSK31 Easy to use	<a href="http://www.digipan.net/">http://www.digipan.net/</a>
TAPR - Lots of info	<a href="http://www.tapr.org">www.tapr.org</a>
TNC to radio wiring help	<a href="http://freeweb.pdq.net/medcalf/ztx/">http://freeweb.pdq.net/medcalf/ztx/</a>
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WinLink 2000 system info	<a href="http://www.winlink.org/k4cix/">www.winlink.org/k4cix/</a>
Another GREAT Web resource	<a href="http://www.g3vfp.com/">www.g3vfp.com/</a>
Airmail -free program to use WinLink2000	<a href="http://www.airmail2000.com/">www.airmail2000.com/</a>
WinPSKse - PSK31 freeware	<a href="http://www.winpskse.com/">www.winpskse.com/</a>
The Chart NOW ON THE WEB	<a href="http://www.qsl.net/wa2hng/ham_radio.htm">http://www.qsl.net/wa2hng/ham_radio.htm</a>

### The Infamous Chart -- Almost everything ... updated monthly

Table 1. The Infamous Chart.

## Writers' Camp

*What is involved in writing a column for 73 Amateur Radio Today? How does a particular event or gadget get chosen to be a topic? What happens between getting the idea and seeing the final column in print?*

Actually, writing a column or an article isn't all that hard if it's about something that interests you. Many people who are reading this could write an article for 73 and see it published with very little difficulty. I'll tell you how I see it and maybe some of you might find it appealing enough to try your hand at writing an article for Uncle Wayne.

1. Find something interesting that you'd like to share with others. I enjoy amateur radio, and especially enjoy the ability to help others through public service communications. I have a great time with those little gadgets or gizmos that make it possible to carry out communications. Since I enjoy these things so much I naturally enjoy sharing this with others. Give me an audience and I'll talk about it. If I don't have an audience, then I'll put it down on paper. In a manner of speaking it's harder to not share something that interests us and easier to share it. Where do I get my ideas? Sometimes it's because I've seen something new — either a product or a procedure. Maybe there was a different approach to handling something that we all do routinely such as using a computer to design your own QSL cards. In other cases it may be a question or an idea that a reader has sent me. In other cases I've tried to look at an aspect of the hobby through the eyes of someone who is just getting started. Why did this hobby fascinate me so much that I got involved? What things would people today find just as interesting? Each of these things is the starting point for a column or article.

2. Think about what you want to say. In my case, I usually focus on how something works or what it does as opposed to the in-depth technical aspects of the subject. When I've written about APRS I tended to focus on what the benefits are as opposed to how the individual packets are constructed

to carry the data. Amateur radio is a technical hobby, but it is a hobby so I find it more interesting to focus on the benefits. In other words, ask yourself why you find something interesting and how you can share that in terms someone else might enjoy. It's best to write what the reader wants to read rather than what the writer wants to write. That may sound confusing, but here are two ways of writing about the same topic:

a. Filet mignon is one of the choicest servings of beef. It is relatively lean yet full flavored with a delightful firm but juicy texture. There is no doubt as to why this is the premium choice of gourmets.

b. The psoas muscle is cut from the posterior bovine carcass and cut into 8- to 12-ounce segments. After a period of exposure to microbial agents, the tissue is considered "aged" and heat-treated before being consumed as an energy source for *homo sapiens*.

Same subject, totally different approach.

If you want to be a writer, you need to write. There is nothing quite as daunting as a stack of plain white paper to a writer. It stares at you and you stare back (okay, it's actually a virtual piece of paper on the word processor, but you get the idea). Sometimes the best way to get started is just to write — about anything or nothing. This can then lead to the core of the article you will eventually write. Another approach is to write the article mentally and then translate it to paper. I find that sometimes when I'm jogging my mind will begin to wander, then focus on an idea. By the time I get home I've got a pretty good skeleton of the article I will write. If you're more of a linear thinker you may want to take this a step farther and write an outline of what you want to cover. In any case, start getting the idea down onto paper. Once that page is no longer blank it is easier to make real progress. In most cases you'll build from what you started, although

every writer has started an article that started in one direction but ended up being totally different.

Writing is kind of like living in a time warp. This column is being written in April for publication in the July issue. You are therefore reading something that is months old and a lot may happen between when it is written and when it is read. I've written articles based on products that have been discontinued by the time the article was printed. Most of the time this is not a major problem, but there are implications. What I wrote in the summer of 2001 was eclipsed by the terrorist attacks of September 11th. On a smaller scale, writing a Christmas issue column in September seems a little odd. If you're interested in writing an article about Field Day, plan accordingly.

There may be awards for writing, but I don't expect to see one. I believe it was Stephen King who pointed out that the check is cashed and the money spent long before the awards are given out. Personally, I write because I enjoy doing so. I hope others enjoy what I write as well. On the other hand, if everyone agrees with everything I write it would be pretty boring. Wayne Green's editorials always generate discussion, controversy, etc. Yet for decades people have been drawn to his articles like moths to a bright light. You may find that others disagree with what you've written, but that doesn't so much mean you're wrong (although that's certainly possible) as much as that you've generated thought. In this politically correct time when feelings are the focus, it's good to do something that gets people thinking.

Even Pulitzer Prize winners have editors. One of the beauties of writing is that with rare exception the writer is not alone in

*Continued on page 59*

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## New Signals

*For the amateur-radio satellite enthusiast, 2002 has had a great start. We've had reliable operation via AMSAT OSCAR-40 (AO-40); fun with the FM satellites like UoSAT OSCAR-14 (UO-14) and AMRAD OSCAR-27 (AO-27); and great digital experimentation and communication via Nav OSCAR-44 (NO-44), the International Space Station, and UoSAT OSCAR-22 (UO-22).*

The list goes on, with the Fuji satellites, the RS series, and others. Keeping up with them is challenging, and there always seem to be new ones.

### A Saudi surprise

In early April, AMSAT president Robin Haighton VE3FRH received a message from Turki Al-Saud at the Space Research Institute in Riyadh, Saudi Arabia, announcing the long-awaited activation of the amateur-radio system on Saudisat OSCAR-41 (SO-41). Turki Al-Saud was the author and presenter of a paper at the Saudi-Japanese Symposium on Remote Sensing Applications in 1997, entitled "A Development of Saudi Educational Micro Satellites." The Saudisat group had been studying and

developing plans for their successful launch of two small satellites in 2000 for several years.

On September 26, 2000, a Russian Dnepr-1 (modified SS-18 ICBM) rocket was launched from the Baikonur Cosmodrome near Tyuratam in Kazakhstan. The payloads included MegSat-1, Unisat-1, Tiungsat-1 (now known as Malaysia OSCAR-46 or MO-46), Saudisat-1A (SO-41), and Saudisat-1B (SO-42). The final orbit for the satellites was at 650 km altitude with an inclination to the equator of 64.5 degrees. Like the Russian RS series of hamsats, this is not a polar, sun-synchronous orbit, and thus the satellites do not come by at the same time every day, but exhibit "drift." Orbits in one month may occur just after midnight and noon, but in a subsequent month may be in the late mornings and late evenings. It's constantly changing.

The Saudisat pair are the first experimental/amateur satellites from Saudi Arabia and their national scientific organization. In 1977 the Saudi Arabian government established the Saudi Arabian National Center for Science and Technology (SANCST). The name was changed in 1985 to the King Abdulaziz City for Science and Technology (KACST), but not before they created a department called the Space Research Institute, or SRI, in 1983. The SRI goal is to develop aerospace technology in support of the kingdom's technology transfer programs. The Saudisats are not just ham-radio toys in space. Their primary payloads were designed to support SRI objectives.

Each of the Saudisats weigh 10 kg, are 23 cm on a side, and have solar cells on all sides, providing a peak power of 18 watts. Each has six gold antennas on the top and bottom panel areas. The onboard experiments include attitude control with passive

magnets, solar panel shadowing, satellite ranging, a digital electronics radiation detection device, thermal control, a single event upset counter, a self-healing battery charger, a mechanical RF relay, two circular-polarization UHF antennas, and multiple analog and digital communications systems. These are some loaded microsats.

A ground control station in Riyadh monitors nearly 60 channels of telemetry and provides command and control operations for both Saudisats. The satellites have survived almost two years in space and are doing well with their experiments, and now, Saudisat 1A is active with single-channel, cross-band, FM repeater activity.

### SO-41 ham operation

The uplink for SO-41 is 145.850 MHz with a downlink of 436.775 MHz. As with the other FM hamsats, there is considerable Doppler shift on the downlink during overhead passes (as much as 20 kHz). At the beginning of an overhead pass, the downlink can be as high as 436.785 MHz. Just before LOS (loss of signal) at the end of a pass, the center of the FM downlink will be best heard around 436.765 MHz. Power output is one watt.

Unlike satellites like UO-14 and AO-27, it is somewhat difficult to work SO-41 with a handie-talkie and a handheld antenna like the Arrow. Satisfying contacts are best from well-equipped home stations with circular antennas and the ability to shift polarization. While most hams have set their crossed-Yagi antennas for only RHCP (right-hand circular polarization), optimum reception and transmission is obtained by switching from one polarization to the other when uplink or downlink fades occur. The

N5VFF-1>DM79, NOCALL* <UI>:N9AB - hi andy, here brian
WD4OZN>EM55, NOCALL* <UI R>:whats ur qth andy
W5ACM-2>EL29EQ, NOCALL* <UI R>:hi brian!
K5PK>EM96TD, NOCALL* <UI>:
N9AB>CQ, NOCALL* <UI>:qTH EN52xg
KD4RDB>APRS, NOCALL* <UI>:
W5ACM-2>EL29EQ, NOCALL* <UI R>:
K5PK>EM96TD, NOCALL* <UI>:
W5ACM-2>EL29EQ, NOCALL* <UI R>:hi k5pk
K5PK>EM96TD, NOCALL* <UI>:Hello ACM
N5UXQ>CQ, NOCALL* <UI R>:de N5UXQ, FM17ho, from Central VA
W5ACM-2>EL29EQ, NOCALL* <UI R>:Andy hr
K5PK>EM96TD, NOCALL* <UI>:Steve hr
W5ACM-2>EL29EQ, NOCALL* <UI R>:fb

Table 1. Kolibri (RS-21) telemetry equations.

# HOMING IN

Radio Direction Finding

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Fullerton CA 92837  
[Homingin@aol.com]  
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## Peak Performances at Pine Mountain

*Who says all hams are couch potatoes? Some are quite athletic! They have found a way to combine their fondness for the outdoors with their love of radio. No, I'm not referring to Field Day. I'm talking about the sport of international-style on-foot hidden transmitter hunting, also called radio-orienteering and ARDF.*

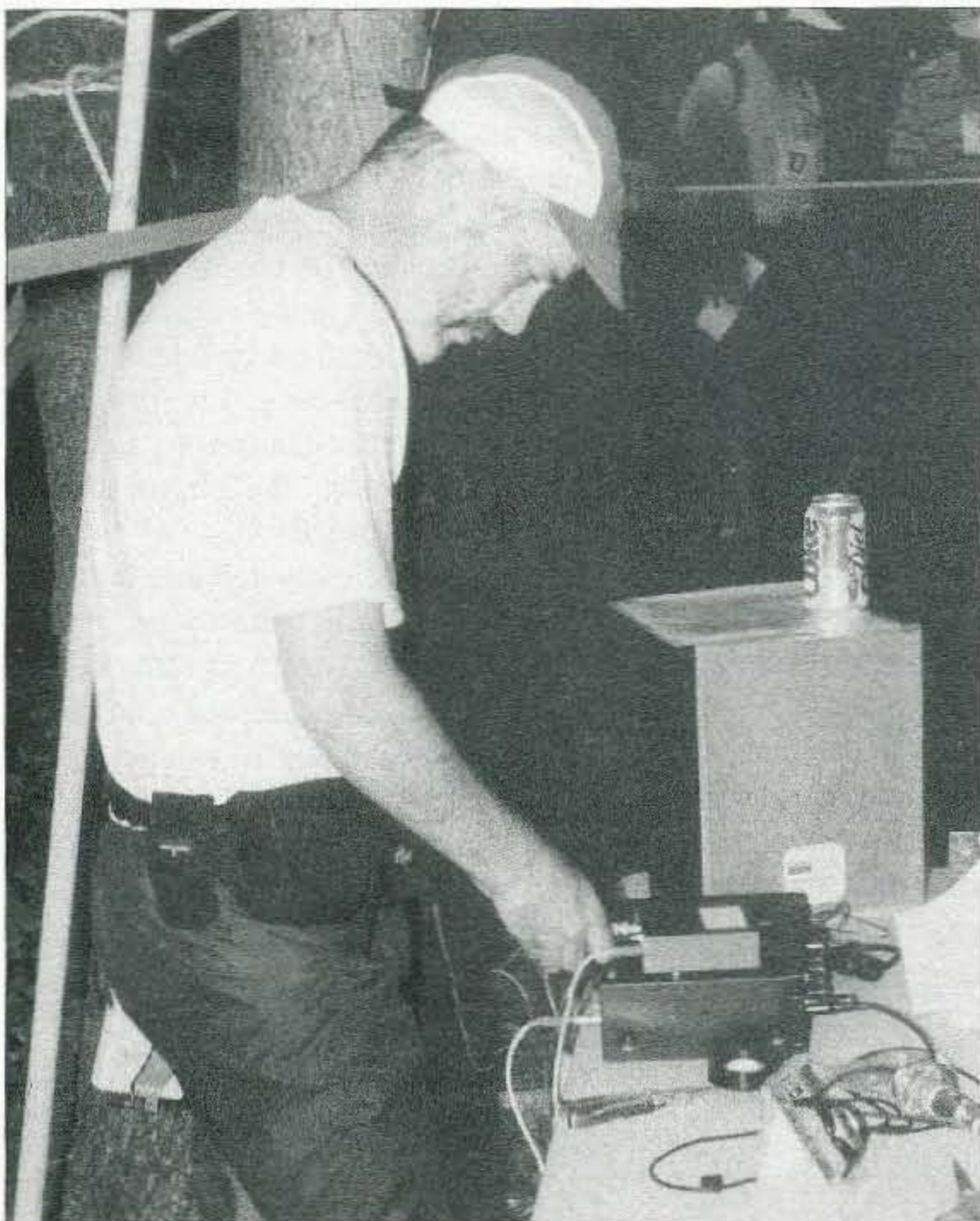
Less than nine months after the First USA ARDF Championships in Albuquerque,<sup>1,2</sup> hams from around the country have converged on another well-mapped forest to see who is best at this fast-growing specialty of amateur radio. The Second USA ARDF Championships took place April 19–21 at Franklin D. Roosevelt State Park near Pine Mountain, Georgia. Two dozen of the country's best radio-orienteers from 14 states were there.

Organizing and hosting the festivities were members of the Georgia Orienteering Club (GAOC). Sam Smith N4MAP (**Photo A**), who put on a challenging ARDF practice session a day before the New Mexico events began, volunteered to be responsible for all of the courses this time. Working closely with him was his wife Laurie Searle KG4FDM (**Photo B**), who ably served as this year's Meet Director.

### A perfect site?

Encompassing 9,000 acres, FDR Park is the largest in Georgia, with beautiful forest, two large lakes, and 37 miles of trails. No wonder orienteering is so popular there! GAOC has created excellent orienteering maps of all the wilderness areas. For fairness to out-of-towners, the club had put a four-month

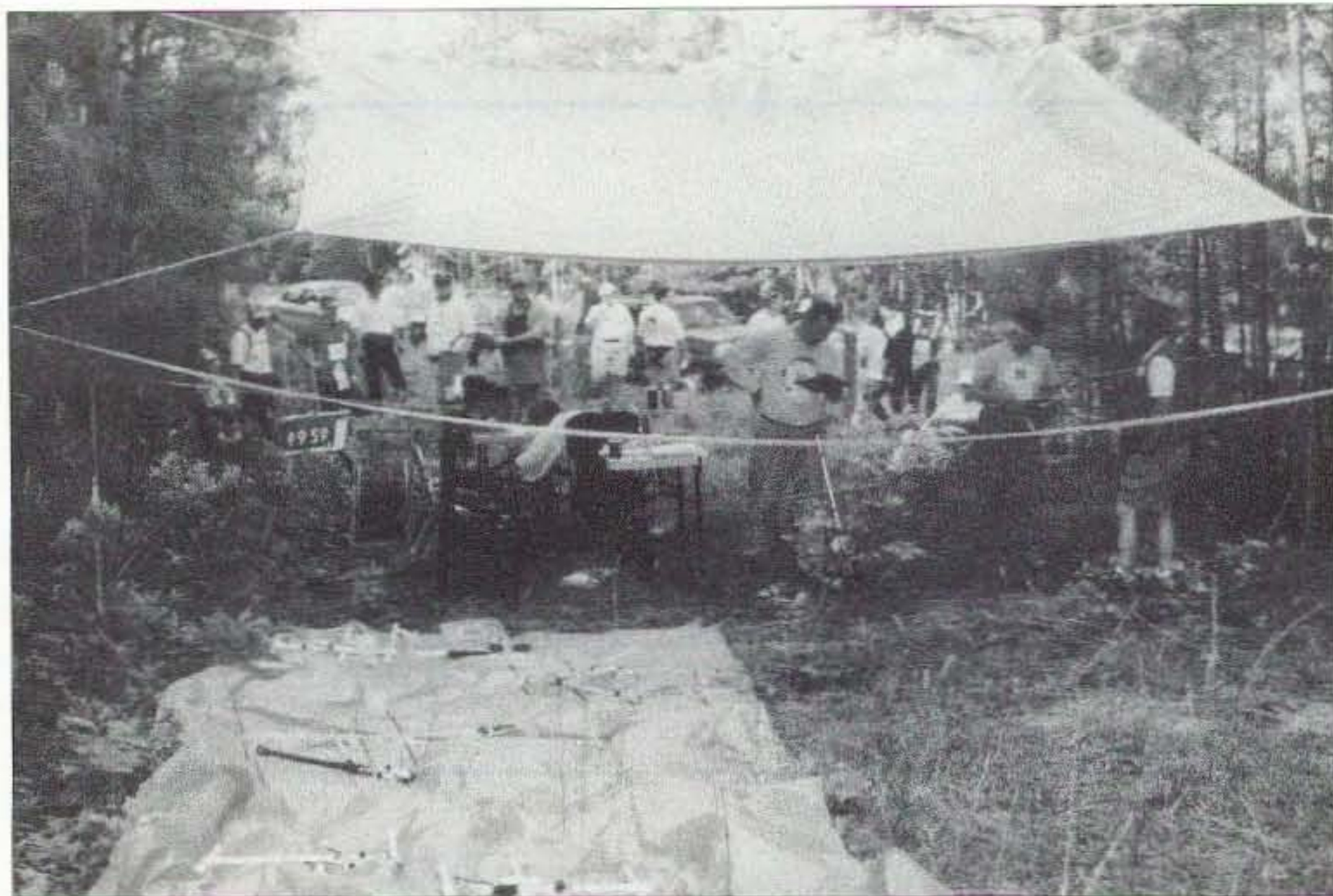
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**Photo A.** Sam Smith N4MAP adjusts the radios and PA system at the starting tent. He set all of the difficult courses at these Championships.



**Photo B.** Laurie Searle KG4FDM took time out from her duties as Meet Director to play her autoharp during a practice session on Friday.



*Photo C. After walking about 3/4 of a mile up the road, competitors arrived at the two-meter starting area early on Saturday morning. Their ARDF sets, which had been impounded upon arrival, were waiting on the tarp.*

## HOMING IN

*continued from page 51*

embargo on orienteering events in the sections to be used for the ARDF Championships.

Weather in Georgia can be very hot and very wet. Neither extreme was a problem during the championships. The thick forest made sunburn unlikely, as there wasn't a lot of sunlight at the base of the trees. At times, I had to resort to flash to get good photos. April WA6OPS, who watched for competitors as they broke into the clearing a hundred yards from the finish line, reported that the sudden glare was disorienting to some of them.

Category	Foxes	2m Gold	80m Gold
M21	5	Gyuri Nagi KF6YKN	Gyuri Nagi KF6YKN
M40	4	Jerry Boyd WB8WFK	Jackson Stump KD5OEO
M50	4	Charlie Siler KO4NO	Charlie Siler KO4NO
M60	3	Bill Farrell	John Munsey KB3GK
F21	5	Valerie Meyer WB8VAL	Valerie Meyer WB8VAL
F35	4	Debbie Pendley KD5LOK	Debbie Pendley KD5LOK
F50	3	Martha Carr	Martha Carr

*Table 1. Competitor categories and USA-only division gold medal winners.*

There were no bears (unlike Albuquerque) and no rattlesnakes (unlike southern California). Copperheads were an unlikely possibility and the poison ivy could be avoided by being watchful. The only bugs to worry about were the fire ants (Don't kick their mounds!) and the chiggers (Don't sit in the pine straw!).

Although these hunts were for national medals, they were open to anyone of any age, licensed or unlicensed. As you might expect, the competitors had a wide range of skills and expectations. Some of them had been doing the sport for years or decades and had competed in Regional or World Championships. They knew how VHF and HF radio signals propagate in a thick forest. Others, including all the Georgians, were relatively new hams or nonhams. However, they were old-timers at deepwoods orienteering. They were unlikely to get lost, but they were still discovering the fine points of radio signal tracking.

Quite a few had been to some practice sessions in local parks but had never been on a full-size ARDF course. Three from Albuquerque learned the mechanics of ARDF by putting on our first national championships last year, but they hadn't gone for the gold as competitors. There were even a few who had no idea what they were getting into. For instance, John Munsey KB3GK is an expert mobile T-hunter who has been featured on these pages for his hamfest hunt activities.<sup>3,4</sup> I encouraged him to come, and he brought fellow Floridian Bill Thomas KE4HIX with him. They researched

and selected suitable on-foot RDF gear for 80m and 2m, took to the courses, and surprised themselves pleasantly with their successes.

Many participants arrived by car, including Marvin Johnston KE6HTS, who drove all the way from Santa Barbara CA. Others came by air, usually through Hartsfield Atlanta International Airport, a hub of Delta Airlines. ARDF gear looks pretty strange and intimidating to nonhams, but nobody reported problems with security officers along the way. Most had wisely placed it inside checked baggage.

For those who arrived early enough on Friday, GAOC provided ARDF practice to help them get accustomed to a typical Georgia forest. It was two meters in the morning, with three foxes in a small corner of the park, then 80 meters in the afternoon with three more. For radio-orienteeers who had never tried classic (nonradio) orienteering before, there was a regular GAOC O-meet in another area of the park on Saturday afternoon after the two-meter hunt, with an instruction session for beginners.

All competitors were instructed to be at the park by 8 a.m. Saturday for the two-meter hunt. Since some transmitters were already on the air, competitors couldn't be permitted to use their ARDF gear as they walked to the starting tent. They had to turn in all receiving equipment at the impound table as they arrived. Volunteers from the South Fulton ARES group handled all the impound duties, under the leadership of Ron Smith N4XQN. When a competitor arrived, the crew checked for unauthorized gear (such as GPS sets), put a nametag on the equipment and placed it with others in plastic tubs for safekeeping. The tubs were transported to the starting area, where the gear was carefully laid out on a bright orange tarp (**Photo C**).

Competitors were divided into the same age/gender categories as last year, five for men and four for women, according to rules of the International Amateur Radio Union (IARU). **Table 1** shows the categories and number of foxes that were required to be found in each. Nonrequired foxes were marked out on competitors' punch cards so there would be no confusion. By IARU rules, any competitor may run in the prime age division for his or her gender (M21 or F21), finding all five foxes. Two men and one woman chose to do so — more on that later.

Hunters were started two at a time (each in different age/gender categories) at five-minute intervals. Times were published in advance on the Web so that each hunter



*Photo D. Mike Pendley K5ATM, the OM of KD5LOK, was a bit exhausted after his two-meter run. He took silver in the M40 category.*

would be sure to get to the tent in plenty of time.

GAOC's three-stage start was a bit different from the World Championships, but it was fair and went very smoothly. Seven minutes before each start time, as announced by beeps on the PA system, the pair of competitors came up to the table where their numbered bibs and competitor cards were checked. Two minutes later, they received their maps. Most quickly taped them to their own map boards to prevent loss.

With two minutes to go, they were instructed



*Photo F. Debbie Pendley KD5LOK of Albuquerque is excited because she just finished the two-meter course, giving her a gold medal in the F35 category.*

to leave the tent and proceed up the corridor to the starting triangle, where another official awaited. When they heard the next tones, they could turn on their gear and commence hunting. Their elapsed time started at that moment. If they weren't at the finish line within three hours, with at least one fox punched, they would be disqualified.

Some were much faster, of course. Best overall was Gyuri Nagi KF6YKN. He averaged 19 minutes per fox on two meters and just 15 minutes per fox on 80 meters. Gyuri, whose other call is HA3PA, is a part-time U.S. resident who learned the sport in his native Hungary. He has trained ARDF Team USA members for the World Championships.

### Green means grueling

Though very good, Gyuri's course times were far from his personal best. On both courses, he took 50% longer than he did in New Mexico last year, where there was more sun and much higher altitude. Does this mean that N4MAP's courses were harder? Indeed, that was the consensus among the hunters who had been to both events. Gyuri said that he had never been on a more difficult course. Some others used terms like "sadistic" to describe Sam's fox placement.

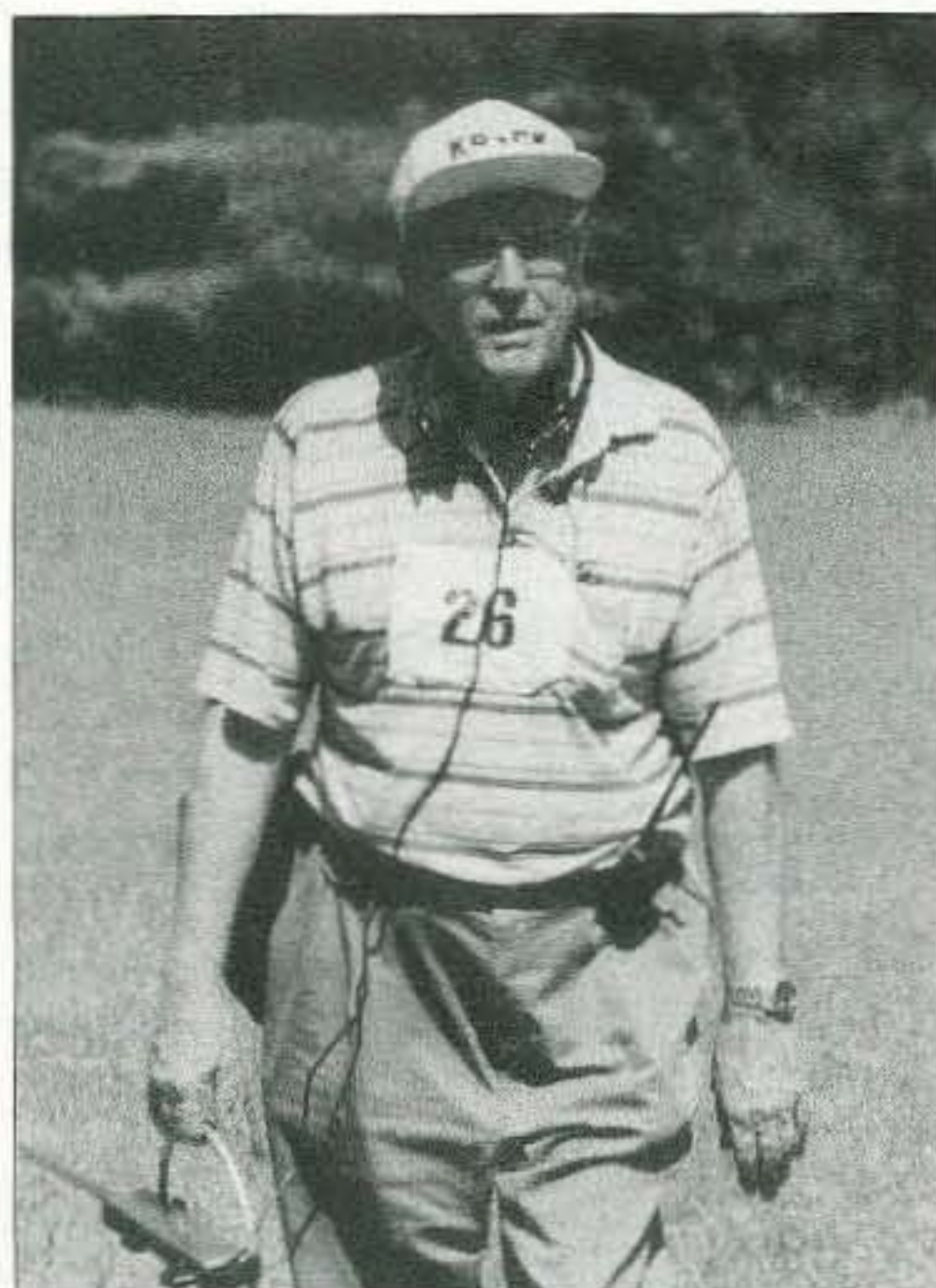
Let's compare: Sam's M21 courses (start to all five foxes, then to finish via direct route) were 6.2 and 5.7 kilometers long for

2m and 80m respectively, with 275 and 165 meters of climb. Jerry Boyd WB8WFK designed his 2001 Manzano Mountain Park M21 courses for 5.0 and 5.5 km length, with climb of 135 and 20 meters. Nobody said that Jerry's courses were too easy!

In orienteering terms, Sam set expert "green level" courses, with the foxes placed farther away from the trails. Confident competitors navigated all the way cross-country. Neophytes usually took longer routes via a combination of trails and short cross-country hops.

Orienteers are used to being instructed exactly where they have to go, planning a course to get there, and following it. For them, radio-orienteering requires a change of mindset, because they won't know exactly where they're going until they get there (except for the finish line). On the other hand, transmitter hunting hams tend to instinctively head directly toward the strongest signal, even though it would be more beneficial for them to study all of the fox signals, establish their most likely locations, then develop a plan to get to them and the finish with minimum time and effort.

For instance, many Pine Mountain competitors made the mistake of first going after foxes MOE or MOI each day, because of their strong signals. Since those two were closest to the finish, it would have been better to save them for last and plan a more



*Photo E. John Munsey KB3GK of Daytona Beach didn't have to run to capture a gold medal on 80 meters in the M60 category.*

efficient route to them via the others. It also helps to keep in mind the IARU course-setting rules, which require that no transmitter be within 750 meters of the start and that all must be spaced at least 400 meters apart.

Not far behind KF6YKN was Charles Scharlau NZØI of North Carolina. If there had been an award for Most Improved Hunter, he would have been a top contender. Although KF6YKN and NZØI have both had their 40th birthday parties, they chose to run in the M21 category instead of M40. Charles, who was in third place on both bands in M40 last year, took silver in M21 on both bands this time. His per-fox times on the more difficult Georgia M21 courses

were better than for his New Mexico M40 performances.

Taking bronze on both days in M21 was Csaba Tisztarto, another seasoned ARDFer who trained in Hungary and has competed in European championships. Like Gyuri, his 80m time was 50% greater than it was in Albuquerque, providing more evidence of the relative difficulty of the Pine Mountain course.

The M40 category had the most entrants, including all of the men from the Albuquerque area. The Duke City hams did very well, capturing all of the medals in that category except one. Snagging gold on VHF and bronze on HF was Jerry Boyd WB8WFK, who was Event Chair for last year's Championships and whose homebrew 80m ARDF receiver/antenna project has been featured on the pages of this magazine.<sup>5</sup>

The M40 gold medalist on 80m was Jackson Stump KD5OEO, with an impressive 25 minutes per fox. Jack, who also took bronze on 2m, is a newcomer to the sport. Mike Pendley K5ATM (Photo D) took silver on 2m and was 4th USA finisher on 80m. He had been in charge of housing, food, and meeting rooms for last year's USA Championships, but he didn't compete then. Taking M40 silver on 80m was Brian DeYoung K4BRI of Alexandria, KY, one of three OH-KY-IN club members in attendance.

Three veterans of the last ARDF World Championships and one experienced orienteer squared off in the M50 category. Charlie Siler KO4NO of GAOC streaked to the finish on both bands at least twenty minutes ahead of the others. Did he have a "home field advantage"? Maybe, but there's no doubt that he deserved his two gold medals. Taking silver was Bob Frey WA6EZV of Cincinnati, who had undergone an amazing weight-loss and training program in the past two years. Trading off for third and fourth place were Dick Arnett WB4SUV of Erlanger, KY and Marvin Johnston KE6HTS of Santa Barbara, each eager to earn a place on Team USA for this year's World Champs. Marvin got bronze on 2m and Dick got the medal on 80m.

John Munsey KB3GK walked to a silver medal finish in M60 on 2m and to a gold medal on 80m (Photo E). Capturing gold on 2m was Bill Farrell of GAOC, who found all three required foxes in under 85 minutes.

For the first time ever, YLs took to the woods in a USA national ARDF championship event. Earning gold medals on both bands were Valerie Meyer W8VAL in F21, Debbie Pendley KD5LOK (Photo F) in F35, and Martha Carr of GAOC in F50.

## Please pass the Parmesan

Good food is a tradition at ARDF events worldwide, and there was plenty of it in Pine Mountain. After the practice on Friday, the Neher family cooked everyone a fine picnic supper in the park. The ceremonial banquet was Saturday, after the two-meter event, in nearby Hamilton, Georgia. It was served by members of Christ the King Church, with all-you-could-eat spaghetti and desserts.

There's not enough room in this issue for all the photos and details from Pine Mountain that I'd like to show you. I have only mentioned the USA-only Division, but there was also a complete set of awards in the Overall Division. That will have to wait until next month. Team USA for the 2002 ARDF World Championships in Slovakia will have been selected by then. I may also be able to announce the dates and location for the next USA ARDF Championships.

Watch your mailbox for the next installment. Meanwhile, you can get complete results for every Pine Mountain competitor, including elapsed time and number of foxes found, by going to GAOC's radio-O champs Web site: [<http://www.gaorienting.org/Radio-O/Radio.htm>].

For more information on how you can get involved in ARDF, check back issues of *73 Magazine* and visit the "Homing In" Web site URL at the beginning of this article. There you will find information on upcoming events, local ARDF contacts, and equipment ideas. If radio-O hasn't caught on in your hometown, take the lead in getting it started. Happy hunting!

## Footnotes

1. Moell, Joe, "Homing In: ARDF Championships Part 1 — Triumph in the Land of Enchantment," *73 Magazine*, December 2001.

2. Moell, Joe, "Homing In: ARDF Championships Part 2 — The World Comes to Duke City," *73 Magazine*, January 2002.

3. Moell, Joe, "Homing In: T-Hunting Fun in the Sunshine State," *73 Magazine*, March 2002.

4. Moell, Joe, "Homing In: Take the Hamfest Foxhunting Challenge," *73 Magazine*, May 2002.

5. Boyd, Jerry, "You Can Build the FoxFinder 80," *73 Magazine*, November 2000.

**Correction:** In our June issue on page 46, all of the paragraphs in quotes preceding "All aboard for Slovakia" should not have been so. Our apologies to KØ0V for this editing error. 73

### Scrambling News

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[www.scramblingnews.com](http://www.scramblingnews.com)

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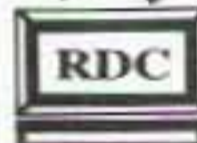
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# Too Many Projects to Build

*Listen up, as a solder-stupefied ham reveals how to reach this nirvanic state.*

*You've waited impatiently for an entire month for your latest issue to find its way to your mail box. And while the articles presented are outstanding presentations, they just aren't what you're looking for. Nothing "jumps off the page," grabbing your attention, demanding to be built, or if the design is interesting, it's definitely beyond your capability or pocketbook.*

**N**ot all builders have the needed expertise to build the "all-band, super-stompin' QRP rig of the century." Not to mention a fully outfitted shop rivaling those of NASA. Not to mention needing and/or wanting every rig/device/gadget/trick that graces the pages of 73 and the other ham rags every month.

Now, those are difficult words of to write about 73, but you know what I mean. Amateur radio is a hobby, and while it often occupies a major portion of our lives, it shouldn't take bread from the table. There must be an alternate solution to the problem, and I'm going to tell you of one.

Knowledge of another flavor is usually what we know the most about — electronics. Electronics construction and design is a "nice to know," and the challenge of building my own rig is a goal I set for myself. I'm working on it, but there's a long way to go before I don the cap and gown to gain my engineering degree.

That's not to say that either of us is lacking in knowledge. After all, you *are* reading a "technical hobby magazine," aren't you?

Let's establish a rule or two that will help us in our future building

endeavors. First, the word "can't" isn't to be used.

Yes, *you can build it* — you just don't know it yet.

I'm too old, vision ain't what it was, hands shake, etc. Well, you've just described me, so now what's *your* problem?

I don't have money for parts. For the answer to that, look in the dictionary under the word "poor," and I suspect you'll find my picture there.

There, I've eliminated some of the excuses used to avoid trying. Now, let's get on with searching for a project to build.

No, there isn't a shortage of designs for those hams not sporting an EE degree, nor is not having unlimited resources or equipment for building a major obstacle. Publishers are diligently searching for printable designs. They are, however, trying to please readers' desires in many areas of interest, at least once in a while. Therefore, not all interests can be addressed all of the time.

So what's a home-brew addict to do when the other guys and gals are being treated to their interests?

Back issues of periodicals are a good source of information. Perhaps you

didn't really read every article in last year's issues. Now would be a good time to survey them to refresh your memory as to what they contained. In 73, the January issue usually contains a listing of all the articles published for the preceding year. Using this as a guide can help you through 12 issues quickly.

Today's technology has provided us with a source of information that has changed all our lives. Various "buildable" projects are on the Internet, and often it's a case of not knowing where to look that is the hindrance. Not only are there a wealth of designs, but also the authors often are unparalleled leaders in their field! What better way to learn about designs than by learning from the leaders?!

Here's one suggestion: Go on the "Web" and read the information at [<http://harry.pmp3.net>]. His call sign is SMØVPO, indicating that he is from Sweden. Reading Harry's on-site personal information, he's an engineer employed by a major electronics firm and provides the information on his Web site to assist other hams. Now that's the true spirit of amateur radio!

*Continued on page 56*

## Too Many Projects to Build

continued from page 55

Harry's site not only provides "buildable" circuits using parts that aren't difficult to obtain, but it also offers excellent learning incentives for the new or old builder. There are many others producing e-information purely for the advancement of the hobby, and to provide encouragement for those of us who require it. Some sites offer basic electronics theory along with construction articles.

That site is only a suggestion. There are literally hundreds more to be found. Some of the other ones I use most often are [qrparci.org], [qrp.pop.net], and [njqrp.org]. These aren't the only ones — just those I have found to be beneficial when looking for receiver and transmitter designs. The Web addresses were current at this writing, but addresses have a way of changing without notice, so please bear that in mind.

Use the "links" selection at such URLs to lead you to other "like" Web sites. At my QTH the downside of Web surfing is time. Searching all these locations can take time, time you hadn't intended to spend on the computer! Especially when you find the locations from other builders who include pictures of their projects! The digital world has opened an opportunity for all the world to "look at mine." Oh, well, there is always a price to pay for everything. To save the location for future information, add the sites to your "favorites" section as you find them.

Don't overlook the articles about test equipment! Building your own signal generator, audio amplifier, and such can be not only rewarding but also useful in the future. There's just something about having built it yourself that adds to your ego.

### Later ...

So anyway, time has now passed, and reams of printed pages describing projects worthy of consideration have stacked themselves neatly after arriving from your printer.

Pictures of neatly built rigs built by other builders attest to their expertise

and cause *envy* to fester within your thoughts.

Alas, now another problem has been created! Too many projects to build, and not enough time to build them all!

Now is the time to be extra careful!

It's Murphy's Law that the next issue of your favorite builders' magazine will be "packed" with circuits just for you.

Like I said, "There's a price to be paid for everything." Happy homebrewing!

*(Editors' note: To ensure more circuits just for you, call us at 603-924-0058 and let us know what you are looking for!)*

73

## LETTERS

continued from page 8

NH. You just follow a few simple steps and then use your handheld keypad to key in your called party I link registration number. If you read the info on the site, you will soon understand the simple procedures and signal flow for a call.

This has to be the best system for amateur radio that I have ever seen. It is growing by approximately 100 new registrations per day. In our local area, a small county in SW VE1, we have seen approximately 12 hams join in less than one week. Give it a try and see what you think ... [http://www.aacnet.net/] (software here).

P.S. By the way, I love your editorials and we also follow your eating habits. Hi.

**Edwin Olsen W4GES.** My most recent lipid panel results are beautiful, and this without Lipitor or Zocor, or any other cholesterol-lowering drugs. I attribute this to following your dietary guidelines. Each of these drugs had had a very adverse effect on my liver. In the case of Zocor, it took months before my liver enzymes went back to normal. Thank you for your pioneering efforts in promoting good health.

73

## Ladder Crystal Filters for NBFM

continued from page 19

Also available from Barnes and Noble bookstores.

### Appendix

From page 38 of Reference 2, the

parallel capacitance (including holder capacitance) of a lower sideband ladder crystal filter is:

$$C_p = (C_x f_o / BW_3) \times ((1/rov_3) - (k_{12} + k_{23})) / [(1/rov_3)^2 - 1]$$

where  $1/rov_3$  is the shape factor and  $k_{12}$ ,  $k_{23}$  are filter coupling coefficients. For a 6-pole Chebyshev filter,  $k_{12} + k_{23} = 1.255$ . Rearranging the equation above, the bandwidth at 3 dB down is:

$$BW_3 = C_x f_o K / C_p$$

where  $K$  is the complicated fraction on the right. This is the equation used to generate **Table 1**. For a shape factor of 5, 7.5, or 10,  $K$  equals 0.156, 0.113, or 0.0883, respectively. If  $C_p$  is completely canceled, then the bandwidth can be very large. However, in practice there will always be some stray capacitance and variations with temperature, which result in some small capacitance. Hence **Table 1** does not go below 1 pF.

73

## Easy-Build Project of the Month

continued from page 23

so-called "phantom" power draw. This is present even if the on/off switch is in the off position. The wall converter is still using a no load power level. This amounts to nearly nothing and is of no concern if you have a main power switch to your workbench. I have made it a practice to use a wall switch to turn off power to my work bench when it is not in use. The work bench lights are my indication that everything is off.

Well, it is my hope that folks will build one of these units and a breadboard and start a little experimenting. There are some neat things behind the switches and dials of that appliance sometimes called a "rig." Good luck!

### References

1. *Ham Radio*, July 1978, p. 36.
2. *Ham Radio*, January 1978, p. 95.
3. *Ham Radio*, July 1989, p. 20.

## Sources

1. Jameco Electronics, catalog: 1 (650) 592-8097.
2. Hosfelt Electronics, catalog: 1 (800) 524-6464.
3. Digi-Key Corp., catalog: 1 (800) 344-4539.
4. Mouser Electronics, catalog: 1 (800) 346-6873.
5. Far Circuits, 18N640 Field Ct., Dundee IL 60118.
6. Ten-Tec, Inc., catalog: 1 (800) 231-8842. 73

## Tesla's Champions

*continued from page 28*

we know as radio. Marconi, Fessenden, Braun, Alexanderson, and others should be credited with the development of radio, not its creation.

FINN suggested: "creating a future extensive exhibit to expand his treatment of AC systems."

WAGNER: Even a casual observation of the electrical displays at NMAH clearly points to the fact that Thomas Edison is Dr. Finn's personal hero. Further, examination of data bases shows that he has written no fewer than ten papers and articles on the subject of Edison.

Noting the history of the AC/DC "war" that has been written about in numerous articles and biographical accounts of Tesla — a war of ideas between Tesla advocating AC and Edison tenaciously resisting its introduction, clinging desperately to DC, is it reasonable to assume that Dr. Finn could provide objective oversight for such an exhibit at the Smithsonian's NMAH?

## Concluding comment

Great men think profoundly, say great words, and make great contributions to humanity. Certainly Nikola Tesla was one of these great men as evidenced by what he thought, what he said, and what he accomplished for the greater good of everyone. One statement he made stands out in my mind, which serves to illustrate the degree of commitment Tesla had as a man and as a scientist: "My paramount desire today,

which guides me in everything I do, is an ambition to harness the forces of nature for the service of mankind." Tesla, in his lifetime, did accomplish his goal, and we are all the better and richer for it. If any man serves as a model for emulation, it is Nikola Tesla, but if somehow we lose track of his life story, then we will become the poorer.

My students and I are committed to our efforts of reintroducing Tesla to the academic community as long as we are able. Nevertheless, we realize that we cannot do this job without the help of others; therefore, we beseech everyone who understands and appreciates what we are doing to give us the support we need to continue.

*John Wagner W8AHB can be reached at 3890 Tubbs Rd., Ann Arbor MI 48103.* 73

## Travels with Henryk — Part 6

*continued from page 36*

I met Santos again a few months ago, but in the Cape Verde Islands, off the coast of Africa. He was on the D44TC team in 2001 CQ WW Contest SSB. But that is another story. 73

## What Amateur Radio Means to Me

*continued from page 37*

dummy load, headphones and most of my other station accessories. The next items I plan to add are a linear amplifier that will increase my input-output wattage from 100 watts to 1300 watts and a taller tower for my antenna. The linear amplifier I am planning on is manufactured by a sister company of MFJ.

All in all, it is better to be talking to and making friends with thousands of people worldwide than a few hundred people in your own area. I can truly say that amateur radio has done a lot for me!! 73

**Say You Saw it in 73!**

## CALENDAR EVENTS

*continued from page 40*

19th until 8 p.m. EDT July 20th. Frequencies will be 28.350, 21.330, or 14.340. A nice certificate is available with an SASE. QSL to SREL, 2909 W Perkins Ave., Sandusky OH 44870.

### AUG 10, 11

**MARYLAND-DC QSO PARTY** On the air 1600–0400 UTC August 10th to 11th, and 1600–2359 August 11th. Suggested frequencies: 3.643, 3.92, 7.07, 7.23, 14.055, 14.268, 21.115, 21.37, 28.055, 28.38, 50.15, 52.525, 146.55, 146.58 and 446.00 MHz. Try CW on the odd half hours. Scoring: Add up your QSO points and multiply by the sum of the multipliers. Multipliers may be claimed once each and they do not repeat from band to band. QSO Points: 10 points per club station, 5 points per mobile station, 4 points per QRP station, 4 points per Technician station, 3 points for a CW QSO, 1 point all other QSOs. Remember, only the highest single point value may be applied per QSO. Multipliers: For stations outside MDC: 1 per MD county + DC + Baltimore City (25 possible). For MDC Stations Only: The basic 25 above + each of the other 49 US states + each DX country. Note: An optional scoring/summary sheet that makes scoring easy is available for an SASE. This is available from Antietam Radio Association and at the Web site. Certificates are awarded to all stations with 50 or more QSO points in their entry. Please visit the Maryland-DC QSO Party Web site at [www.w3cwc.org]. Send logs and scoring summary with an SASE by September 20th to the contest primary sponsor, Antietam Radio Association, P.O. Box 52, Hagerstown MD 21741-0052. Logs can also be E-mailed in plain text format to [wa3eop@arrl.net]. A Special Award — The Worked All Maryland Multipliers Award — has yet to be claimed. Last year W3LRC almost did it with 24 of 25 worked. WA3HAE accomplished that the year before! Who will be the first person to do this? The only stipulations are: 1) all contacts must be from a single QTH, 2) all contacts must be made during a single year's QSO party. Donations towards the continued operation of this activity are always welcome and may be sent along with hard copy entries to the primary sponsor. See you in the pileups. Page WA3EOP.

### AUG 17, 18, 19

**NEW JERSEY QSO PARTY** The Englewood Amateur Radio Association, Inc. invites all amateurs the world over to take part in the 43rd Annual New Jersey QSO Party. Rules: (1) The time of the contest is from 2000 UTC Saturday, August 17th to 0700 UTC Sunday August 18th, and from 1300 UTC Sunday August 18th to 0200 UTC Monday August 19th. (2) Phone and CW are considered the same contest. A station may be contacted once on each band — phone

and CW are considered separate bands — CW contacts may not be made in phone band segments. New Jersey stations may work other New Jersey stations. (3) General call is "CQ New Jersey" or "CQ NJ". New Jersey stations are requested to identify themselves by signing "De NJ" on CW and "New Jersey calling" on phone. Suggested frequencies are 1810, 3535, 3950, 7035, 7235, 14035, 14285, 21100, 21355, 28100, 28400, 50-50.5, and 144-146. Suggest phone activity on the even hours; 15/10 meters on the odd hours (1500 to 2100 UTC); 160 meters at 0500 UTC. (4) Exchange

consists of QSO number and QTH state/province or country. New Jersey stations will send county for their QTH. (5) Scoring: Out-of-state stations multiply number of complete contacts with NJ stations times 3 points per QSO times the number of New Jersey counties worked (maximum of 21). New Jersey stations multiply the number of complete contacts times 3 points per QSO times the multiplier. The multiplier is the sum of the number of states (other than NJ), Canadian provinces, and NJ counties worked. Maximum is 49 + 13 + 21 = 83. (6) Certificates will be awarded to the first place

station in each New Jersey county, state, province, and country. In addition, a second place certificate will be awarded when four or more logs are received. A total of two plaques have been donated by the ARRL Section Managers for NNJ and SNJ to the highest scoring single operator station residing in each of their sections. (7) Logs must also show the UTC date and time, QSO exchange, band, and emission, and be received not later than September 14, 2002. The first contact for each claimed multiplier must be indicated and numbered and a check list of contacts and multipliers should be included. Multi-operator stations should be noted and calls of participating operators listed. Logs and comments should be sent to: Englewood Amateur Radio Association, Inc., P.O. Box 528, Englewood NJ 07631-0528. A #10 size SASE should be included for results. (8) Stations planning active participation in New Jersey are requested to advise EARA by August 1st of your intentions so that we may plan for full coverage from all counties. Portable and mobile operation is encouraged. 73

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## THE DIGITAL PORT

*continued from page 44*

platforms superceding Win98. There is a downside to this Win98 step. There are also programs being written that will not run well unless you have XP installed.

There is a solution if you are the sort of ham who has to have it all. You can get some plug-in hard drives and put different operating systems on each of them and install the software that works where it is most comfortable. The one operating system most will agree not to have is Me.

Now there are a certain number of programs that run very well on Me. DigiPan and MixW do. Zakanaka and Logger are supposed to communicate with each other when they are both up and running. They will not do this under Me. But they work flawlessly under Win98.

I got so disgruntled with finding some of my favorite programs would become dysfunctional under Me that I was ready to jump at the idea of installing the Win98. Another program that got the hiccups with Me was my antiquated yet adequate Word 6 (from Microsoft) that runs just great again under Win98.

The experiments will continue. I have a lot of ham software that will work its way onto this hard drive as time slips by. Most everything I have experience with will most likely fly as expected.

One of my favorite older pieces of software is XPWin, which was written by KF7XP. This is another fatality of the Microsoft juggernaut as it builds "new and

improved" operating systems. The story I get is the author found his software needed to be updated to "keep in step with the times" and he just simply took it off the market. Another notch in the MS belt, I guess. That's it for this month. If you need help with these ideas, feel free to drop me a line at [KB7NO@worldnet.att.net]. 73, Jack KB7NO. 73

## ON THE GO

*continued from page 48*

getting his or her work published. After the article is complete the editor looks at the article with a fresh set of eyes and fixes a myriad of problems. The author knows what he means and what he meant to write. The editor reads what is actually written and can make sure that it actually says what it should. If you decide to try your hand at writing, the editor will take what you write and polish it where needed.

Somewhere out there, I suspect that at least one of you has been toying with the idea of writing an article. As hams we always have something to say, so it's a natural extension that some of us are going to put our thoughts in writing. Who's going to give it a try? 73

## HAMSATS

*continued from page 50*

Saudisat 70-cm downlink antennas are LHCP (left-hand circular polarization).

In his initial E-mail to AMSAT president VE3FRH, Turki Al-Saud announced that initial ham operation would be limited to passes over the United States and Saudi Arabia. By closely monitoring the load on system resources, it may be possible for the control station at SRI to open activity to include other parts of the world. Saudisat 1B (SO-42) is not yet available on the ham bands. Work with the other onboard experiments and software development has been the priority. Both satellites are capable of 9600-baud digital store-and-forward operation, but until further notice, we will be quite satisfied with the added resource of SO-41 as an FM repeater in the sky.

## From Russia and Australia with Kolibri

As noted in the May "Hamsats" column, a new educational satellite this year was Kolibri (hummingbird), a Russian/Australian project for students at the Ravenswood

Girls School and Knox Grammar School in Sydney, Australia, and the Obninsk school system through the Center of Computer Technologies at the Institute of Atomic Power near Moscow, Russia. This small satellite, also known as Kolibri-2000 or RS-21, had a primary downlink on 145.825 MHz with CW telemetry. Due to the low orbit of Kolibri, it reentered the atmosphere after only 711 orbits.

Kolibri was remotely launched from the Progress M1-7 ISS resupply vehicle within hours after separation from ISS Russian Service Module Zvezda on March 20, 2002. The satellite weighed 20.5 kg and had deployable solar panels capable of generating 60 watts at peak illumination. Onboard systems included particle and electromagnetic field analysis experiments and an AC magnetometer. The satellite's computer took care of data acquisition, housekeeping, telemetry, thermal and attitude control. The primary command station for Kolibri was located in Kaluga, Russia, with another site in Tarus, Russia.

Shortly after Kolibri was released, hams reported reception of CW telemetry on 145.825 and 435.335 MHz. The telemetry was sent as alphanumeric code groups at 10-second intervals. This made it a bit difficult to second-guess Doppler shift in between the transmissions, but signals were usually quite strong, when the satellite was transmitting. Operation was intermittent during its short life. An example of telemetry received at 2054 UTC on April 28, 2002, on a downlink of 145.825 MHz, included: ITXA0 PTXA0 TTXA136 ITXB3 PTXB0 TTXB138 TFLV130 TFLN144 TPPA136 TPPB136 MTX51 MRX34. **Table 1** shows some of the telemetry decoding equations for Kolibri as provided by Miles Mann WF1F on his Web site [<http://www.marex-na.org>].

Kolibri was just the first in a series of small educational and experimental satellites from the collaborative efforts of groups in Russia and other countries for launch from ISS and Progress space vehicles. A group that has been involved with recent RS programs is AMSAT France (AMSAT-F). On May 3, 2002, two very small (6 kg each) AMSAT-F satellites reached orbit on Ariane Flight 151. The primary payload was a 3,000 kg imaging satellite, SPOT 5. The launcher was the workhorse Ariane 4 rocket. The French hamsats are called Idefix. They were set to transmit recorded voice messages and digital telemetry on 145.840 and 435.270 MHz through the end of June, when the batteries were predicted to give out. There are no solar panels. As with the Kolibri project, more small satellites are expected from AMSAT France in the future. Yes, it's a challenge just to keep up! 73

## NEVER SAY DIE

*continued from page 4*

kids are able to learn this new way of reading. Every school in the country should be teaching this.

How about kids with dyslexia or ADD? They have no problem with what George calls Natural Reading. The parents of kids with dyslexia, ADD or hyperactivity should stop feeding their kids poisons so these problems would go away.

This is the best answer I've seen to the growing illiteracy problem, where nationally our kids have been falling further and further behind in their reading skills compared to kids in other developed countries ... countries which spend far, far less on education.

Yesterday (a Saturday) I spent the afternoon driving around Hillsborough (NH) taking pictures of the yard sales all around the town. Must be over a hundred of 'em. I was working on an article for my new magazine, NH ToDo. In addition to picking up an almost new Akai cassette deck for \$5, I picked up dozens of interesting books for only a quarter each.

I also picked up a dozen I want to read at the Hancock town dump (called a transfer station these days), where there are always hundreds of books up for grabs ... with new ones appearing almost every day. The same goes for the Peterborough town dump.

Another source of bargain books is library sales. I'll drive an hour for one of those. They often have thousands of books going for 10¢ to 50¢ each.

## Do It Yourself

You can learn to speed read at any age, it just takes a lot longer to retrain your brain when you're a teen or older.

*Continued on page 61*

### Smart Battery Charger

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## D is for Doldrums

*July is often a challenging period for DXers, and this month will be no exception. Since the noontime sun is high in northern skies, we can expect strong D-layer ionization to weaken signals on the daytime bands. We are also still seeing a large amount of solar activity, and so will probably experience greater than normal signal absorption.*

The lowest bands would normally be your best bet here, since they require less power to achieve adequate signal strength, but the daily Maximum Usable Frequency (MUF) will probably limit you to 15, 17, or 20 meters.

The nighttime bands will also be limited, but for different reasons. They will primarily be affected by the short duration of darkness and by atmospheric static generated from strong convective storms. In this case, 20 and possibly 30 meters will be the most workable bands.

Together, these day and night conditions characterize the summertime "doldrums" by reducing the usable bands to a narrow range of choices. However, this is a time when CW "fists" have a definite advantage over voice-only operators since Morse code can be copied with a signal-to-noise ratio as low as 3:1, allowing wider use of the HF frequency spectrum.

A speech quality single-sideband (SSB) signal with a 3 kHz bandwidth typically requires a signal-to-noise ratio of at least 7:1 to be readable, so this should be a good incentive for those with voice-restricted tickets to study for the code test.

As far as this month's solar prediction goes, my crystal ball indicates that the first third of July will be erratic with just a few Fair-to-Good (F-G) days to work with. Decent HF propagation conditions should finally appear around the 13th but will only last about a week.

Solar activity will then increase significantly, with strong flares probable from the 20th through 24th. The 26th should begin a period of generally favorable conditions, especially for midlatitude operators, but high latitude stations will continue to have some difficulties through the end of the month.

July 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
	1 F-G	2 F	3 F-P	4 F-G	5 F-G	6 F
7 F-P	8 F-P	9 F	10 F-G	11 P	12 F	13 F
14 G	15 F-G	16 G	17 G	18 F-G	19 F	20 P
21 VP	22 P	23 VP	24 F-P	25 F	26 F-G	27 F-G
28 F-G	29 F-G	30 G				

EASTERN UNITED STATES TO:												
GMT:	00	02	04	06	08	10	12	14	16	18	20	22
Central America	15-20	(15) 30	20 (40)	(20-40)	x	(20)	20	(20)	(15)	(15)	15 (20)	(10) 17
South America	15 (20)	(15) 20	20 (40)	(20-40)	(20)	x	(15)	(15)	x	(10)	(10-20)	(10) 20
Western Europe	20	20	(20-40)	(40)	x	(20)	x	x	x	x	(20)	20
South Africa	x	(40)	x	(20)	x	x	x	x	(15)	(15)	x	x
Eastern Europe	20	20 (40)	(20)	x	x	x	(20)	x	x	(15)	(15)	(20)
Middle East	20	20 (40)	(20)	x	x	x	x	x	x	x	(20)	(15)
India/Pakistan	(15-20)	(20)	x	x	(20)	x	x	x	x	x	x	x
Far East/ Japan	(15)	x	x	x	x	x	(20)	(15-20)	(15)	x	x	(15)
Southeast Asia	(15-20)	x	x	(20)	x	x	(20)	x	x	(15)	x	x
Australia	(15)	(15)	x	x	(20-30)	(20-30)	(20)	(20)	x	x	x	x
Alaska	(15-20)	(15-20)	(15-20)	20	20 (40)	(20-40)	(20)	(20)	x	x	(15)	(15-20)
Hawaii	(15-20)	(15-20)	(15-20)	20	20 (40)	(20-40)	(20)	(20)	x	x	x	(15)
Western USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20-40)	(15) 20	(10) 20	(10-20)	(10-20)	(10-20)	(10) 20
CENTRAL UNITED STATES TO:												
Central America	(10) 20	(15) 30	20 (40)	20 (40)	(20-40)	(20)	(20)	(15) 20	(15-20)	(10-20)	(10-20)	(10) 17
South America	10 (20)	(10) 20	(15) 30	(15) 30	(20-40)	(20)	(20)	(15)	(15)	(10)	(10-15)	(10-20)
Western Europe	(15) 20	20	(20-40)	(20-40)	x	(20)	(20)	x	x	x	x	(15-20)
South Africa	x	x	(40)	(20-40)	(20)	x	x	x	(10-15)	(10-20)	(20)	x
Eastern Europe	(20)	(20)	(20)	(20)	x	x	(20)	(20)	x	(15)	(15-20)	(15-20)
Middle East	(15-20)	(20)	(20)	(20)	x	x	x	x	x	x	(20)	(20)
India/Pakistan	(15-20)	(15-20)	(20)	x	x	x	(20)	x	x	x	x	x
Far East/ Japan	x	(15)	(15)	x	x	(20-40)	(20)	20	(20)	x	x	x
Southeast Asia	(15)	(15)	(15-20)	(20)	x	x	(20)	(20)	(15-20)	(15)	(15)	x
Australia	(15)	(15)	(15)	(20)	20 (40)	(20-40)	(20-40)	20	(20)	x	(15)	x
Alaska	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	(15-40)	(10) 30	(10-20)	(10-20)	(10) 20
Hawaii	(15-20)	15 (20)	(15-20)	20	20	(20)	20	(20)	x	x	x	(15)
WESTERN UNITED STATES TO:												
Central America	(10) 17	(15) 20	(15) 20	20	(20)	(20)	(20)	(20)	(20)	(10-20)	(10-15)	(15-20)
South America	(10-20)	(10) 17	15-20	(15) 20	(20)	(20)	(20)	(15)	(15)	x	(15)	(10-15)
Western Europe	(15-20)	(20)	20	(20)	x	x	x	(20)	(15)	(15)	(20)	(15-20)
South Africa	x	x	x	(20)	(20)	x	x	(20)	(20)	(15)	x	x
Eastern Europe	(15-20)	(20)	(20)	(20)	x	x	x	(20)	x	x	x	(15-20)
Middle East	(20)	(15-20)	(15-20)	(20)	x	x	x	x	x	x	x	(20)
India/Pakistan	x	x	(15)	x	x	x	x	(20)	x	(15)	x	x
Far East/ Japan	(15)	(15)	(20)	(20)	(20)	(20-40)	(20-40)	(20)	(20)	(15-20)	x	(15)
Southeast Asia	x	x	(15)	(15)	x	(20)	(20)	(20)	(15-20)	(15-20)	(15)	x
Australia	(10-15)	(10-15)	15	(15-20)	20	20	20	(20)	20	(20)	x	(15)
Alaska	(10) 40	(10) 40	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	20-40	(15) 40	(10) 40	(10) 40	(10) 40
Hawaii	(10-15)	(10-20)	(10-20)	(15-20)	20	20	(20-40)	20 (40)	(20-40)	x	x	(10-15)
Eastern USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	(15-20)	(10) 20	(10-20)	(10-20)	(10) 20

**Table 1. Band, time, country chart.** Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.

## Band-by-Band Summary

### 10 and 12 meters

When open, reliable paths will mostly lead you to the Caribbean, Latin America, and South America. Rarer contacts may sometimes be found in Africa or the Southwest Pacific. Expect signals to peak in the morning or late afternoon, and don't forget that these bands can stay open well into the evening at this time of year. Expect short-skip to fall between 1,000 and 2,000 miles.

### 15 and 17 meters

These bands can often be worked to diverse areas of the globe throughout the day, but plan on the strongest signals occurring to the east in the early morning and to the west in late afternoon. Look for openings past local sundown, especially when sporadic-E has been noted. Look for short-skip out to 2,300 miles.

### 20 meters

Good daytime DX will be possible but the strongest signals will be limited to relatively short periods after sunrise, in the late afternoon, or in the early evening. Decent nighttime DX will also be possible, especially to the west and northwest. Expect short skip to vary from 500 to 2,000 miles during the day and from 1,000 to 2,300 miles at night.

### 30 and 40 meters

Some good worldwide DXing can be had throughout the night as long as atmospheric noise isn't too great, but static from nocturnal thunderstorms will probably be frequent. Daytime openings can be worked in North America, Canada, and Mexico, but skip will be limited to 600 miles or so. At night, skip will fluctuate from 500 to over 2,000 miles.

### 80 and 160 meters

High static will mask signals on these bands most of the time, but occasional weak openings may occur between sunset and sunrise. Look for peaks near midnight and in the predawn hours. Short skip will vary from 1,000 to 2,000 miles.

That's all for this time. ... Have a safe and happy Fourth of July!

## NEVER SAY DIE

*continued from page 59*

The best way to get started is to get some large print books from your local library, such as the large type editions of the *Reader's Digest*. Then start scanning the pages, taking maybe five seconds to a page, and see how much you can remember after scanning a few pages. Do this every day for at least a half hour. It's going to take persistence, since this is a whole new way of reading and your right brain is going to have to rewire itself to deal with it.

The prize, after a month or so, is being able to read a couple books an hour, with good comprehension.

With some books you'll have to go back to your old, slow, way of reading. You don't scan in computer manuals like you do a novel.

### The Scanning Technique

Once you've read a book, whether by speed or slow reading, there's a memory trick you can use to keep the whole book fresh in your memory indefinitely.

What you do, with the help of someone else, is to get comfortable, close your eyes and then tell your partner everything you can remember in a book you've just read. Go through it in detail.

Now, silently scan through the book again in your mind, telling your partner about anything new that you've remembered this time through.

Do this all over again, voicing any new memories. To help you, your partner can stop you now and then, asking where you are in the book at that moment.

After a half dozen or so scans you'll be scanning through the whole book in a few seconds.

Every few months take a few minutes to mentally rescan through books you've scanned. This helps refresh the memory circuits ... just like a computer.

We have an unbelievable memory capability, it's just that we get used to not using it. My grandfather had whole books of poems memorized. And Frank French quoted for over a half hour from Maurice Gottschalk's diaries at his performance of Gottschalk's music at a Fresno Ragtime Festival.

### Reverse Speech

This whole business of finding hidden messages by listening to speech played backwards didn't make a lot of sense to me, so I haven't been a big fan of the technology. Yeah, I've heard some reverse speech via the Art Bell show, but it wasn't very clear.

That's suddenly changed.

By chance I picked out a book I'd gotten a year ago and started reading. It explained that our eyes see everything upside down and our brain has to learn to turn it over for us. It said that scientists believe that the right side of the brain receives language backwards and that children first start to speak backwards. It said that recordings of baby-talk gibberish played backwards revealed intelligible speech.

So we may well have the left side of our brain producing what we want people to hear, with the right side of the brain sneakily revealing what we really think.

Hmm, I see a market for tape recorders that can play backwards so parents will be able to talk with their babies sooner.

Say, that right side of the brain is the same one kids can learn to use to speed read. Maybe it's about time we stopped neglecting the development of half our brains.

### Kicking Ol' Nick

Why'm I such a nut on smoking? Coupla reasons. First, my dad smoked until he was about 65 and then spent the next 20 years living and sleeping with oxygen bottles before emphysema finally killed him. Second, almost every friend I've had down through the years who smoked is now long gone. Heart attacks, stroke, lung cancer, and so on. Most died in their late 50s.

Smoking is directly responsible for 87% of lung cancer cases. It also ruins the teeth. It makes men impotent in their 50s. Yet less than half of the smokers are trying to quit. Maybe they've read the statistics that only one in 40 actually succeed?

It's the nicotine-altered brain chemistry that makes it so difficult. It robs smokers of their free will. They're addicts to the drug, making it one of the most difficult to kick. Check out page 39 of the June 2002 *Popular Science* for the details of the chemistry involved.

Hey, if I make some "I'm Stupid" stickers available for you to walk up and stick on kids who are wandering around the malls smoking, would you have the guts to go ahead and use them? Youngsters are stupid to take on a lifetime, expensive, killer drug addiction. Older smokers are just to be pitied for having been so stupid as kids.

### Toddler TV

Wouldn't you know that researchers have found one more way that we're dumbing down our kids? And it's permanent! Yep, it's that ogre television. At that window of time when babies brains are normally busy building the circuits

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for body coordination, for talking and playing, they're sitting there stupefied, watching Sesame Street.

This brain-building period is a one-time deal — a use it or lose it opportunity.

How bad is it? A study in Cincinnati found that 40% of the two-year-olds watch more than three hours of TV a day!

Sure, TV is a great opiate for frazzled mothers trying to cope with a baby that's into everything almost every waking minute. Sit 'em down and hypnotize them with TV. And ditto day care centers, where there are rows of toddlers staring for hours at the screen — but not toddling.

There are no second chances when it comes to early brain building. Recent success in giving babies born blind their eyesight as adults has shown that they will never be able to actually see as the rest of us do. The brain neurons were never developed for it. They can't recognize anything.

I hope more research is done in this area so we'll have an idea of how many IQ points we're permanently shaving off kids' brains by using TV as a pacifier. Duh?

### Smart ETs?

Because of science and technology, our world has changed more in the past hundred years than in the previous hundred centuries. Yet, for some weird reason the scientific establishment, along with the media and politicians, haven't grasped the ramifications of our sudden development.

Between UFO and contactee studies, anyone who has bothered to read the research reports knows that ETs are here — and have been for a long time. We also know that to get here their technology has to be way ahead of ours. Way, way ahead.

So why aren't they landing on the White House lawn — other than the Secret Service would immediately blast them to smithereens? That's easy. They're intelligent and thus they're well aware of how we treat strangers.

Are they a danger to us? Our military obviously think so. But if they were, with their technology they could have wiped us out long ago. It would be worse than the battle of Omdurman in 1898, where a handful of British, led by Sir Herbert Kitchener, wiped out over ten thousand khalifa with their Maxim machine guns, and a loss of about 400 men. And no Bruce Willis to save our asses.

As Arthur C. Clark's *Third Law* says, "Any sufficiently advanced technology is indistinguishable from magic." And that leads to Michael Shermer's *Last*

*Law*, "Any sufficiently advanced extraterrestrial intelligence is indistinguishable from God."

Would Captain Kirk and his crew want to mess with a planet where the occupants were busy killing hundreds of millions of their people—other maybe to observe the carnage?

### School News

The teacher unions have been pushing hard, spending millions to promote smaller classes (since that means more teachers), and with considerable success. Between 1969 and 1997 the number of students per teacher in public and private schools has gone from 25.1 to 18.3 — more than a 27% gain (and 27% more union dues). So what's been the change in academic performance? Kids' SATs have been steadily dropping.

But then, there are other factors which muddy the water, such as the huge increase in single-parent homes, which has gone from 15% in 1970 to 32% in 1995.

Asian kids are leaving ours behind in the dust, and their classes run about 40 students per teacher. On standardized science and math tests our high school kids rank somewhere between Greece and Lithuania, and way behind Albania.

Almost everyone, legislators included, are looking for a quick fix. As usual. Like our health, never mind what's causing the illness, let's do something so we won't feel the pain we're causing ourselves. The aspirin of smaller classes hasn't eased the educational pain. Nor will paying teachers more. That's been tried. Over and over.

Like our health problem, it's going to take an educational lifestyle change to stop the pain. Which is what I've been preaching for some time now.

### Lock 'em Up!

Another first for America: Two million prisoners! That's more prisoners than farmers (1.9 million), a quarter of all the prisoners in the entire world — and we've been able to accomplish this feat with only 5% of the world's population.

Though blacks make up only 13% of our population, roughly half of our prisoners are black. And about two-thirds of our prisoners are there on drug charges.

This mess is costing us about \$60 billion (that's about \$250 out of my pocket every year) and it's mainly the result of our lousy public school system. There are very few well-educated people in prison, if that tells you anything. And, once there, the education people get is in crime and diddling the legal system — not in how to read and build successful careers in our society. Our legislators, having not noticed that socialism has

failed in every country it's been tried, have saddled us with a socialist school system.

Our teachers, protected by their unions, have as much incentive to excel as the clerks in communist country stores, where customers are looked upon as nuisances to be ignored.

Many blacks have the worst of the deal, with uneducated single mothers and no father figure, living in inner cities where you either join a gang or get killed, and where education or talking English are considered "being white" and to be avoided. It's no wonder we're paying dearly to lock over a million of 'em away out of sight.

Will we wait until we have three million prisoners to admit that we have a problem and start considering some changes in the system that's causing it?

My vision is of building a new educational system which will eventually destroy the current failed model, replacing it with one where, from birth to death, people will be busy educating themselves, loving every minute of it, and at a fraction of today's school costs.

A better education certainly would help reduce the number of black unwed mothers, mostly teenagers, which account for 60% of black births!

I estimate that it'll only cost about \$750,000 to get this movement started. Hey, Bill Gates! Bono? Jobs?

### WWIII?

There's good reason to suspect that WWIII has already started, but we just haven't noticed. Oh, the World Trade Center got our attention — at least for a few days — then it was back to *Frasier*, *Texas Justice* and *Judge Judy*.

Meanwhile, way off our radar screen have been reports on *60 Minutes* and other exposé shows on the millions of illegal immigrants crossing our borders, tons of drugs being brought in, and our Immigration Department having no clue about where thousands of Muslim visitors with student, visitor or no visas have disappeared.

Hasn't anyone read about that Trojan Horse caper?

Hey, why should an enemy mount a Pearl Harbor-type attack when they can, for a tiny fraction of the cost and danger, hit us with a thousand mini-Pearl Harbors all around the country, using an infiltrated sleeper army?

We know there are thousands of Muslims here from Iraq, Saudi Arabia, and other Mid-Eastern countries, many brought up from birth to hate America. We know that bioweapons are an incredibly cheap

*Continued on page 64*



# Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

**The Secret Guide to Health:** Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). \$10 (#05)

**The Secret Guide to Wealth:** Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. \$5 (#03)

**The Secret Guide to Wisdom:** This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. \$5 (#02)

**The Blood Purifier Handbook:** This explains how to build or buy (\$155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! \$10 (#01)

**Plant Growth Stimulator:** This has the same circuit as the above, all ready to use. Postpaid: \$155 (#PGS).

**My WWII Submarine Adventures:** Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life

aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the *Drum*. \$5 (#10)

**Travel Diaries:** You can travel amazingly inexpensively – once you know the ropes. Enjoy Sherry and my budget visits to Europe, Russia, and a bunch of other interesting places. How about a first class flight to Munich, a rented Audi, driving to visit Vienna, Krakow in Poland (and the famous salt mines), Prague, back to Munich, and the first class flight home for two, all for under \$1,000. Yes, when you know how you can travel inexpensively, and still stay in first class hotels. \$5 (#11)

**73 Writer's Guide:** It's easy, fun, can pad your résumé, and impress the hell out of your friends. Yes, of course we pay for your articles! \$0 (#78)

**Wayne's Caribbean Adventures:** My super budget travel stories – where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. \$5 (#12)

**Cold Fusion Overview:** This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. \$5 (#20)

**Improving State Government:** Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut it's expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy *any* taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. \$5 (#30)

**Mankind's Extinction Predictions:** If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. In this book I explain about the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack? I'm getting ready, how about you? \$5 (#31)

**Moondoggle:** After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with some readers who worked for NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)  
No, I'm not a nut case.

**Classical Music Guide:** A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gottschalk's fabulous music! \$5 (#33)

**The Radar Coverup:** Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. \$3 (#34)

**Three Gatto Talks:** A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system – the least effective and most expensive in the world. \$5 (#35)

**Aspartame:** a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

**\$1 Million Sales Video:** The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. \$40 (#52)

**Reprints of My Editorials from 73.** Very few things in this world are as we've been taught, and as they appear. As an iconoclast I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

**1996 100 Editorial Essays:** \$5 (#72)  
**1997 157 Editorial Essays:** \$8 (#74)  
**1998 192 Editorial Essays:** \$10 (#75)  
**1999 165 Editorial Essays:** \$8 (#76)  
**2000 101 Editorial Essays:** \$5 (#77)  
**2001 104 Editorial Essays:** \$5 (#78)  
**Silver Wire:** With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. \$15 (#80)

**Colloid Reprint.** April 97 article on a silver colloid maker, history, and how to use the stuff. \$5 (#98).

**Colloid Clips.** Three 9V battery clips, 2 alligator clips & instructions. \$5 (#99)

**Silver Colloid Kit:** \$25 (#80-98-99)

**Four Small Booklets Combined:** Dowsing: why and how it works; Super Organic Food: a trillion dollar new industry; Schools in 2020: another \$ trillion industry; Anthrax, a simple cure. \$3 (#86)

**Stuff I didn't write, but you need:**  
**NASA Mooned America:** René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

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## NEVER SAY DIE

*continued from page 62*

way to kill large numbers of people. We know that suitcase atomic bombs can easily be brought into America, awaiting an attack day.

We also know that the FBI and CIA both have long records of unbelievable bungling.

On the other hand, I keep reading warnings that while all those fanatic Muslims may be a threat, the next Big One will be with China. Hmm, could that explain the sudden proliferation of Chinese restaurants all around the country? They're everywhere! Have you noticed that hardly any of the people working in them have bothered to learn English? Gee, I wonder why that is? Hey, wouldn't a restaurant be a wonderful place to cook up bioweapons? Who would notice an extra fifty-gallon tank over in the kitchen corner? Or drums of anthrax powder in the basement labeled MSG?

Oh, don't worry about me, I'm just a natural worry-wart.

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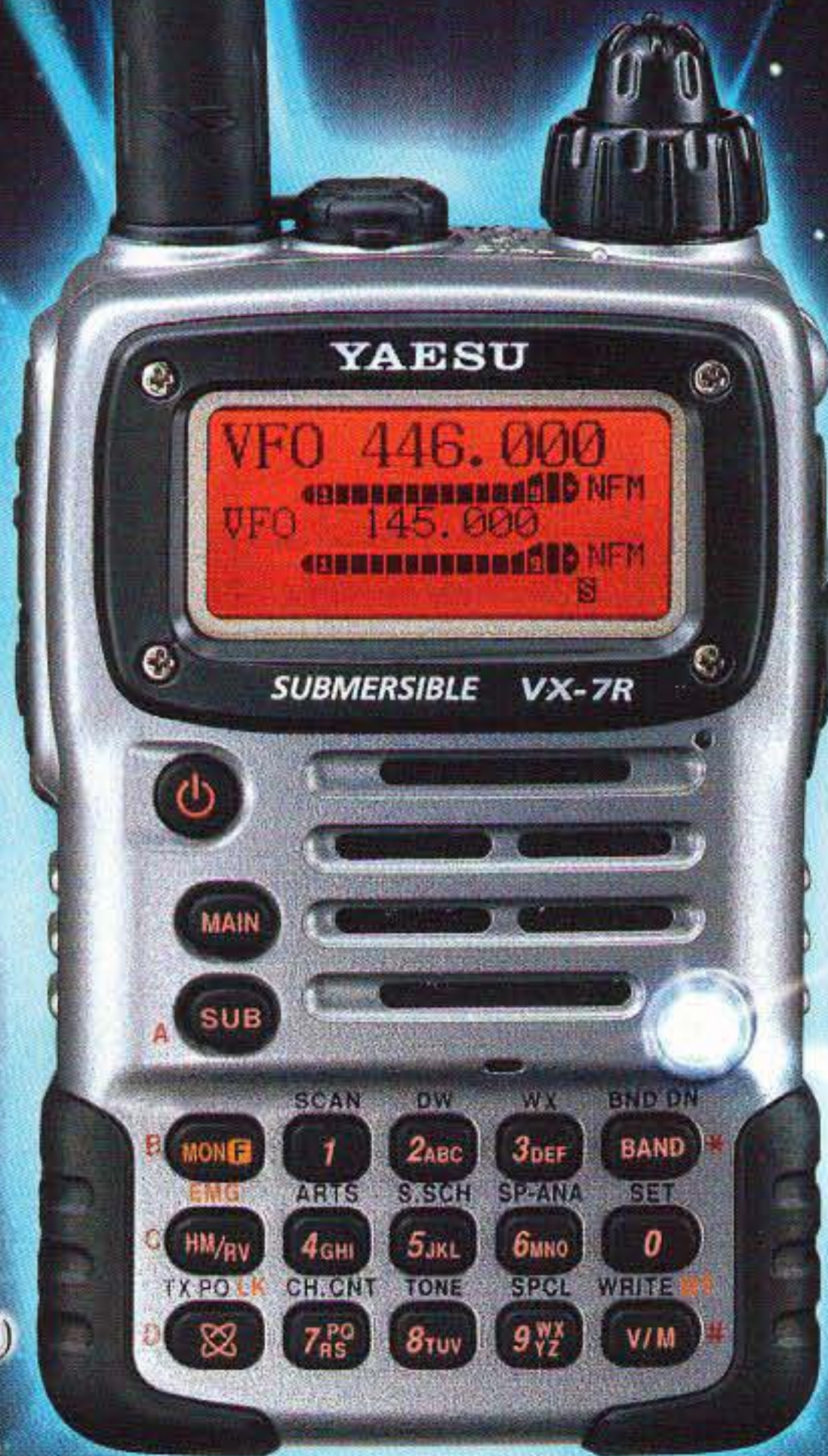
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