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73 Amateur Radio Today

Build:

- 1.2 GHz FM Rptr
- AC Voltmeter
- Simple Keyer

Review:

- Ham
Weather
Station

Unveiled:

- VTVMs
- IRCs



World
Fox hunting
Championships
page 47

Texas to Terrorist:
So What Else Is New?

Page 1

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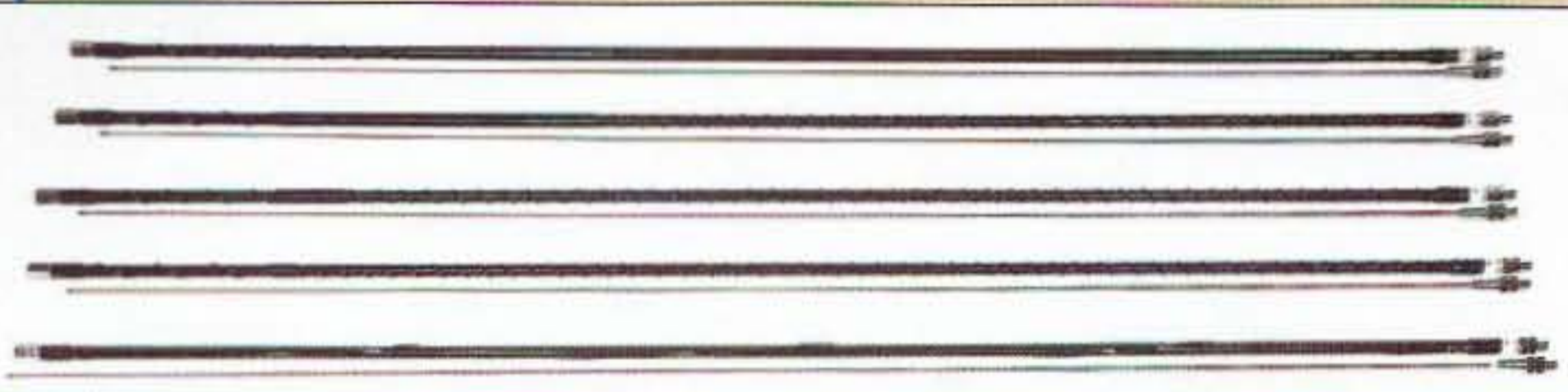
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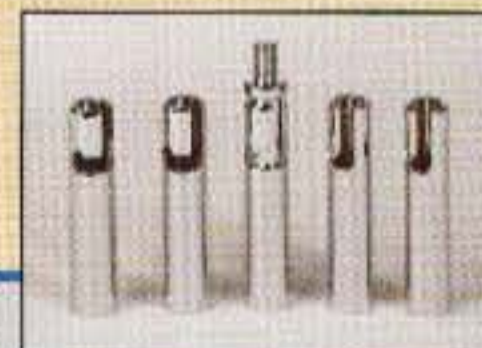


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73 Amateur Radio Today

TABLE OF CONTENTS

FEATURES

- 10 Build a 1.2 GHz FM Repeater — NY9D**
With a lot of initiative and perseverance, these hams realized success.
- 15 All-Star Expanded-Scale AC Voltmeter — K8ZOA**
Monitor your line voltage with this high-performer.
- 22 Travels with Henryk — Part 2 — SMØJHF**
SMØJHF shares some photos — and the fun of hamming.
- 24 VTVMs and FETVMs — W2GOM/7**
Theory and practice.
- 27 The ABCs of IRCs — G3SWH**
Just what ARE International Reply Coupons, anyway?
- 55 Build This Simple Electronic Keyer — Sellen**
One of the nicest little projects we've seen.

DEPARTMENTS

- 49 Ad Index
64 Barter 'n' Buy
54 Calendar Events
40 The Digital Port — KB7NO
44 Hamsats — W5ACM
47 Homing In — KØOV
4 Never Say Die — W2NSD/1
53 On the Go — KE8YN/Ø
60 Propagation — Gray
1 QRX
63 Radio Bookshop

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Web Page
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2001 Annual Index
page 31

REVIEW

- 35 The Peet Brothers Ultimeter 2000 — KE8YN/Ø**
A weather station with hams in mind.

QRX . . .

Terrorism — What Is That?

I got a big laugh out of the dialogue of Osama bin Laden, the Taliban, politicians, and the news media. They say terrorists will hit us again in the oncoming weeks and months. What a joke! You have a better chance of getting killed on Interstate 35E than by a terrorist.

Osama has probably seen 100-degree-plus summers in Afghanistan, but he doesn't have fire ants to go with it. If he did he wouldn't be sleeping on the ground in his cave. He talks of pain and suffering he

is going to inflict on us. He doesn't know what pain is until he gets kicked by a green-broke, two-year-old colt in a freezing rain.

Germ warfare? Texas ticks will give you Rocky Mountain Spotted Fever and Lyme disease, blister beetles kill your horse, greenbugs destroy a wheat crop, and termites eat your house. Anthrax has killed Texas cattle for over 125 years. What's new?

Our prairie dogs carry the plague, armadillos carry leprosy, and our bats and skunks carry rabies.

Continued on page 6

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



MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

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



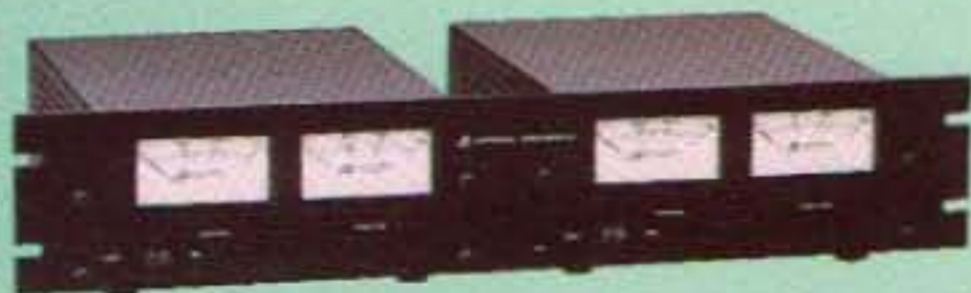
MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

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



MODEL SRM-30M-2

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 1/2	10.5
SRM-30-2	25	30	3 1/2 x 19 x 9 1/2	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 1/2	10.5
SRM-30M-2	25	30	3 1/2 x 19 x 9 1/2	11.0



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MODEL SS-10EFJ-98

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

*ICS - Intermittent Communication Service



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- ✓ 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

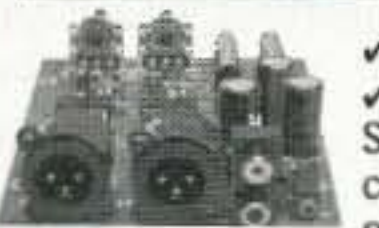


- ✓ Visible and audible display of your heart rhythm
- ✓ Re-usable sensors included; just like visiting the hospital!
- ✓ Bright LED "beat" indicator
- ✓ Monitor output for oscilloscope display

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!

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- ✓ Connect consumer outputs to XLR inputs
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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!

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- ✓ 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.
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- ✓ 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.

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 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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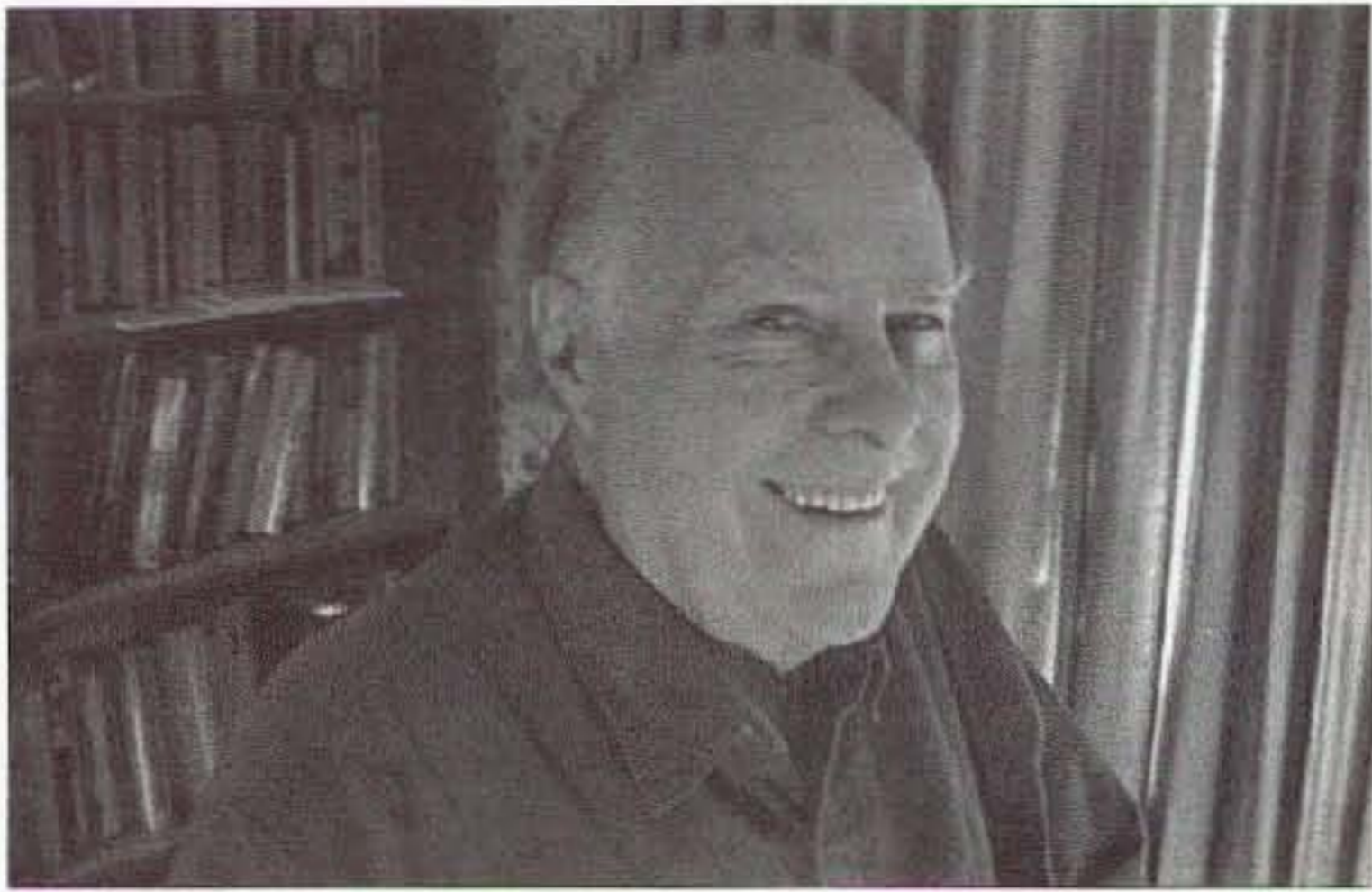


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If You Think ...

... That Saddam is through getting even with us, you've been watching too many football games and not enough *Frontline* reports on PBS. It's just too easy for the who-knows-how-many Iraqi "students" and "visitors" to set up cells to make biological weapons. As with the September attack, we've seen that our government has been hopelessly inept in dealing with this mess.

Immigration has no idea how many Iraqis, Iranis, Saudis, Jordanians, Syrians, Sudanese, and so on are here, or where they are. The FBI has continued its long history of not communicating with other agencies, ditto the CIA, and so on.

But, no matter how the terrorist networks hit us, the one thing that we're going to really need is communications. And that's another thing that our beloved government hasn't made any effort to provide. Every time there's an emergency, the phones and power go out, taking the cell phone system with it. Our police, fire, rescue, and other services have no way to intercommunicate — until we hams step in.

So what's our national organization doing about beefing up and coordinating us so we'll be better prepared? In the past it's been up to the hams in the emergency area to solve the problem after a disaster has hit. Now we need a national disaster communications system and we don't even have the beginnings of one.

If we're going to be able to provide services anywhere anytime, we need all 600,000 licensed hams to be ready to help, not just the approximately 100,000 now active. Plus, we need a new wave of youngsters coming into the hobby.

Please tell me if you've seen any sign that the ARRL HQ gang has come in off the Newington golf course yet and are getting hot to promote amateur radio nationwide. Any sign at all.

What to Do?

That's easy. Amateur radio needs national visibility. The American public needs to find out that there still is an amateur radio service. We need exposure.

So, how can the League get us exposure without spending a fortune on space advertising in magazines and newspapers? Two easy ways. One is to send out press releases every time we provide a service, or even prepare to provide a service. Hundreds of ham clubs have emergency vans set up. Please tell me if you've seen any articles about them in the media. I've seen one newspaper clipping in the last three years. If they don't know how to do this, I have a \$40 video giving away the secrets I've learned.

The other way is to use talk radio.

There are thousands of talk radio shows, and all of them are looking desperately for interesting people to interview. In early November, I got a call from Alan Corbeth

N7PUN asking if I'd be available that night to go on with Barbara Simpson on Art Bell's (W6OBB) *Coast-to-Coast* talk show. You bet. I talked for four hours and the result was a two-week avalanche of E-mails, letters, faxes, and back-to-back phone calls.

Yes, of course I talked about amateur radio.

Please see if you can find out why the League hasn't fielded some hams with the gift of gab to promote our hobby on talk radio. A list of 700 talk shows is inexpensively available. It gives the details on the station, host, producer, phone and fax numbers, and so on.

I've been getting on as many talk shows as I can, but I'm just one person — and I'm busy helping a new magazine get started to boost vacationing in New Hampshire.

Walking the Walk

It's been a while since amateur radio has contributed significantly to the radio state of the art. The last major contribution was, I'd say, our development of repeater systems. It was our development work which made cell phones possible. We can claim that as a success story, and never mind the downside of millions of people slowly destroying their brain cells and getting brain tumors from having the antennas too close to their heads. Like the cigarette deaths, this will, I expect, turn into another lawyers' paradise.

But that was a generation

ago, and politicians with a valuable natural resource to milk have very short memories.

Yes, it's much more difficult to experiment in these days of massive integrated circuits and no good source of parts. It isn't like the old days when some radio stores had dozens of tables of parts. Cheap parts. I used to have boxes of potentiometers, cartons of variable capacitors, thousands of resistors, boxes of capacitors of every kind, tube sockets, shelves of tubes, switches, relays, transformers, wire, cables, and connectors. Well, whenever I needed a part I didn't have I'd buy a dozen or two, so I'd have 'em.

With spread spectrum and digital communications, we have fallen behind. Way behind. The ARRL's single-minded preservation of CW, which is only a slightly faster way of communicating than smoke signals, has helped keep amateurs focused on the past instead of charging off into the future.

I still remember how hard the ARRL fought RTTY, and that was 50 years ago. They pulled every dirty trick they could to prevent RTTY from escaping 2m and getting onto the low bands. Why? Heck, here was a new mode of communications which was five times as fast as CW and error-free. It presented a serious threat to their National Traffic System, which had its origins back in the old spark days when messages had to be relayed to go any distance.

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 ANTMNBNC 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.

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

Mfg. suggested list price \$429.95/CEI price \$189.95
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 Trunk Lockout • Trunk Delay • Cloning Capability
 10 Priority Channels • Programmed Service Search
Size: 2 1/2" Wide x 1 3/4" Deep x 6" High
Frequency Coverage:
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continued from page 1

We have rattlesnakes, copperheads, and water moccasins. Ho-hum.

They talk of gas and biological warfare. They have never pulled in behind a cattle truck while it's raining, or ridden in the front seat of a pickup between two cowboys after they've just eaten a big bowl of Texas Red. Texas ain't for sissies! We have posted signs all over the state that say "Don't mess with Texas!"

Osama and the rest of you (soon to be Texas deep-fried) turkeys, consider yourself warned!
From the Internet.

Pay to Listen to Old Art Bell Radio Shows

If you are a fan of Art Bell W6OBB's *Coast-to-Coast* AM radio program and you miss tuning in one night, it's going to cost you money to hear a repeat of the show on the World Wide Web. This, after Premiere Radio Networks announced that as of Monday, October 15, 2001, there would be a fee to access old shows.

According to the Premiere announcement, the longtime free audio streaming has disappeared and has been replaced with a new \$6.95-a-month subscription service called Art Bell's StreamLink. With StreamLink you can listen anytime you like to any Art Bell show from the last 30 days.

Not everyone is happy with the decision to charge, including Bell. According to a posting to his Web site, it was not his decision to change the free Internet access. Rather, it was a decision made by Premiere based on cost.

Bell says that there are now millions of people on the Internet, and bandwidth costs money — about \$1.5 million per year for all the Premiere shows. He says that Premiere hopes to break even. W6OBB says that he has been receiving many angry E-mails and that he understands the anger at having to pay for what was free. But he also understands that the company cannot continue to cover the ever growing cost.

Bell adds that there is at least one bright spot. Says W6OBB: "It is still free on the radio."

More information is on the Web at [www.artbell.com].

Thanks to the Art Bell Web site, via Newsline, Bill Pasternak WA6ITF, editor.

FCC Creates New Disaster Communications System

You may want to write your congressman on this one.

"This, in essence, is designed to remove third party relays — Amateur Radio operators" per Scott Verity KC2FBV in his letter to the editor of *World Radio*, October 2001. Scott goes on to

quote Part 97 Subpart A — General Provisions #97.1 (Basis and purpose), the FIRST item listed: "(a) Recognition and enhancement of the value of amateur service to the public as a voluntary noncommercial communications service, particularly with respect to providing emergency communications."

"To that end, RACES is provided for by FCC regulations (#97.407)," per Scott, and he goes on to say "The FCC, by creating and implementing this new 32-channel interservice communications system, will ELIMINATE Amateur Radio Service's PRIMARY reason for existence."

Scott discusses hobby versus service and comes to the answer: "A SERVICE is publicly viewed as VITAL and a hobby, in the public's eye, is seen JUST as a hobby. A hobby, in the public's eye, is done SOLELY for fun and is of no enduring value to society. Amateur radio is ... a service, that, to our advantage has a hobby side."

This new 32-channel system will be spending our tax dollars on operators, equipment, repair, maintenance, training, and perhaps facilities lease payments. The goal is year 2006, which should give the FCC to reallocate UHF TV channels 60 through 69 from broadcasters.

Mr. Verity suggests that the U.S. government openly endorse amateur radio, thus avoiding the outlay of tax money for training, equipment, personnel, facilities, etc. *We suggest that these channels be allocated to the amateur radio community specifically for such emergency communications.* (It is suspected that there would be video signals included in the new proposal.) There would be no waiting till the year 2006; radio amateurs are here now.

Scott encourages all citizens to get involved for no increase in taxes for these services. "I urge EVERY amateur — ESPECIALLY those involved in public service (NTS, ARES, RACES) — to write a letter urging your public officials to REJECT the new FCC decision and to affirm their support of amateur radio."

Which public officials would I suggest sending letters to?

Whether by mail or E-mail:

- Senators
- Representatives
- Governor
- FCC (FCC Chairman Michael K. Powell)
- President George W. Bush
- Vice President Dick Cheney

Take a moment to write each of the above. Ask them to REJECT the proposed 32-channel inter-service communication system and to fully support amateur radio instead."

(References: *World Radio*, October 2001, "Letters to the Editor," Scott Verity KC2FBV. *World Radio*, July 2001, "FM & Repeaters," Bill Pasternak WA6ITF.)

Thanks to Tuned Circuit, November 2001, a bulletin of *The L'Anse Creuse ARC*, via Newsline, Bill Pasternak WA6ITF, editor.

DARA Opens Nominations for Ham of the Year

The Dayton Amateur Radio Association has opened the nominating period for the 2002 Dayton Hamvention Awards. There are three awards presented each year. They are the Radio Amateur of the Year, Special Achievement, and Technical Excellence.

The Radio Amateur of the Year is described as the special person who has made a long-term commitment to the advancement of amateur radio. We are looking for a well-rounded individual who has contributed to our hobby in some outstanding way.

The Technical Excellence award is for the person who has made an outstanding technical advancement in the field of amateur radio, while the Special Achievement Award is reserved for the ham who has made an outstanding contribution to the advancement of amateur radio. This latter award is usually given to a respected amateur who spearheaded a single significant project.

All amateurs Novice through Extra are eligible. Awards are decided by the Awards Committee, based partially upon the information received. Magazine articles, newsletters, newspaper clippings, videos, and the like are appreciated but cannot be returned. The deadline for nominations is January 31, 2002. Nominations can be submitted by U.S. Mail to Post Office Box 964, Dayton, OH 45401, or by completing the convenient e-form on the Web at [www.hamvention.org].

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

FAR Scholarships

The Foundation for Amateur Radio, Inc., a nonprofit organization with headquarters in Washington DC, plans to administer 62 scholarships for the academic year 2002-2003 to assist licensed radio amateurs. The Foundation, composed of over 75 local area amateur radio clubs, fully funds seven of these scholarships with the income from grants and its annual hamfest. The remaining 55 are administered by the foundation without cost to the various donors.

Licensed radio amateurs may compete for these awards if they plan to pursue a full-time course of studies beyond high school and are enrolled in or have been accepted for enrollment at an accredited university, college, or technical school. The awards range from \$500 to \$2,500, with preference given in some cases to residents of specified geographical areas or the pursuit of certain study programs. Clubs, especially those in Delaware, Florida, Maryland, Ohio, Pennsylvania, Texas, Virginia and Wisconsin, are encouraged to announce these opportunities at their

meetings, in their club newsletters, during training classes, on their nets and on their World Wide Web home pages.

Additional information and an application form may be requested by letter or QSL card, post-marked prior to April 30, 2002, sent to: FAR Scholarships, PO Box 831, Riverdale MD 20738.

The Foundation for Amateur Radio, incorporated in the District of Columbia, is an exempt organization under Section 501(C)(3) of the Internal Revenue Code of 1954. It is devoted exclusively to promoting the interests of amateur radio and those scientific, literary, and educational pursuits that advance the purposes of the Amateur Radio Service.

Hell-o-o-o-o ...

Ham radio played a role in reuniting with his family a man who had been hiding in the jungles of Guatemala for over three decades. The *CQ Magazine* Web site reports that 72-year-old Salomon Vides of El Salvador emerged from the Guatemalan jungle recently after hiding there for 32 years from a war that lasted about 100 hours.

In 1969, El Salvador invaded Honduras and Vides, a migrant worker, ran into the jungle to escape retaliatory raids. The Organization of American States quickly brought the war to an end, but Vides says he never got the word. He was discovered in August by Rene Sonabo, a taxi driver and Guatemalan ham radio operator, and Sonabo's son. After persuading Vides that no one was trying to kill him, Sonabo used his amateur station to relay the news to Vides's stunned family in El Salvador. He has since been reunited with his brother, but the family had not been able to locate his wife and three children.

Thanks to CQ, via Newline, Bill Pasternak WA6ITF, editor.

Using Microwaves to Clean Exhausts

Radio waves could be the answer to solving one of the world's major environmental problems.

Industrial researchers from the Australia's Swinburne University of Technology in Melbourne have announced a new microwave system that can remove up to 90% of the carbon dioxide and carbon monoxide from automotive engine exhausts.

The microwave emissions converter is being touted as the most important breakthrough for reducing automotive exhaust gases since the development of the catalytic converter. The research team is now working on ways of transforming the carbon particles that are filtered and collected after ionization, and further processing them.

The researchers say that similar microwave deposition techniques are being used to transform carbon particles into artificial diamond powder, which could be used as a scratch- or wear-resistant coating on optical lenses, compact discs, and watches. It might also be used

for prolonging life of bioengineering materials, including prosthetic hip joints, orthopedic pins, and artificial heart valves and veins."

Thanks to Graham Kemp VK4BB and Q-News, via Newline, Bill Pasternak WA6ITF, editor.

Real Sky Hooks

The proposal for these sky hooks comes from ATG industries in southern England. It wants to build reflective airships and have them operate at a height of 65,000 feet.

These craft would be unmanned and use

solar-powered electric engines and a light-weight diesel engine. ATG claims that these "skyhook" ships could keep their position for up to 5 years, and that they could act as transponders for services such as mobile telephones, broadband Internet, and digital radio.

ATG estimates that 19 of these sky hook ships could cover most of the UK and replace as many as 4,000 mobile telephone poles and up to 10,000 towers that are expected to be needed for the new G-3 technology.

It's not known how long these sky hook ships

Continued on page 58

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LETTERS

From the Ham Shack

Jim Beeson WA5QAP, Shreveport LA.

I have worked many modes in my 35 years of amateur radio. I have seen some good things happen in amateur radio and some not so good things happen. That is why I am writing this note with mixed emotions.

One of my more favorable experiences was working Low Earth Orbit (LEO) satellites in the '90s. They were fun to work and did not require much equipment or expense. The only drawback was that the contacts were relatively short — 15 to 20 minutes — and I am more of a ragchewer than that. I never worked Mode B on Oscar 13 even though I wished I had many times. That is why, when I first heard about AO-40, I was very excited.

I read article after article on AO-40 and was definitely caught up in the excitement of what was to be the best amateur radio satellite ever, a new era of satellite. Toward the end of the '90s, I decided to bite the bullet and go all out for AO-40. I spent over \$2,000 on new equipment. Some included two new antennas (144 and 450 MHz), AZ/EL rotator, new coaxial cable and rotator wire, preamps, downconverters, satellite tracking software, antenna control board, and on and on and on.

Then I waited. Launch delay after launch delay. Months went by, and I wondered if AO-40 would ever fly. Then the day came. The excitement was felt all over the amateur community. And a perfect launch, too. Now, after a brief time for the ground controllers to commission the bird, I could start using my shiny new equipment.

Well, it was not meant to be. AO-40 was met almost immediately with problems. Some were unavoidable, but others were not. Human error played a huge hand in what I saw was goof-up after goof-up. AO-40 kept losing ground, and I was wondering at one point whether there would be anything left to work at all! Everything on the AMSAT Web site and preliminary articles indicated that while some systems were malfunctioning, we were still in good

shape. Terms like “we hope nothing else fails” and “it is rocket science” were two of my favorites. My gosh, I thought the people who were running this bird WERE rocket scientists!

I had put my faith, not to mention a lot of my hard-earned money, into an organization that did not seem up to the challenge. And all I saw, when tough questions were asked, were emotional, defensive answers. I have been in the engineering industry for a long time now, and some of this group would not have survived with this kind of track record.

And that's not the latest. The same group, with plans to build another bird with much the same capabilities as AO-40, is asking for donations. Is something wrong with this picture?! It has been my experience that unless upper management is changed, then engineering is done much the same way, systems get put together much the same way, etc.

I think that before we start sending in our money and support, a clear picture of what is proposed needs to be addressed. Where are we going? What did we learn from our mistakes on AO-40? How can we avoid them on this new bird? The same types of things that any responsible organization addresses.

With AO-40 now limping along with only one functional transmitter, I am hoping and praying that it will last a while until some of these issues can be sorted out.

Andy MacAllister W5ACM responds: Item A of the bylaws of AMSAT-NA directs the organization to develop and provide satellites, related equipment, and technology for amateur radio operators worldwide. AMSAT-NA achieves this end via many means, including internal projects and cooperative efforts with other organizations. Phase 3D (now AO-40) represents the most ambitious cooperative program to date. While it is true that three of the transmitters (V, U, and S1) appear to be inoperative, two others are currently in the operating schedule (S2 and K), while others are still being tested or waiting to be commissioned. The glass is not empty. In fact it is far better than half full!

Check out the status chart at [http://www.amsat-dl.org/journal/adlj-p3d.htm]. Yes, AMSAT-NA is soliciting support for new projects, this time to be directed and built here in North America. The organization

has learned a great deal from the experience of the Phase 3D program, but will continue to strive for cutting-edge endeavors. It is through ambitious undertakings that the imagination and drive for new horizons is cultivated in AMSAT volunteers, other partner groups, and educational institutions that wish to pursue their own efforts or join AMSAT-NA in theirs. Thanks for the input, Jim.

Arnold Samuels KH6COY, Ocean Shores WA. I am announcing the death of my very good friend Richard Foster K7AJT on October 11, 2001, at the age of 77. Dick was born October 8, 1924, at Toledo OH. He married Catherine Garbe on June 30, 1951. She survives at the family home in Aberdeen WA.

Dick was blind for many years and became a self-employed piano tuner in 1956. He retired in 1980. He was a four-term president of the Grays Harbor ARC, and was also a member of the Northwest District Quarter Century Amateur Radio organization. He helped deliver Meals on Wheels in Aberdeen. Dick was a great fan of the Mariners. He helped many hams in his earlier years, and we will miss this very active and helpful man.

George Vickery KB4OQU, Davidson NC. I have an idea to help improve the sales of amateur radio equipment. Why don't the manufacturers lease radios just like car companies lease cars? I have leased autos and I have leased test equipment for a commercial radio repair business. What's in it for the average ham? Why, you can use a top-of-the-line radio with little of your cash in it. You don't worry about the maintenance, it's not yours. When the time is up for the lease, you can buy it at an already-agreed-to price. Maybe pick up a new one, or walk away, it's up to you.

This would give us a large number of good used radios in the marketplace. I think most people are more into operating than building. Maybe we would get more people on the air and support our bands. If you are willing to spend \$50 to \$70 for cable TV and \$21.95 for an Internet connection, then why not \$30 to \$40 a month for a new radio? It's a lot more fun than watching some dumb sitcom.

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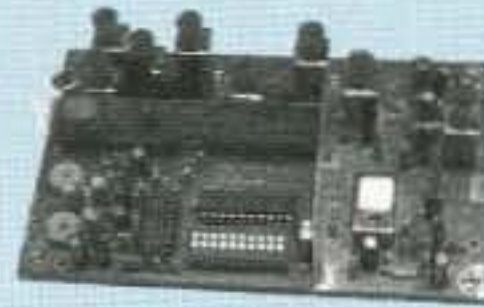
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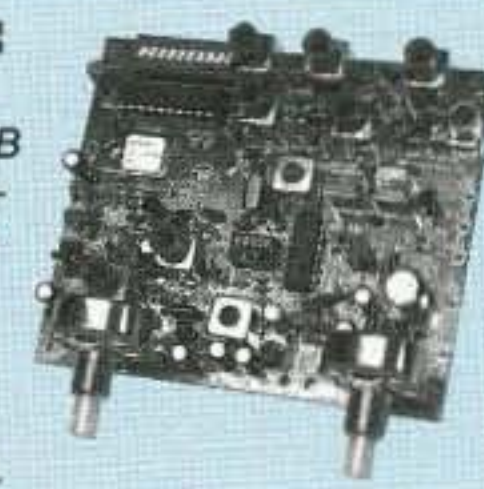
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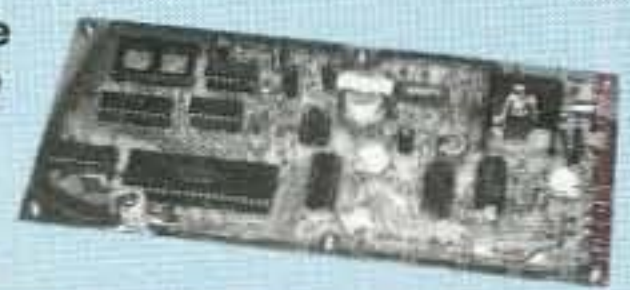
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If you ever need to put an FM amateur repeater on the air, the 1972 ARRL book FM and Repeaters for the Radio Amateur has some clear advice: "Ideally, and in keeping with the true amateur spirit, the repeater operator or club technical committee would build the complete system from scratch."

In the case of our 23cm (1.2 GHz) band, that is currently your only choice. The one factory-built repeater, the Icom IC-RP1220, has been discontinued for some time. This model, and an older one, the Icom RP1210, may show up occasionally secondhand. I was concerned about the older one, as it defaults to the obsolete 20 MHz split and operates in the wrong part of the band. When I brought home my quad-band Icom T81-AT handheld almost two years

ago, there were no voice repeaters for this band in my area, and only a few other hams nearby with equipment for it.

Reuben Reun WBØBWL lived eight miles away and had a 1.2 GHz mobile rig. We tried to set up a point-to-point link, but had poor results, even with a 16-element beam at my end. I called around to some of the microwave equipment suppliers like Down East Microwave and SSB Electronics. They did not at the time (1999) sell any amplifiers that could be used with an HT,

as you needed a microwave-rated transmit/receive switch for this application. One of the companies did suggest you could build a repeater using their transverters added to the inputs and outputs of a 2-meter repeater.

Our local VHF/UHF club, The Northern Lights Radio Society, runs a mini-hamfest every year called Aurora. There I found a kit-built 1.2 GHz transverter based on the Rick Campbell KK7B series of designs. The unit came in a cardboard box including 1.2 GHz 3-watt and 10-watt amplifier modules and a 900 MHz 3-watt amp all for a hundred bucks. The seller said the receive section was broken.

The transverters multiply a local oscillator (LO) signal, and use mixers and or bandpass filters with an incoming or outgoing 1.2 GHz or 144 MHz signal to down- or upconvert. I found the calculator under some stuff on my workbench and learned to figure out my incoming and outgoing signals less the LO. A Radio Shack 1.2 GHz-rated frequency counter (on closeout for \$79) was going to be my test bench. I found out my LO was running, and attached my trusty 2-meter Icom u2AT (the other part of my test bench) to the input. I hooked up an HF dummy load

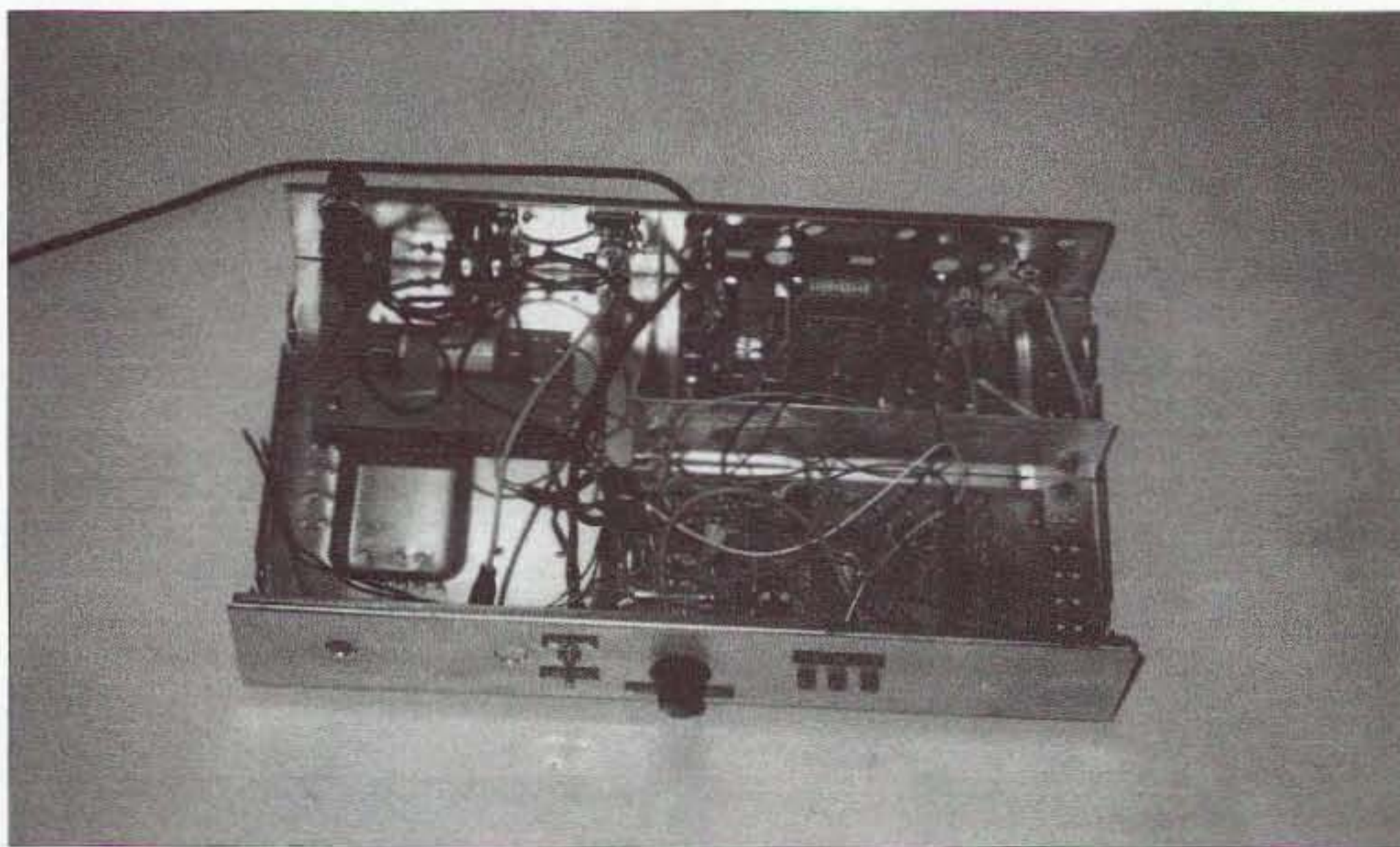


Photo A. Top view of the repeater.

and sat the T81AT nearby. I set the u2AT at 144, and the T81AT to receive at 1291 and pushed the PTT. Success! I was on the air on 1.2 GHz with the transverter.

I now had two problems — how to build a repeater with this setup, and how to get myself down to the proper repeater subband. Our local frequency coordinator, Paul Emeott KØLAV, took an interest in my project. I went over to his place, and he loaded the back of my pickup truck with all kinds of “microwave-type” stuff he had accumulated. This included parts from an old commercial microwave link system, and some TVRO satellite receivers. He also handed me a coordination packet and the ARRL-approved band plan — I needed to be at around 1285 MHz on my output, and -12 MHz down the input.

I called Down East Microwave, who agreed that I needed a new LO crystal to move the transverter frequency downward. The idea is to adjust the 2m output frequency (I’ll call that the IF from now on) to stay in the normal tuning range of 2m equipment. I did not want to be working with several watts of RF on the aircraft band, even between modules.

Now I need to build a 2m repeater. I thought about using one of my 1.2 GHz HTs as the receiver, and my transverter coupled to another 2m HT as the transmitter. I would also need a controller and IDer module to stay within the rules.

Hamtronics has a line of low-cost controllers and other parts. I selected their COR-4 controller kit. It was simple to build, and didn’t work. I replaced the CMOS chips one at a time with spares from my collection. One of the 4020B chips was no good. I was using an ungrounded soldering iron at the time, and may have zapped the chip accidentally. The controller sprang to life and beeped out my call over the speaker. Now I needed to interface my HT as a receiver. For that I would need to come up with carrier-operated squelch, which did not appear on the radio anywhere. The transmitter was easy — just add audio and PTT. There were many schematics for interfacing PTT to the HT in the packet radio literature.

My extensive QST and 73 files revealed a sample squelch board, and there was another one in the RSGB VHF Handbook. Neither one worked very well for my application, despite many hours of wiring and testing. I added the largest reed relay I could find in my parts stock to switch on the transmitter(s), as the built-in transistor in the controller was rated at only an amp or so. In trying to interface the HT to the PTT line, I got some 12V into the speaker mic jack and burned out the audio section on my u2AT.

At this point I called Hamtronics again. They had a nice synthesized 2m receiver with COR kit, the R301-2Y. Other than one slightly tricky surface mount IC on the bottom of the board, this one went together rapidly and worked the first time. The directions called for an RF signal generator for alignment of the many slug-tuned coils. Back to Reuben again — he got a Wavetec 3000 series RF signal generator on loan from Don Rice NØBVE, who also had a 1.2 GHz mobile rig.

I would need another transverter for receive. I ordered a receive-only model from Down East. The one I got at the hamfest was by this point driving me crazy — the LO was intermittent, and did not seem too happy with the new crystal. I kept noticing that some of the coils on my unit did not match the documentation for the board in the ARRL *Microwave Projects* book. I also got a \$99 1.2 GHz SWR bridge and wattmeter from Radio City, a Comet CM-120. Of the two amplifier kits I got, the 3-watt unit seemed OK, but the 10-watt model was baffling. I could not get more than 3 watts out of it. I studied the data sheets on the Mitsubishi modules used in the amplifiers, which are fairly simple devices to wire, but you have to be careful to ensure the resulting amplifier is stable. My Icom T81AT served as test signal generator for much of this project.

I ordered a Hamtronics factory-built 2m transmitter (T301-2T) as well. For only a little more than the kit you get a free crystal oven. Reuben kept telling me to be careful of frequency stability, since we were multiplying the crystal so many times. I also ordered a 20 dB

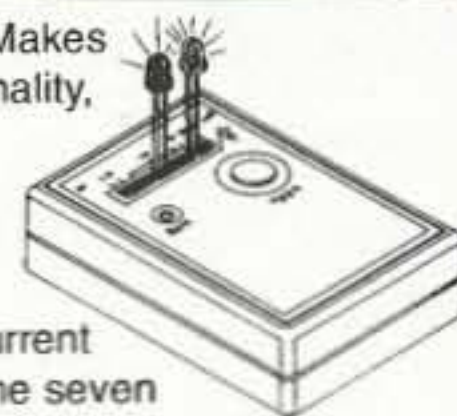
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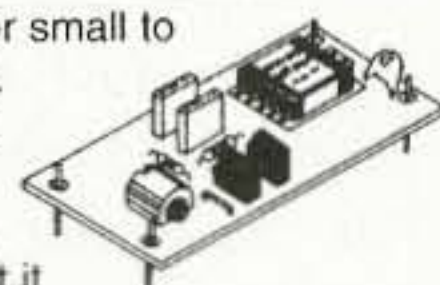


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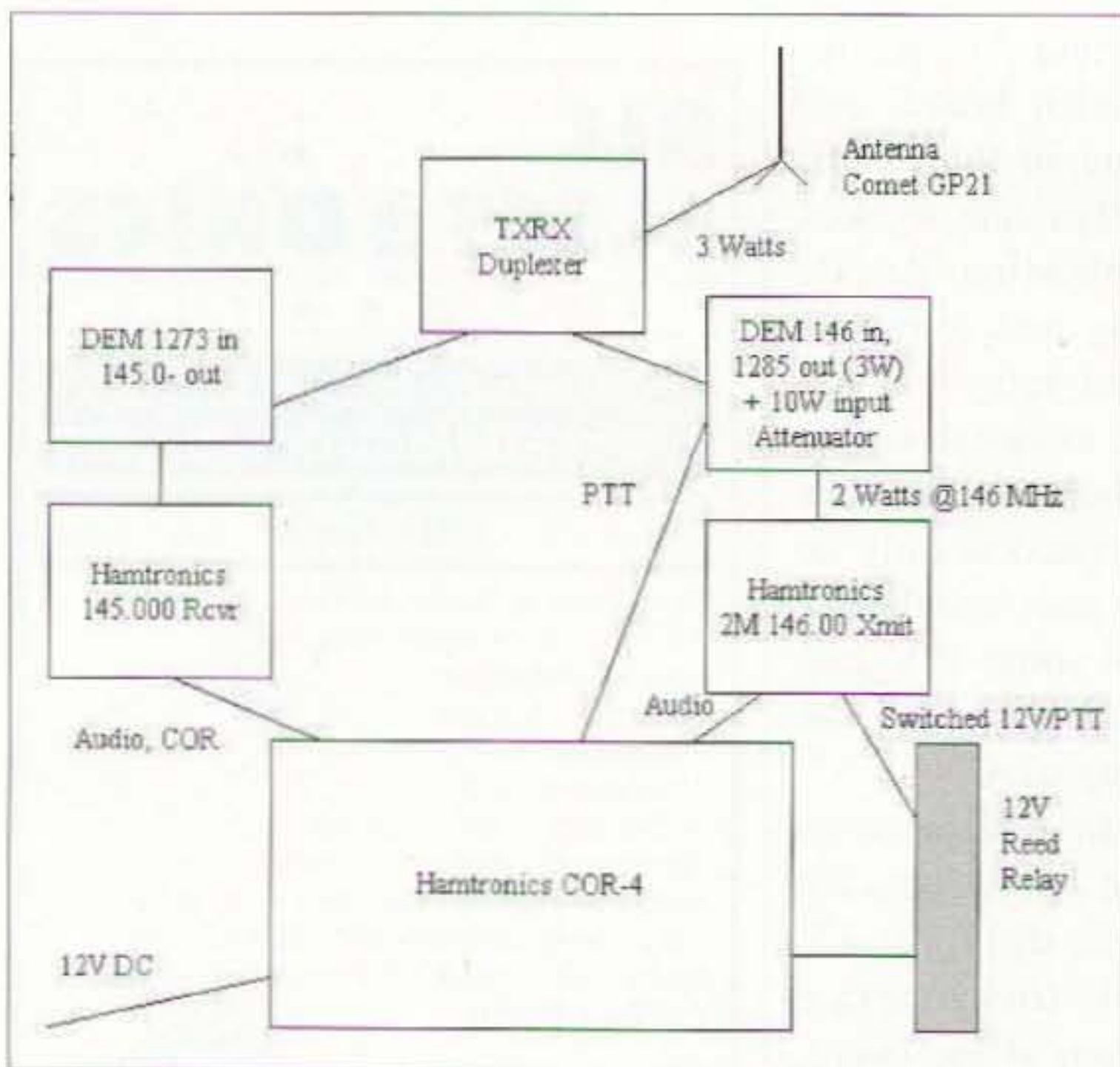


Fig. 1. NY9D 1285 MHz repeater block diagram.

attenuator from RF Parts, as well as a microwave-rated dummy load. The hamfest transverter was rated for a low-level (milliwatt) input, and the Hamtronics 2m transmitter could not be easily adjusted below 2 watts.

Soon the parts were in, and everything was wired together. I put the whole system in one of the TVRO cabinets I got from Paul. I put a metal shield in between the controller and 2m receiver and transmitter. In retrospect, I should have used separate cabinets, or a high-grade

more LMR-400 cable for my single chimney-mount. I also started buying some 1.2 GHz radios on eBay. I found a mobile rig, an Icom IC1200, and a couple of Icom IC12AT HTs. Prices on mobiles (even older 1 watt units) for this band seldom got far below the price of a new radio.

The moment of truth soon arrived. I turned on the DC power, and my callsign beeped out of the T81HT set to receive on 1285 MHz. (I tried to never hardwire any RF outputs to my HTs or frequency counters, but used

repeater-type cabinet with highly shielded compartments.

By this time there was no turning back. I checked the ARRL repeater directory for ads for duplexers. I called TX/RX Systems, and they said right away that I was entitled to a 20% discount as an amateur station. I have the model 28-97-01A. I also got Radio City to order a three-band Comet GP-98 antenna and some

NØBVE came booming in from 20 miles away, full-scale to my lousy site from his powerful antenna complex. I talked to him for a bit. The machine otherwise did not have good range at all. I took the transverters apart, replaced the RCA power jacks with feedthrough caps sold by Down East, and put ferrite beads and bypass caps on the power leads. (The transverters are not designed for repeater use, which requires lots of shielding and bypassing.)

Now the range was better. I checked the output power — 3 watts all the time into the duplexer, and hardly anything out from the duplexer. I think I had an oscillation someplace.

I ordered a factory-built transmit-only transverter (146 = 1285) from Down East. I took care to keep my "IF" frequencies 1 MHz apart. I added the optional high power (10W) input attenuator as well. This time, I got three watts into the duplexer and three watts out of the duplexer, and a range of over three miles from my 22-foot chimney-mount antenna. I think my old kit-built transmit transverter was definitely an issue here. I also moved the 2m receiver out of the controller/transmitter cabinet, and gave it its own box.

One constant theme of the discussions with local repeater experts was that we would need a rooftop site for this machine. Any significant coax or even hardline runs would lead to excessive signal attenuation on this band. A lucky contact with Ed Jacobson WBØVHF from the 3M Amateur Radio Club led to a meeting. Ed was enthusiastic about VHF and microwave work, and stopped by one day to examine the machine and take some notes.

Ed brought the idea of taking over my system before the club board. They went for it, and were happy with my agreement to basically give them the system, with the caveat that I would get it back if they ever got tired of it. I joined the club as an associate member, ordered up a new ID chip with the club call, and a Comet GP-21 1.2 GHz repeater antenna. Ed called back some time later and said they had 40 feet of spare 1/2-inch Andrew hardline at the

rubber duck antennas placed nearby.) All sorts of nasty static and feedback came out as well. I consulted Reuben, who said desense was my enemy from here on out. "Get some double-shielded coax jumpers," he said. Those came from Cable X-PERTs. I walked around the block, and could reach the system. Reuben could not hear the machine from his location.

The first night,

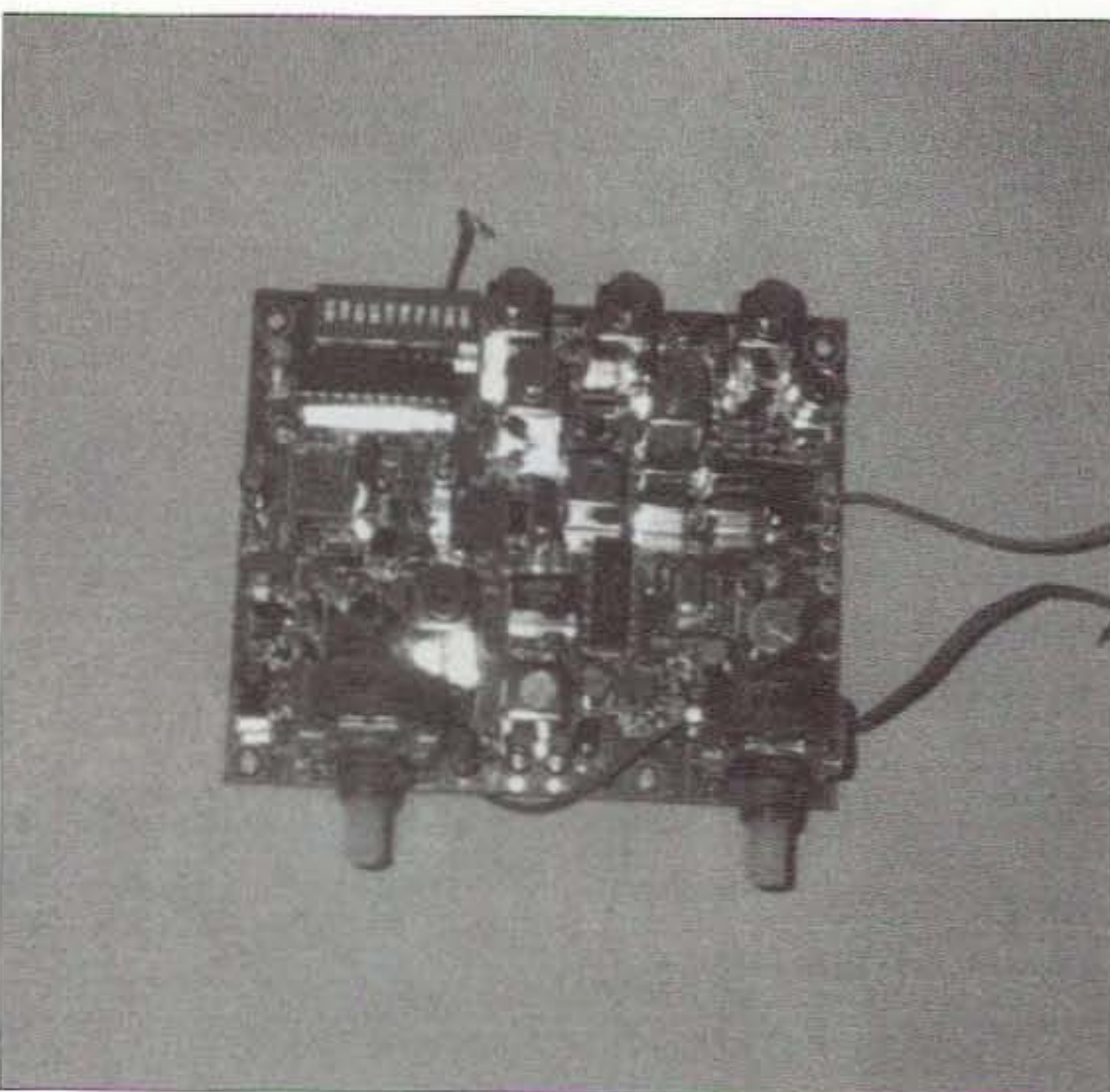


Photo B. A Hamtronics 2m receiver with COR.

Transverter Math Summary

For the KK7B (separate LO board) transverters, you can correlate your LO crystals to the desired input or output frequencies according to the formulas below. The newer Down East (single board including LO) transverters use a different LO crystal frequency range. I believe your 2m IF should remain in the 2m amateur band, since you may be dealing with several watts of power.

Stock: 96.000 MHz crystal. Multiply by 6 in the LO to get 576 MHz. Then multiply by 2 in the transverters to get 1152 MHz. Add 144 MHz to get 1296 MHz. This is where a lot of the weak signal work is. Remember the transverters are simplex.

Repeater use: For work in the 1.2 GHz repeater subband, to maintain a 2-meter "IF" you need new crystals. For receive at 1273 (1285 - 12 MHz), you need 94.0833 MHz. For the transmitter on 1285.000, you need a 94.875 MHz LO crystal. Down East can order these for you. Make sure your transmit and receive "IFs" are 1 MHz or more apart, or you will likely have trouble in your repeater.

A frequency counter can let you figure out if your LO is working, and you can see the various frequencies at work in your system by poking around inside the transverter with a rubber duck antenna on the counter.

site and an available antenna mount. I led the "transmit inhibit" lines from my controller out to a rear jack for connection to the club's system controller.

We found hardline N connectors at another hamfest, and Ed replaced the PL-259s with those on the existing feedline at our new site. Soon we were on the air. I looked around nervously at the other commercial repeaters sharing the site — no lights seemed to blink when I keyed up and gave my callsign. So far, so good.

Back on the ground, we were able to reach the machine from my T81AT on a Comet 3-band mobile antenna on my

Continued on page 14

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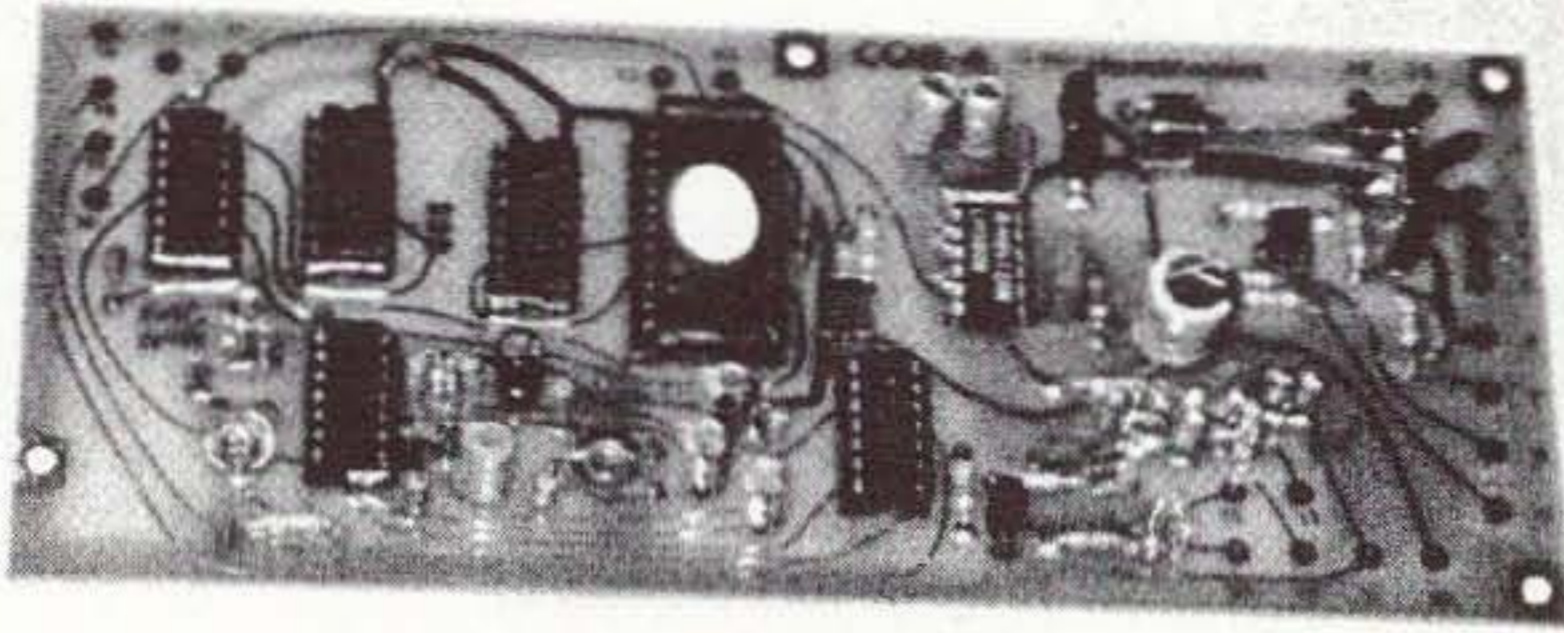


Photo C. The Hamtronics COR-4 repeater controller.

Build a 1.2 GHz FM Repeater continued from page 13

trunk well past the 20-mile mark on the way to a Wisconsin hamfest. Reuben said he was surprised and delighted at the coverage. The machine, with about 12 watts of ERP between the antenna gain and a little feedline loss, seem to be about even in terms of transmit and receive sensitivity and coverage. I put the parts from my hamfest Down East 3 watt in, 17 watt out amplifier into a proper cabinet, and may experiment with that. This amplifier can be connected between the existing transmitter and duplexer 1285 MHz input connector and would not need a T/R relay or switch.

I asked around about in-line coax lightning suppressors. The club did not use them, but every commercial machine on the site did. Others consulted on the topic said not to bother.

After returning from a business trip a week later, I jumped in the car and

keyed up the machine. Nothing was heard, all the way home. My wife said there had been a "ton" of lighting that day. All I could think of was the pile of credit card receipts that led us here and how many more would be needed for the lighting damage. I called Ed on his cell phone — we've got to get to the site.

The next morning Ed called me back — he said the machine seemed fine, and then he turned down the squelch — there was our ID. The one problem I was sure was fixed was back. I asked him to power cycle the receiver module — it was back on the air. The receive converter LO was not locking up again. We are down from the normal LO crystal frequency by almost 2 MHz, and the local oscillator should probably be adjusted a bit. Down East suggests tweaking the 8 turn LO choke.

After all this, we are still learning about this interesting band. We have some bragging rights in town, not only

that we have the highest-frequency amateur voice repeater in three states, but that we built it ourselves. We have a very minor problem still with some RF feedback, but if I can upgrade some of the rat's-nest of jumpers and adapters in between modules, that should settle down.

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SSB Electronics, 124 Cherrywood Drive, Mountaintop PA 18707. (570) 868-5643. [<http://www.ssbusa.com>].

TX/RX Systems, 8625 Industrial Parkway, Angola NY 14006. (716) 549-4700. [<http://www.txrx.com>].

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A standard analog multimeter scale, say 0 to 250 volts, is neither easy to read nor particularly accurate. Hence, I decided to create an expanded-scale AC voltmeter, reading between 110 volts and 135 volts. This idea isn't original — a vacuum tube version was available from RCA in the 1950s — but it's still a nice addition to the shack.

Theory of operation

The principle behind an expanded-

scale voltmeter is simple — by floating one end of a voltmeter with a precision voltage reference, we can increase resolution and accuracy.

Suppose we want to measure the voltage of a battery that we know is somewhere between 5 and 6 volts DC. The simplest method, of course, is to set your voltmeter to the 0 to 10-volt scale and connect it across the battery terminals.

If you have a typical analog multimeter, you will have an accuracy of about 2% of full scale, in this case 0.2 volts. If

the "true" battery voltage is 5.5 volts, your meter could read anywhere between 5.3 and 5.7 volts and still be within its rated accuracy.

Suppose that you also have an accurate 5.000-volt power supply. By using it as a reference and reading the difference between the voltage standard and the unknown, you can use a lower voltmeter scale and significantly improve measurement accuracy.

In this case, you can use the 0 to 1-volt scale on the voltmeter, as the voltage reference "cancels out" 5.000 volts

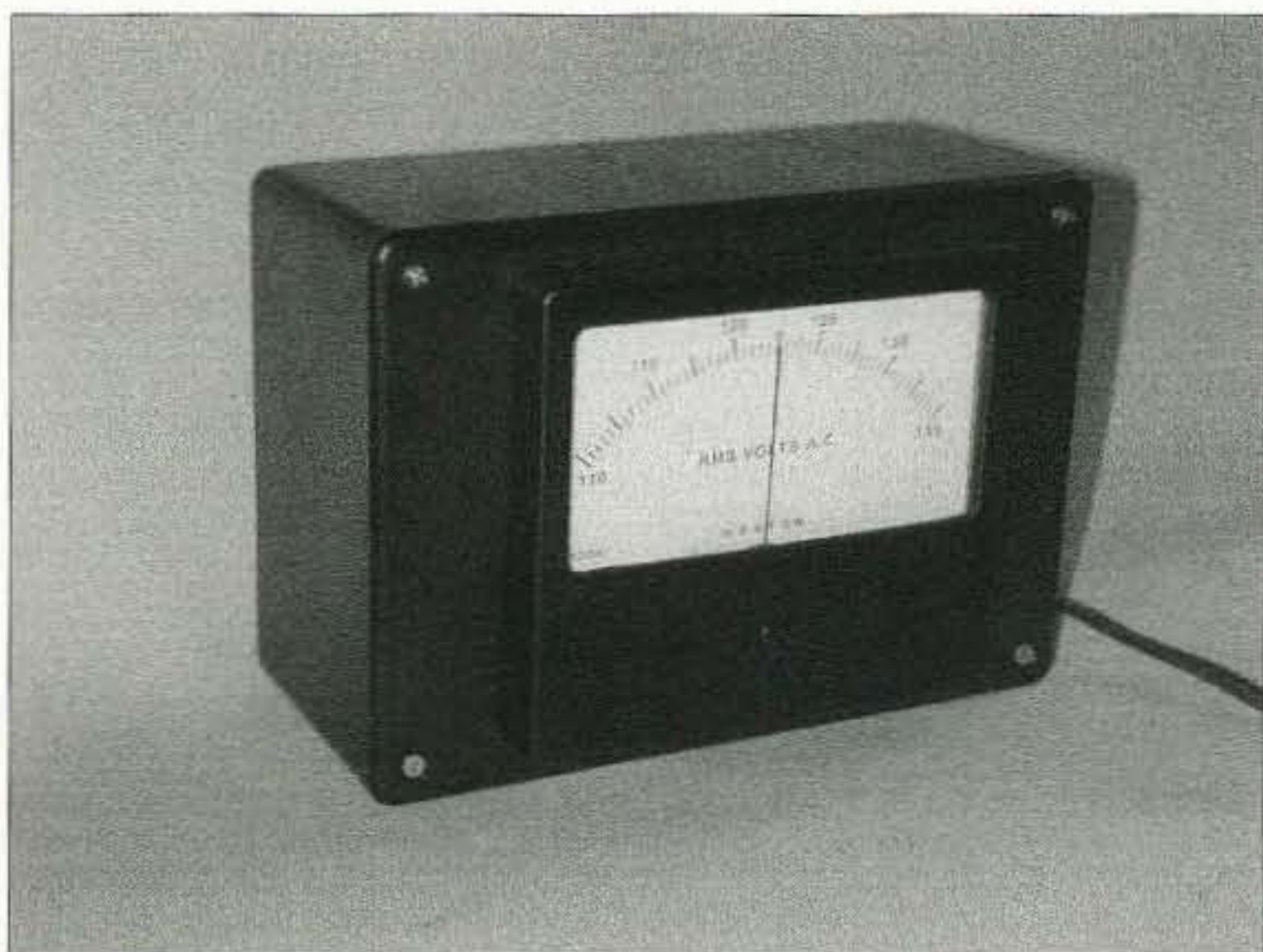


Photo A. The completed unit.

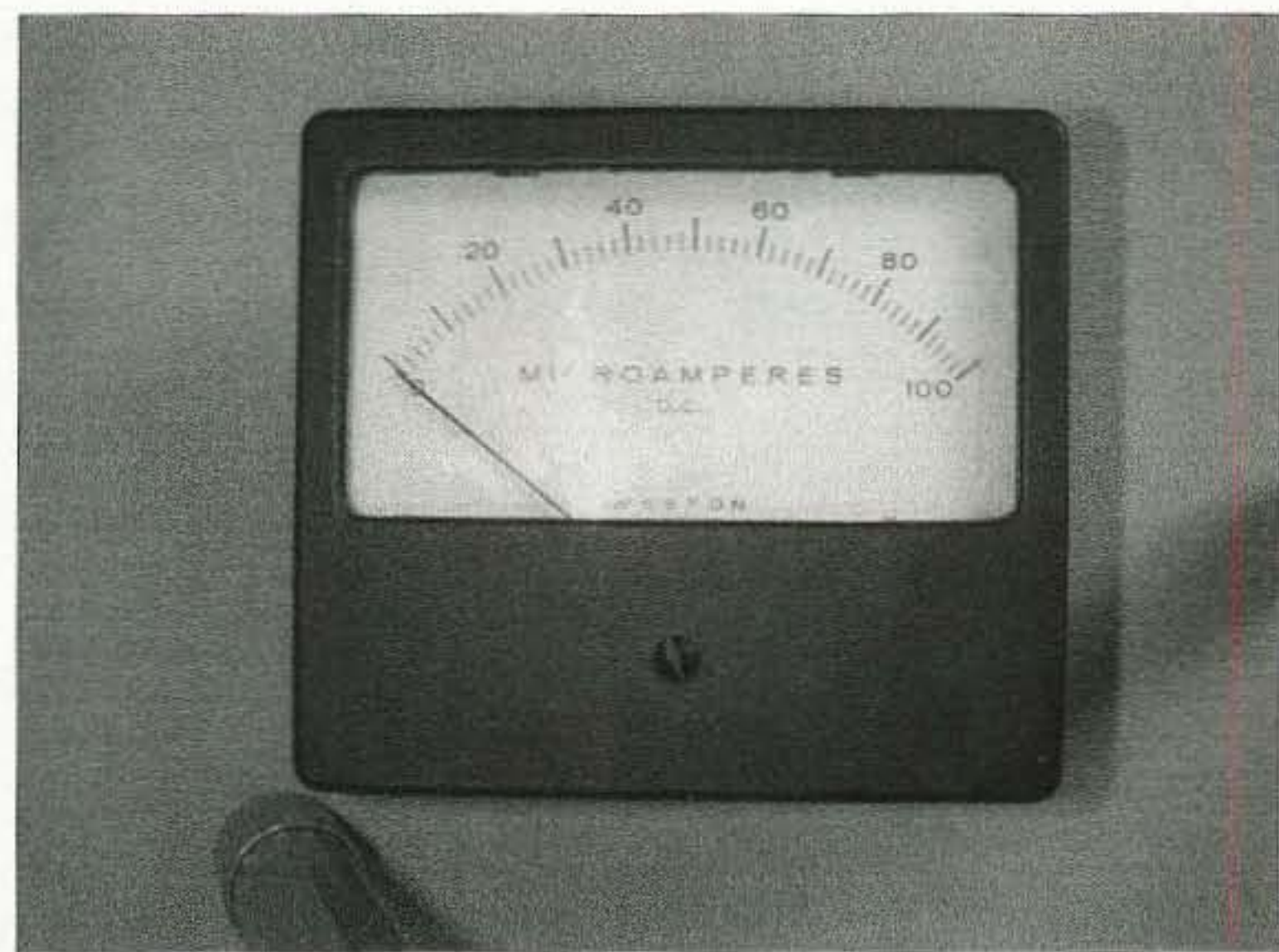


Photo B. I started with a Weston 0-100 μ A meter.

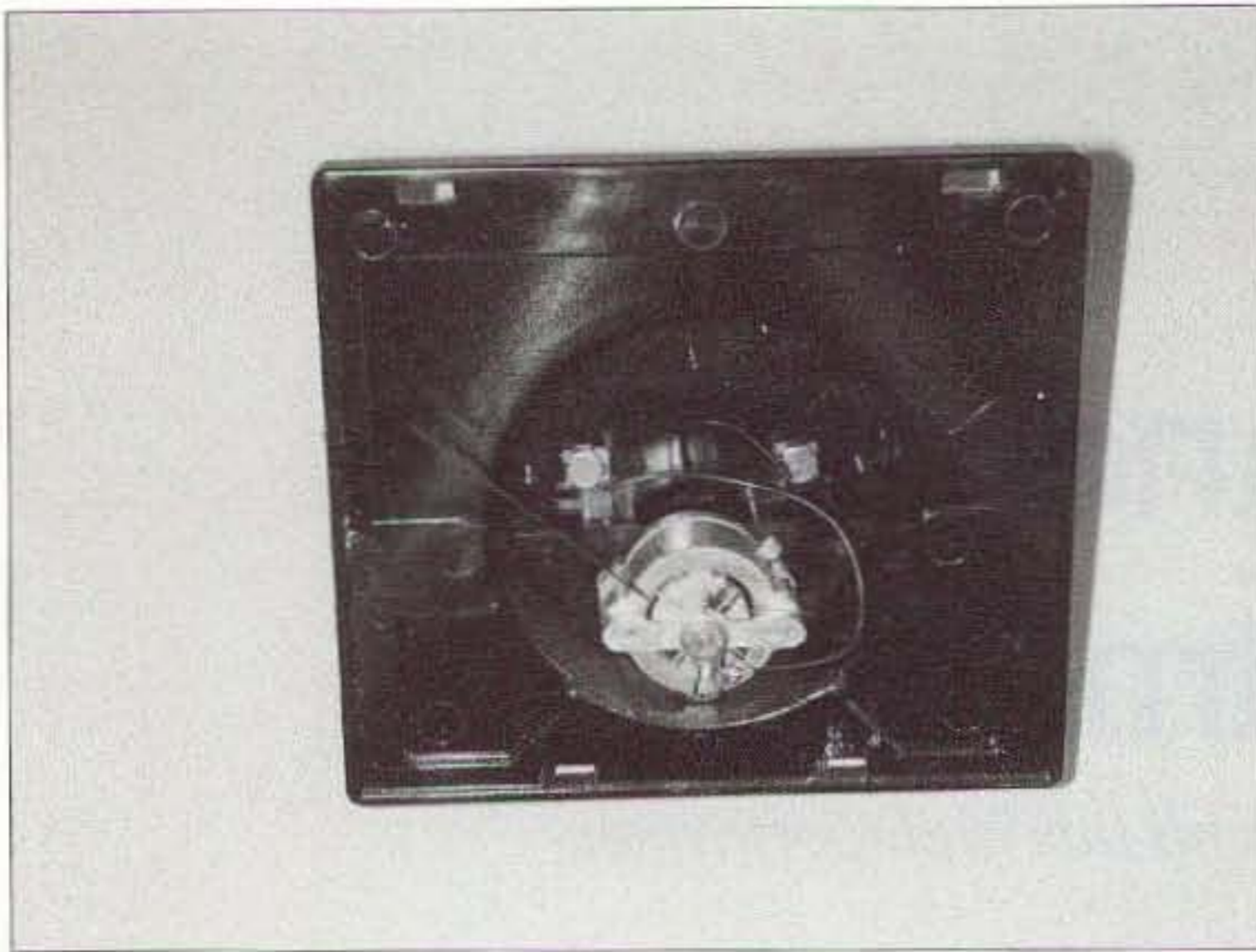


Photo C. View after disassembling meter case and removing scale plate.

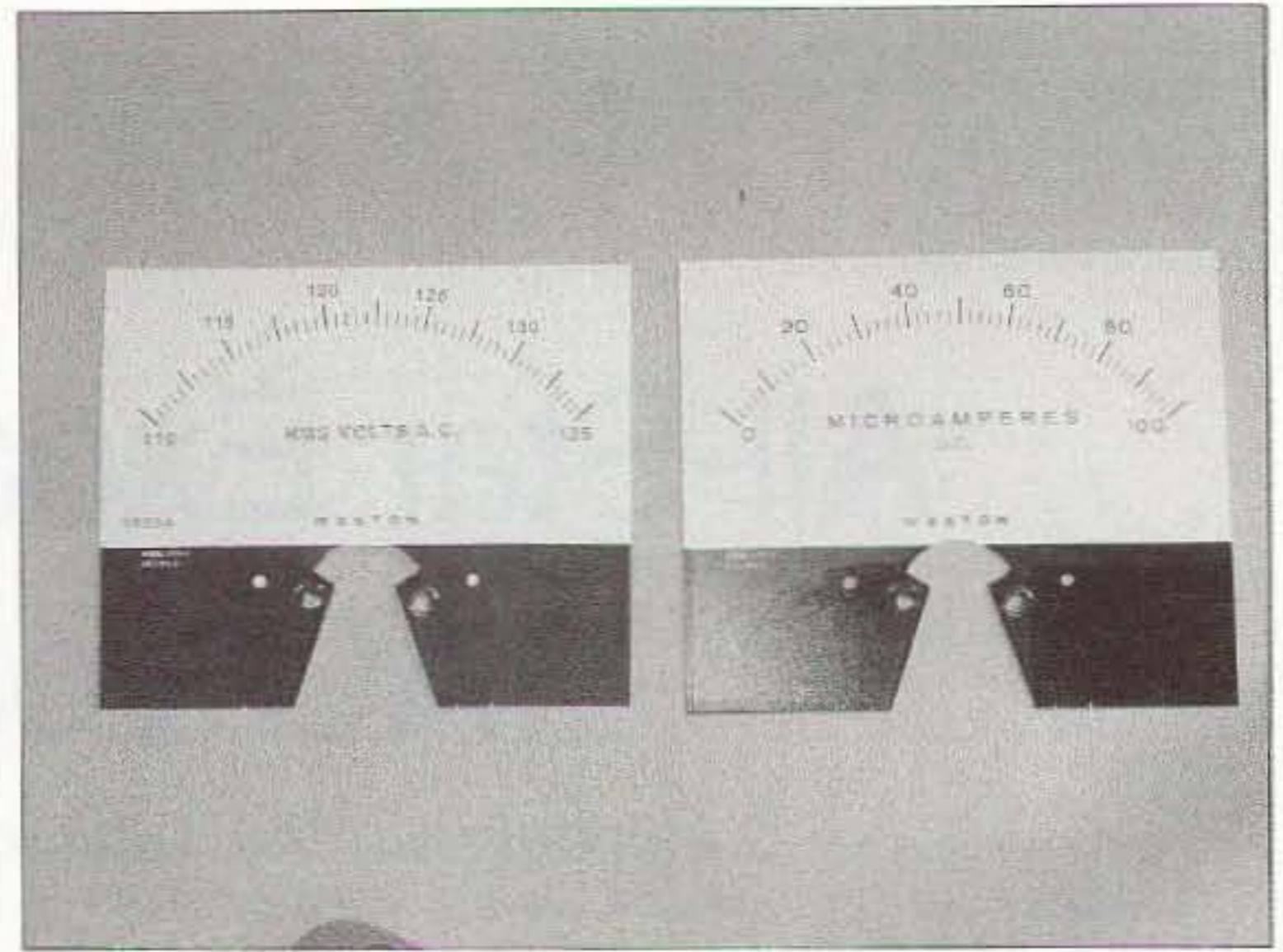


Photo D. The original and new paper scales.

of the unknown voltage. Using the same 2% voltmeter as before, the error is now only 0.02 volts (2% of the 1-volt full scale). A perfect voltmeter would read 0.50 volts, to which must be added the reference voltage. The limits of accuracy are now 5.48 and 5.52 volts, an order of magnitude improvement in error from the simple measurement technique. The voltmeter scale has, in effect, been recalibrated to read 5.00 to 6.00 volts, with an accuracy not 2% of full scale, but 2% of the difference between the maximum and minimum limits of the meter. This is the principle behind the expanded scale voltmeter.

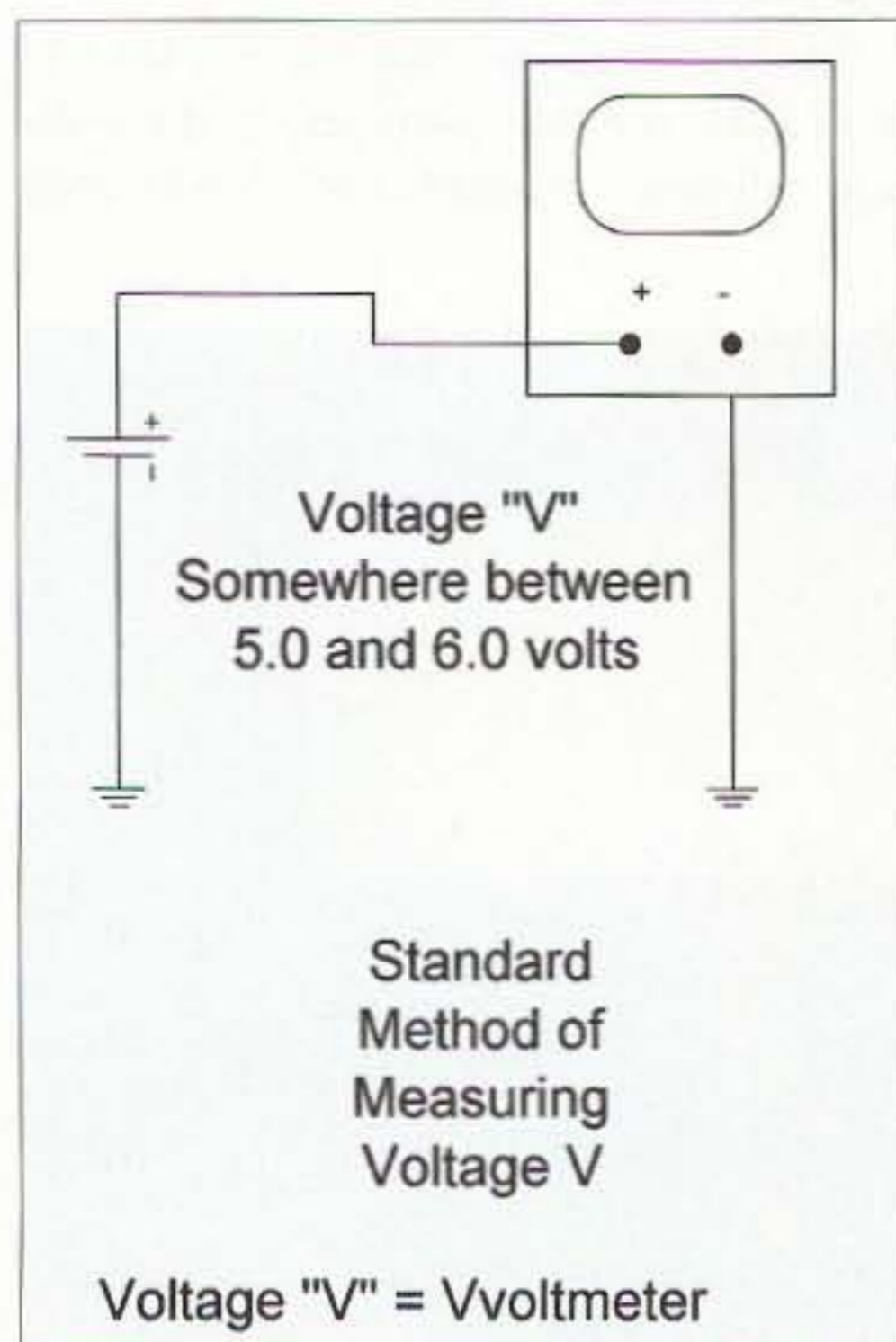


Fig. 1. Voltmeter on 0-10-volt scale.

Of course, this assumes that the reference voltage is accurate, as its error budget must be added to the voltmeter error. We'll take care of that in calibrating the overall instrument.

To extend this concept to an expanded scale AC voltmeter reading, we just need one more step; a rectifier to convert the AC voltage to DC.

Circuit description

Since this is a junk box project, the circuit description will concentrate on concepts so that the builder can adjust important parameters to match the available components.

The left-hand portion of the circuit produces a stable DC reference voltage of about 5.1 volts. The right-hand portion of the circuit produces a DC voltage proportional to the AC line voltage. The meter and series adjustment resistors (R2 and R3) measure the difference between the DC reference and the DC proportional voltage.

Reference voltage source

T1 is a small low-voltage transformer. I used a Stancor SW210, rated at 5-0-5 volts at 110 mA. The two secondary windings are connected in series to yield 10 VAC and feed a full-wave bridge rectifier, U1. The bridge I used is rated at 1 A, 400 V, but anything over 100 volts should be satisfactory. The objective is to produce around 15 to 20 volts to feed the reference subcircuit (Q1, R1, and D1) when the line voltage is at the lower limit

you have selected for the meter. This circuit only draws a few milliamperes, so you may see much more output voltage than expected, based only on the transformer rating. For example, my SW210 transformer should result in around 13 VDC, but in fact at only 100 volts line voltage, I measured 17.4 volts. Small transformers have significant series resistance and the output voltage will soar under light loading.

As a safety measure, both the primary and secondary of T1 are fused.

A transformer with a 12.6-volt secondary should work fine without any other changes in the circuit. If you have a 6.3-volt transformer, use a voltage doubler.

Q1 and R1 form a constant-current source, with the current set by the value of R1. Current flowing through R1 biases the gate of Q1 negative. Any change in current causes an offsetting change in Q1's bias thereby restoring the original current. I used an MPF102, but most N-channel JFETs should work in this circuit.

This simple circuit is quite effective, with a 50% increase in drain voltage causing less than a 2% change in current.

D1 is a 1N751A 5.1-volt zener diode. By feeding the zener through a constant-current source, instead of a simple resistor, we can further stabilize the reference voltage. I selected a 5.1-volt zener as the reference because zener diodes in this voltage range exhibit the lowest voltage change with temperature.

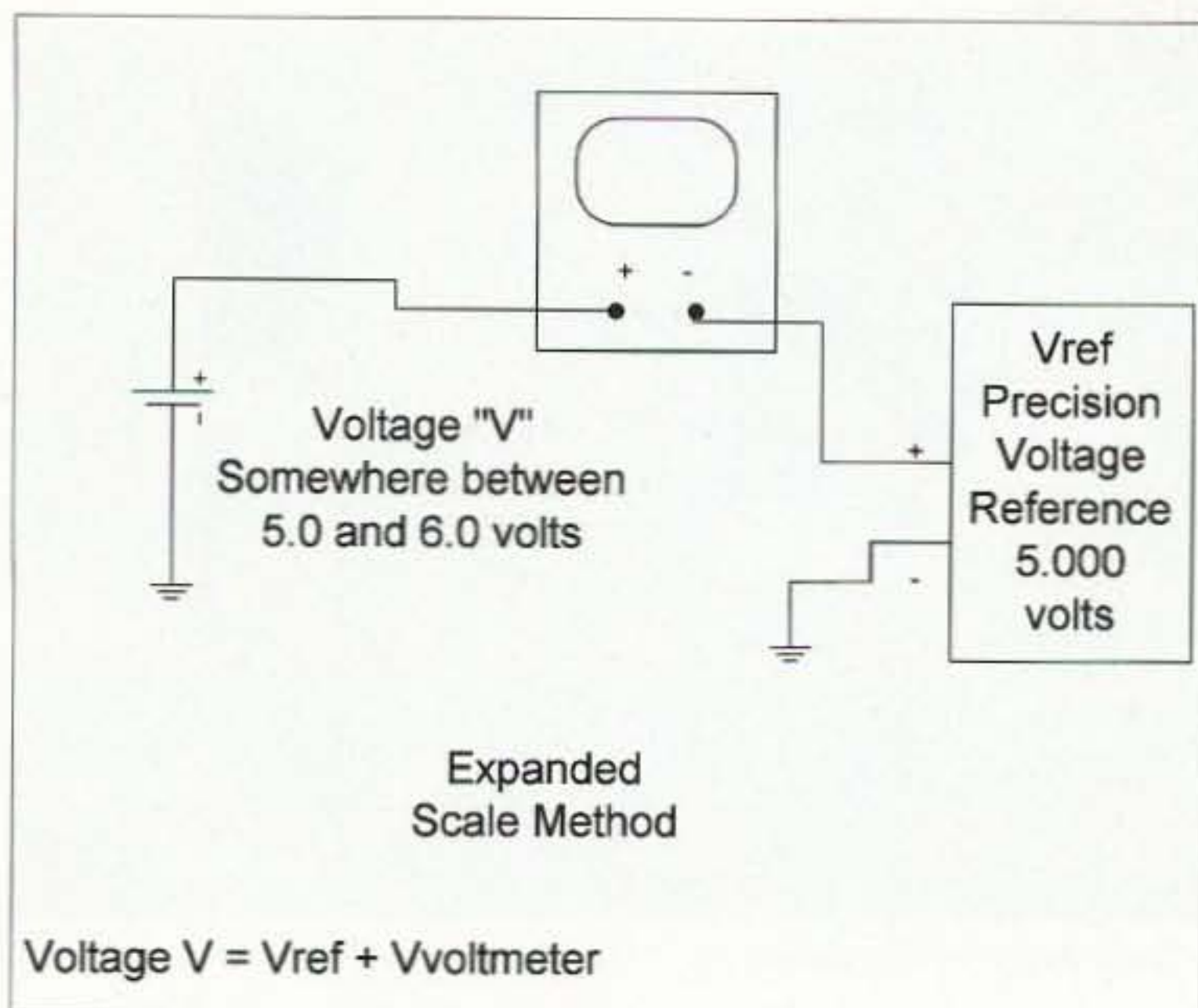


Fig. 2. Expanded-scale method.

An added refinement is to set the current through D1 to a value that minimizes changes in zener voltage with temperature. For the 1N751A, 5 mA produces essentially zero voltage change over the temperature range -25°C to $+125^{\circ}\text{C}$.

Due to unit-to-unit variation in FET characteristics, it is necessary to select R1 to produce 5 mA through D1. Start with 270 ohms for R1 and measure the current. (You can just measure the voltage across R1 and calculate the current with Ohm's law — divide the voltage across R1 by its value in Ohms.) If the current is below 5 mA decrease R1, or increase it if the current is above 5 mA. A zener current between 4 and 5 mA will be fine. You could, of course, use a 1k pot and adjust it to produce 5.0 mA, but since this is a "select once and forget" adjustment, hand selection of an appropriate R1 works just as well.

If you don't want to use the constant-current zener approach, a 78L05 low-power 5-volt reference can be substituted. However, a 78L05 has a typical line regulation of 10 mV, or about 0.2%. This is not as good as I measured for my circuit, but provides reasonable results.

The combination of constant-current source and zener yields a remarkably stable voltage reference. Varying the AC input voltage from 100 volts to 135 volts only shifts the zener voltage 500 microvolts, representing a 0.01% shift in the 5.1-volt reference.

Proportional DC voltage

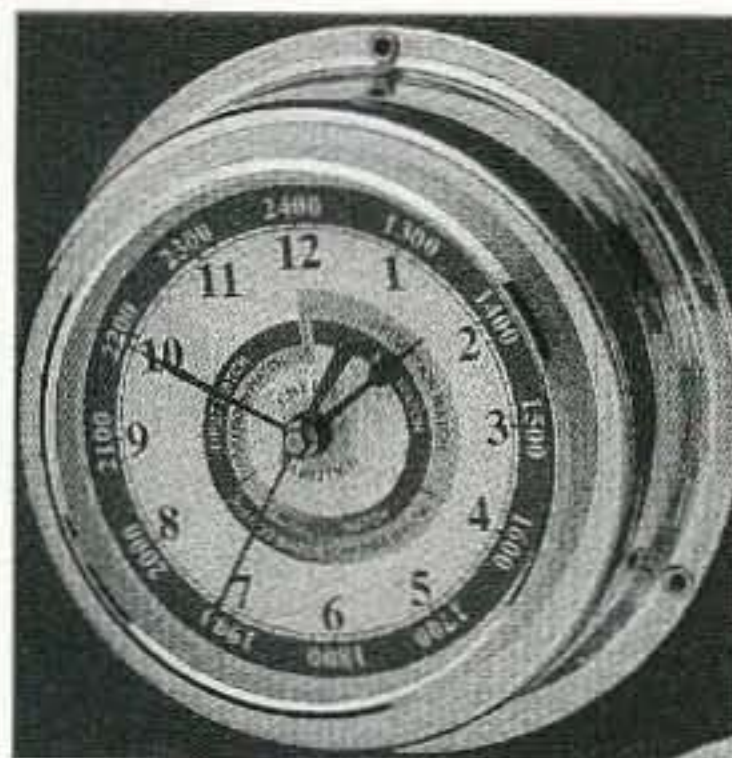
R5, R6, and R7 form a voltage divider, fed from the input line voltage. A variable sample of the line voltage is rectified by D4 and partially filtered by C2.

The component values shown in the schematic will work for a meter sensitivity between $50\ \mu\text{A}$ and $500\ \mu\text{A}$. If your meter requires 1 mA or more current, it may be necessary to reduce R5 and R7 proportionally.

R5 dissipates about 0.5 watts at maximum line voltage and hence should be rated at 2 watts or more. Since the value of R5 directly affects the sample voltage, it should be a metal film resistor for good temperature stability. R7 should also be stable, but since R5 swamps its effect on accuracy, a standard carbon film resistor is acceptable.

C2 and R4 are selected to provide some filtering of the rectified sample voltage, but not complete filtering. About 1.5 volts p-p of ripple can be measured across C2. The reason C2 is intentionally small is to permit the meter to react to short fluctuations in line voltage. If you have an under damped meter and can see the pointer responding to the term ripple, increase C2.

R6 is used to adjust the meter to zero at the minimum desired voltage reading. With a $100\ \mu\text{A}$ meter, the values shown permit setting the meter zero between 90 volts and 125 volts.



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In building the expanded scale meter, I first tried to derive the proportional voltage from the secondary of T1. Unfortunately, I found that the particular transformer that I used did not yield an acceptable sample voltage — most likely due to core saturation — with a maximum error of 2.8%. In contrast, sampling the input line voltage as shown in the schematic produces less than 0.1% error.

Meter

The meter section of the circuit consists of R2, R3, D2, D3, and M1.

R2 is adjusted to calibrate the meter to a full-scale reading, while R3 is a safety resistor to prevent M1 from experiencing excessive current during adjustment of R2. D2 and D3 are an additional safety measure and shunt excess current away from the fragile meter coil.

The R2 and R3 values will be driven to some extent by your selection of M1.

R3 should be selected to limit the maximum current through M1 to a safe value should R2 be inadvertently set. The maximum difference between the reference and the sample voltages is about 1.25 volts if your meter is set for the range 110 to 135 volts. The $100\ \mu\text{A}$ meter I used has a series resistance of $2.5\ \text{k}\Omega$. In the absence of R3, therefore, the maximum current through M1 would potentially be $1.25\ \text{volts}/2.5\ \text{k}\Omega$



Photo E. The rescaled meter looks as good as the original.

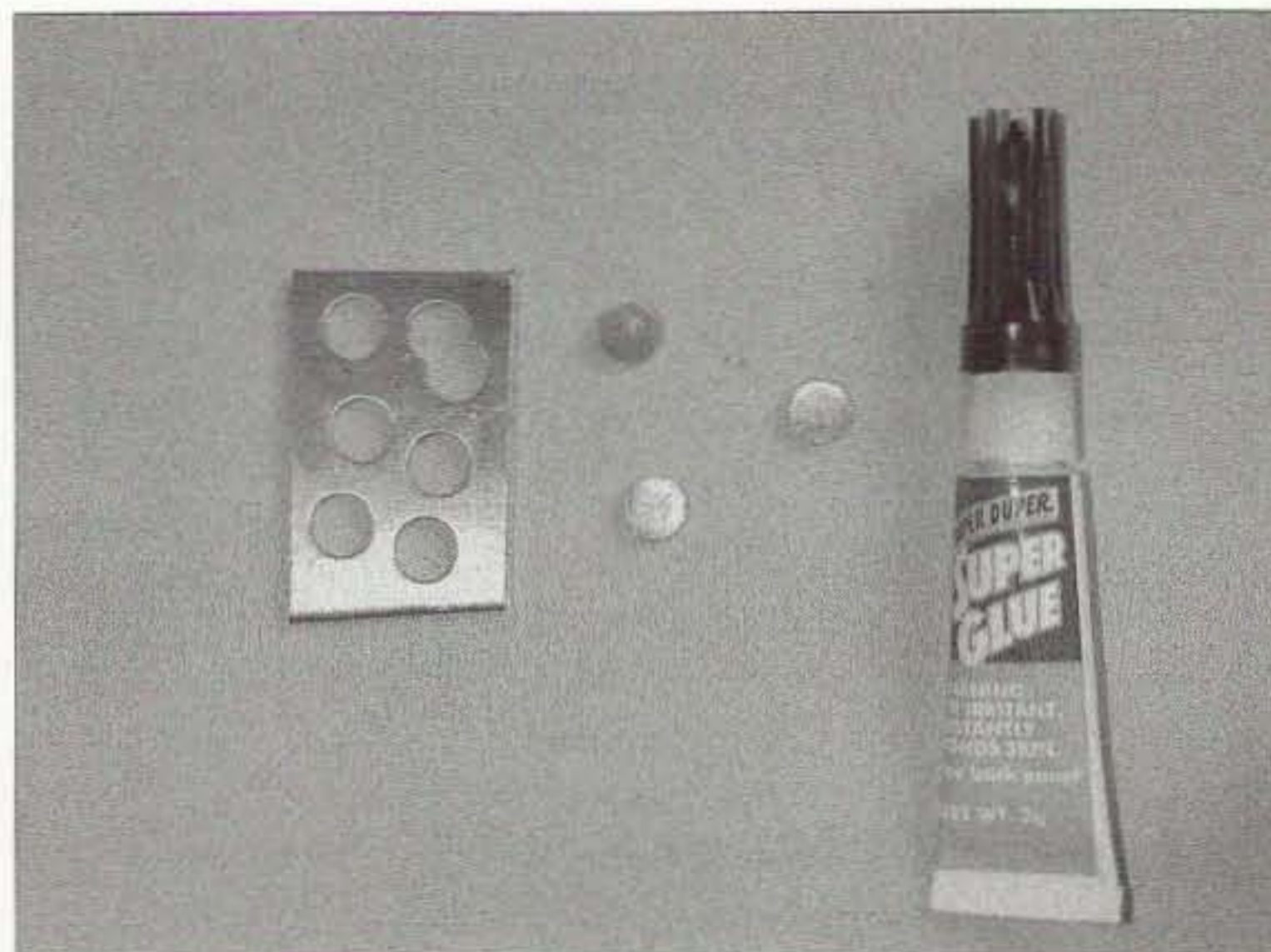


Photo F. Key ingredients for "Manhattan-style."

= 500 μ A. This is a bit high for comfort, so a series resistor of 1.2 k Ω was used at R3. The series resistance is now a minimum of 3.75 k Ω and the corresponding current is 333 μ A, a more reasonable value. A further safety measure consists of the back-to-back diodes D2 and D3 across the meter. These limit the maximum current through M1 to 280 μ A based on the 2.5 k Ω internal meter resistance and a diode knee voltage of 0.7 volts.

Should R7 open up, a substantial increase in voltage might be seen across the meter. In this case, D2 and D3 will protect the meter movement. In addition, when the meter is powered up or powered down, the different charging and discharging rates of C1 and C2 will cause the meter to pin negative for a few seconds. D2 and D3 will prevent damage to the meter during this time.

Rescaling the meter

The following discussion assumes that the meter you have selected is not sealed and can be disassembled. My experience with "unsealing" sealed meters is not good.

Prepare a clean, clutter-free working place and assemble the tools you will need. A set of jeweler's screwdrivers, small pliers, and a miniature wrench set will be helpful. Many of the parts are quite small and a headband magnifier is quite helpful as well. A small plastic box to store the removed parts is a good idea.

I started with a Weston 0–100 μ A meter.

Carefully disassemble the meter case and remove the scale plate.

We will now make a new meter scale, print it, and attach it to the back of the old meter place.

There are several methods to make a new meter scale. I originally started with the excellent meter scale software written by James Tonne WB6BLD, available at his Web page [<http://www.qsl.net/wb6bld/>]. After developing the scale I wanted, I printed it on a sheet of transparent plastic and overlaid it on the meter scale plate I had removed from my meter. Much to my surprise, I found that Weston had used nonlinear spacing and that the spacing between calibration marks varied as much as 20% from one end of the meter to the other. Although WB6BLD's software permits some nonlinear adjustment, it wasn't possible to get an accurate fit to the old scale.

So, I reverted to an old tried and true method. I made a 200% enlargement of the meter face on a copier. Using 200% enlargement, my Weston meter scale almost filled an 8-1/2- x 11-inch page to create a working master. Using typist's correction fluid, I blanked out the old numbers and the term "Microamperes D.C.," keeping the scale on the working master. Using Microsoft Word, I then prepared new numbers and an identifying legend for the meter. I used a font close to the original and adjusted its size and tracking

to match the 200% enlargement. I then cut the numbers and legend out and pasted them onto my working master, using typist's correction fluid to mask any stray marks. A trick to avoid shadows from the pasted up bits is to paint the edges of the paste-up with typist's correction fluid. When you are satisfied with the working master, make a copy at the reverse of the original enlargement. Since I used 200% enlargement, I needed 50% reduction. It's worth checking the reduction against the original meter scale at this point, since the enlargement and reduction scales on copy machines are not always accurate. It may be necessary to play with the reduction factor a bit in order to obtain an exact duplicate of the original. Copy machines also often have a bit of "differential stretch" whereby the enlargement and reduction factors are slightly different for vertical and horizontal dimensions. When you are done, it should be possible to overlay the new scale on the original meter plate and have the dial lines align as exactly as can be seen using a magnifier. You will also get the best appearing results if the copy paper you use is bright glossy white. I used paper intended for inkjet printers and the scale turned out brighter than the original white paint.

If you have a flatbed scanner attached to your computer, you could scan in the meter face and edit it electronically.

The new paper scale is then attached to the back of the original metal scale plate. I used a repositionable artist's

spray adhesive so that I could remove the paper scale if I misaligned it. Use the mounting place screw holes to align the paper scale on the mounting plate. The ultimate accuracy of your rescaled meter depends on your ability to exactly align the paper scale, so work carefully when mounting the paper scale. Re-attach the scale plate with the new scale to the front. Make sure that the meter pointer is not binding on the paper and that bits of paper have not fallen into the meter workings.

Re-assemble the meter cover, ensuring that the mechanical zero screw engages the adjustment tang.

Note that I've labeled the meter "RMS Volts AC." Since the circuit actually responds to the rectified average voltage, this is not a true RMS reading meter. However, it is calibrated for RMS voltage, assuming the line voltage is sinusoidal, a reasonable assumption for normal AC line voltage.

My decision to keep the original scale drove my choice of minimum and maximum voltages. The original meter had 50 division marks with main divisions every 10 marks. If I chose 1 volt per division mark, my meter would span 50 volts, which is larger than necessary. If I instead used 0.2 volts per division mark, my span would be only 10 volts, a bit small. I compromised with 0.5 volts/division for a span of 25 volts. I decided to use 110 volts as the zero point and 135 volts as full scale. This gives even 5-volt divisions for the main scale, but awkward half-volt values for in-between points.

Construction

Since we are dealing with power line frequencies, a variety of construction techniques will work. A printed circuit

board is certainly not necessary, and was not made since the particular meter and components used will likely vary so much from builder to builder.

The expanded scale meter shown in the illustrations uses copper pads on glued PC board, also known as the "Manhattan-style" construction, popularized by Wes Hayward W7ZOI. An excellent description of the nuts and bolts of Manhattan-style construction can be found at K7QO's Web page [<http://www.qsl.net/k7qo/>].

For those unfamiliar with this construction approach, it uses circular copper pads, punched out of scrap printed circuit board stock, glued onto the main PC board. Place a drop of "Super Glue" on the back of the pad and position it. In a few seconds it will be bonded to the main board.

The completed circuit board is mounted on the back of the meter, using the two meter terminal studs. It's necessary, of course, to remove the copper foil from the area around the meter lugs. I used a milling machine, but you could etch it chemically, or cut it out with an Exacto knife and peel the copper from the fiberglass substrate.

Don't rely upon the pads to hold heavy components. I used a TyWrap® to secure T1 to the board. C1 is held in place by a couple dots of hot-melt glue. The fuse holders are secured by 6-32 hardware. I also used quick disconnects on the AC line so that I could easily remove the board while testing circuit modifications.

I used a Radio Shack plastic box to house the meter and board. Since this project involves line voltage, it is

Continued on page 20

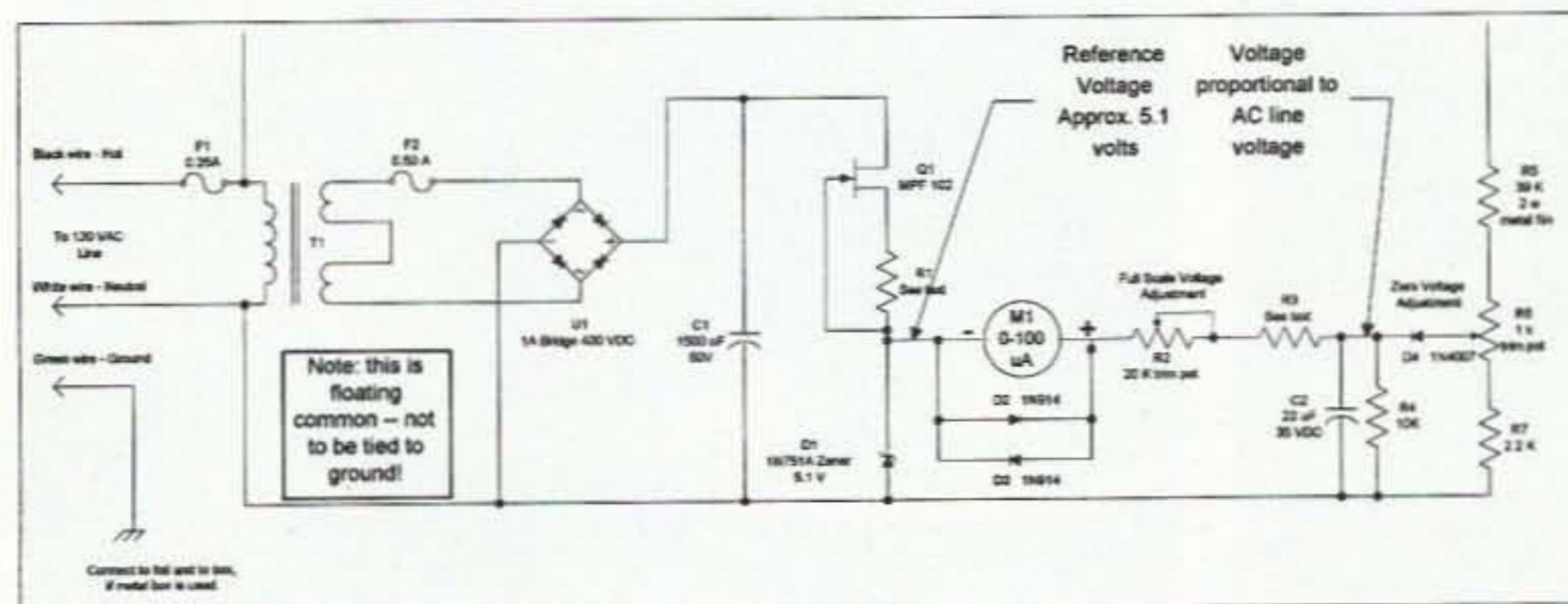


Fig. 3. Schematic.

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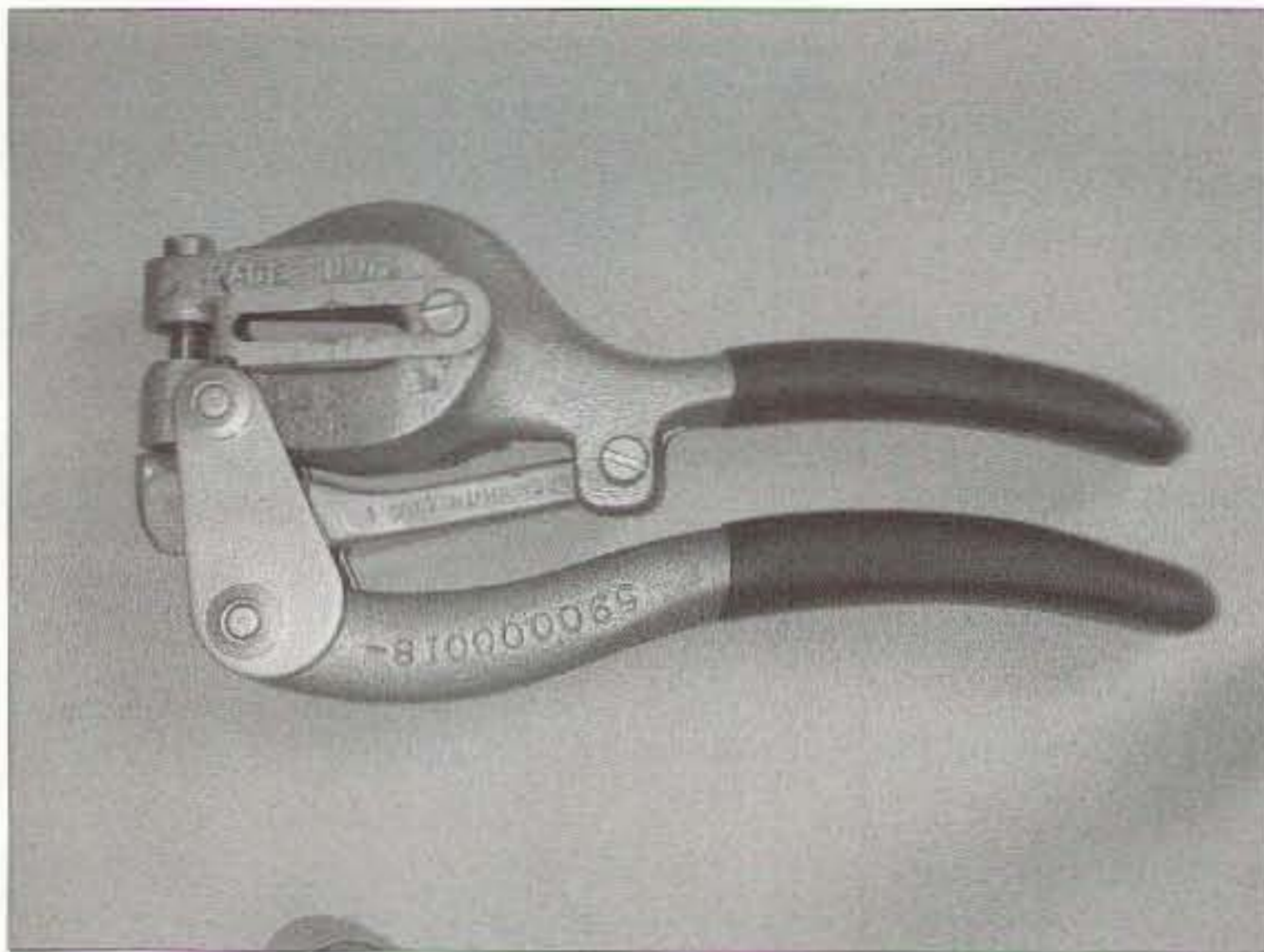


Photo G. I punched out the copper pads with a Roper-Whitney No. 5 Junior hand punch.

All-Star Expanded-Scale AC Voltmeter

continued from page 19

important to protect against inadvertent contact with potentially lethal voltage. The plastic box provides an additional layer of protection. Note also that one side of the AC line is common with the negative side of the low voltage reference DC supply. While normally I would have used the copper foil of the main PC board for the negative low voltage DC connection, this would mean that one side of the AC line was connected to what is usually considered "ground." This could lead to an unpleasant surprise or worse. If you use my wiring technique, please use a 3-wire (hot, neutral, and ground) line cord and connect the

ground (green wire) to the copper foil of the board. The photos show a two-wire line cord that I use with an isolation transformer for testing and calibration. If you use a metal box to house this project, the box should also be connected to the AC line ground wire.

Checkout and calibration

After construction, carefully check your wiring for errors. If you use the Manhattan-style construction, check the resistance between the PC foil and the rest of the circuit. This should be an open circuit.

Disconnect M1 from the circuit for the following initial checkout.

Connect the circuit to a variable AC power source, such as a VARIAC® and place an accurate digital voltmeter across the AC line. Please remember that a standard VARIAC is not isolated from the AC line and that inadvertent contact with the AC line can cause severe shock or injury. Please be careful! I strongly recommend using an isolation transformer between the VARIAC and the expanded scale voltmeter at any time when the case is open and voltage is exposed.

Always unplug the meter from the VARIAC before attaching or detaching clip leads! The steps below require you to measure voltages and adjust potentiometers whilst AC line voltage is applied. Please be careful during this process! Remember the old rule of keeping one hand in your pocket when working around dangerous voltages.

Set the VARIAC to the "zero" voltage level you have selected. Check the voltage across D1 with an accurate digital voltmeter. It should be 5.1 volts ± 0.25 volts. (If you haven't already determined the proper value for R1, do so now.) Note this value as V_{ref} . Increase the VARIAC to the voltage level you have established as the "full scale" voltage. The actual voltage level is not so important. It is much more important that V_{ref} should be essentially unchanged as the AC line voltage is varied. If V_{ref} changes more than a few millivolts, you have a problem with Q1, R1, or D1. (My prototype changed only 0.5 millivolts.)

Move your digital voltmeter to read the voltage across C2. Set the VARIAC to the zero voltage level you have selected. Adjust R6 through its range. You should see the voltage across C2 vary from 4 volts (or less) to 6 volts (or more). Set R6 so the voltage across C2 is equal to V_{ref} . If you can't obtain this range of voltage adjustment, check R5, R6, R7, D4, R4, and C2 and the associated wiring.

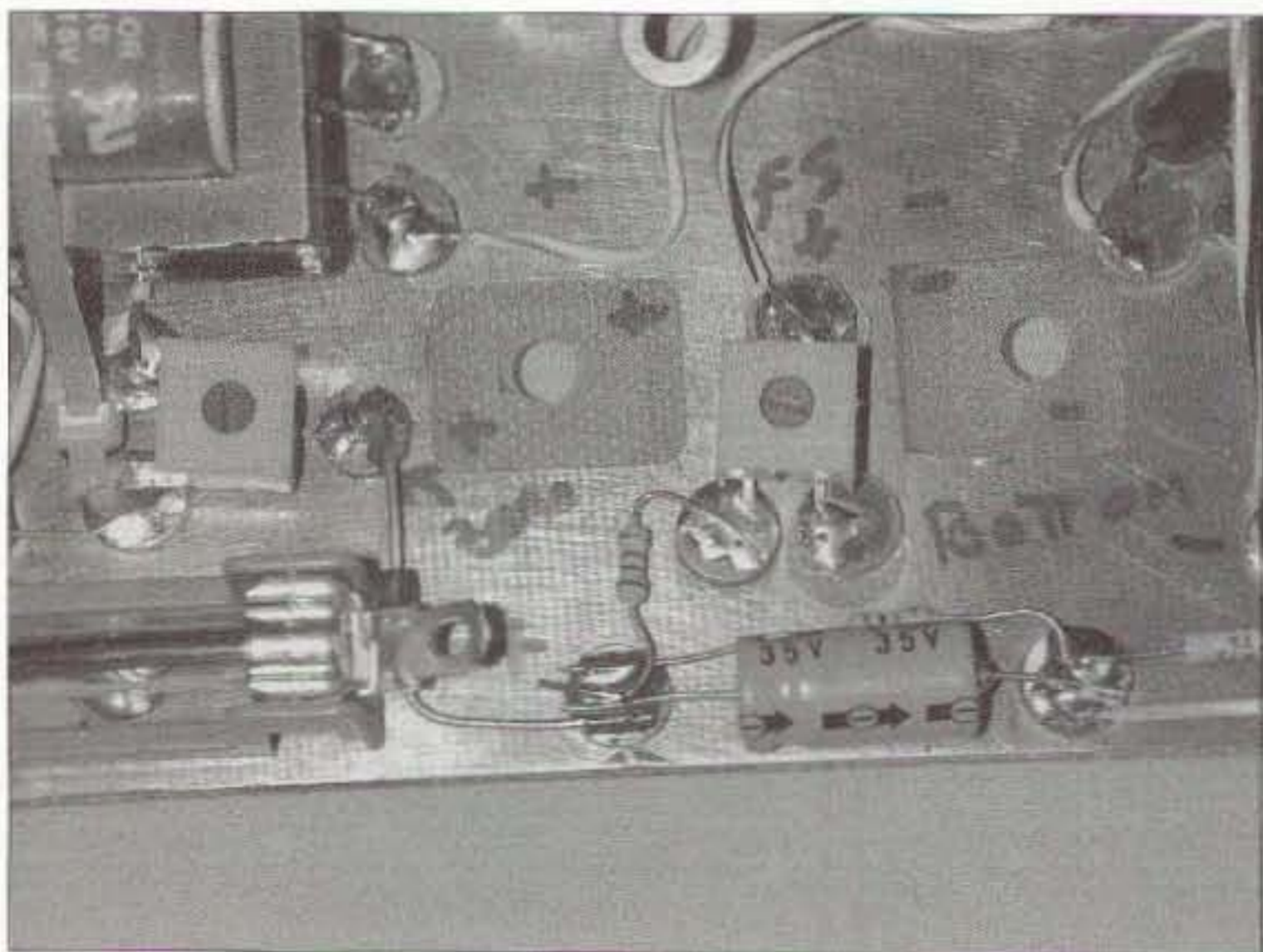


Photo H. Wiring techniques can be seen here.



Photo I. More wiring.

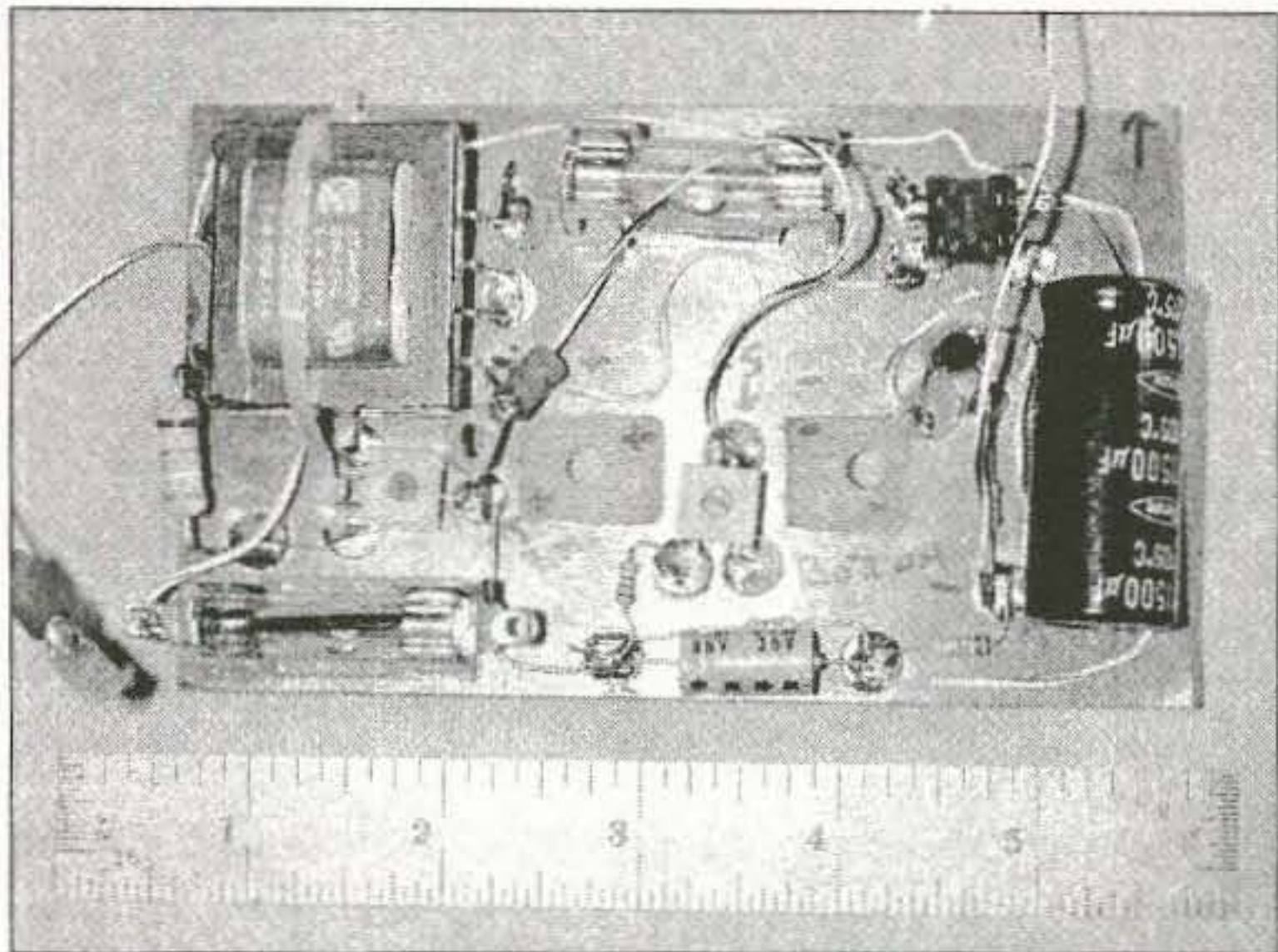


Photo J. The completed circuit board is mounted on the back of the meter, using the two meter terminal studs. It is necessary, of course, to remove the copper foil from the area around the meter lugs. I used a milling machine, but you could etch it chemically, or cut it out with an Exacto knife and peel the copper from the fiberglass substrate.

Disconnect the circuit from the VARIAC.

Preset R2 to midrange and connect M1 into the circuit.

Reconnect the circuit to the VARIAC and set the AC line voltage to the zero voltage level you have selected.

Using a nonmetallic adjustment tool carefully adjust R6 to zero the meter. Use a nonmetallic tool to help reduce the risk of contacting line voltage.

Increase the AC line voltage to the full-scale value and, using the non-metallic adjustment tool, adjust R2 carefully until the meter reads full scale.

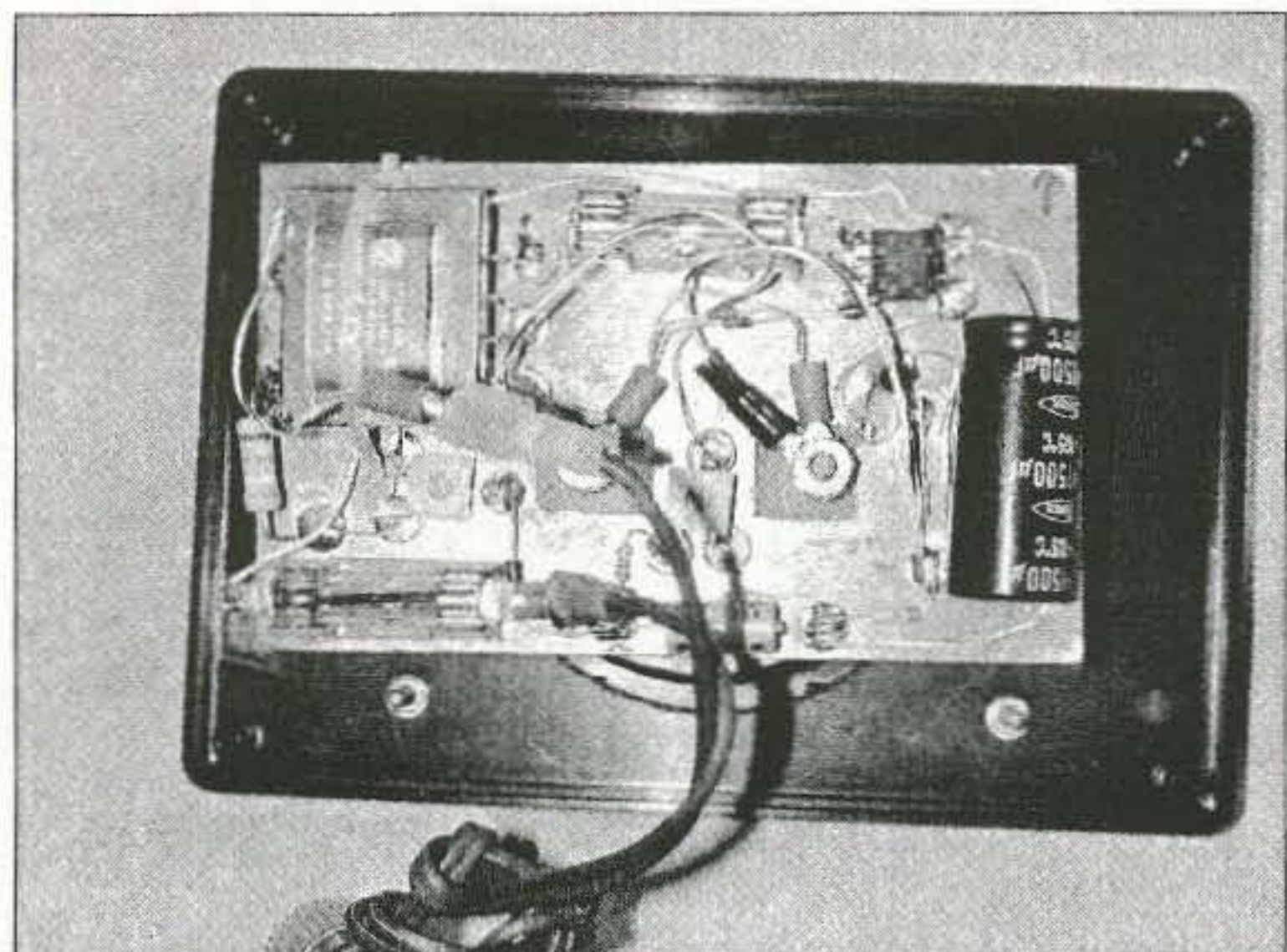


Photo K. The board installed in place.

It may be necessary to repeat the R2/R6 adjustment once or twice, as they interact slightly.

Disconnect the circuit from the VARIAC and install in the box.

Check the accuracy of your meter at several points over its scale range. I found that my expanded-scale voltmeter is within 0.2 volts of my HP 3468 precision digital meter at the worst point

and that almost all readings are within 0.1 volt.

Of course, the accuracy of your expanded scale meter is directly tied to the accuracy of the digital voltmeter used in calibration. A standard, "run-of-the-mill" digital voltmeter obtained for a few dollars may be surprisingly inaccurate when reading AC voltage. I recently received a "free" 3-1/2-digit DVM when ordering some equipment. This DVM is rated as $\pm 0.8\%$ of reading and ± 3 digits on the 0-200 VAC scale. For 125 V, therefore, the error limit would be 1.3 volt. If you can borrow a more accurate DVM, such as a Fluke 187 or 189 ($\pm 0.4\%$, ± 40 digits;

resolution 0.01 volts), the error will be reduced to 0.9 volts. Even a laboratory-grade instrument, such as the HP 3468, is only specified to be within 0.727 volts when reading 125 volts. However, when reading AC line voltage, my Fluke 189 agrees with my HP 3468 within 0.05%, while the

"free" DVM diverges from the Fluke 189 and HP 3468 by about 1%.

One point noted when calibrating the expanded-scale meter is that the AC line is not particularly stable; appliances cycling off and on in the house can cause 0.5-volt variations. Hence, some degree of "eyeball averaging" may be necessary when calibrating the meter. 73

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Travels with Henryk — Part 2

SMØJHF shares some photos — and the fun of hamming.

Poland is a central European country with a stormy history. Political changes in this region some 12 years ago resulted in a more independent governing system. The country has recently become a member of NATO. Some 40 million people live here, but just as many Poles live abroad, scattered around the world.

Approximately 15,000 licenses are issued in Poland, with prefixes SP, SQ, SN, and 3Z. Foreign nationals visiting or settled here are given an SO prefix. As of January 1st, 2001, the CEPT agreement is effective in Poland. The national organization, PZK, an IARU member, has its headquarters in Bydgoszcz nowadays, [<http://www.pzk.org.pl>]. During last year's IARU HF championship, PZK's "headquarters" station SNØHQ did extremely well.

Chris SP7GIQ is 45 years old and received his license at the age of 16. He learned contesting and building

yagi antennas at clubs near Warszawa, Poland. About ten years ago he moved to the small town of Lask, erected a few towers, built quad antennas, and started winning contests (see **Photos B and C**).

When last checked, his station consisted of

10m — 5-element quad at 27m,
5+5+5+5 stacked quads, top at 35m;

15m, 20m — 4-element quad at
27m, 4+4 stacked quads at 35m;

40m — 2-element quad;

80m, 160m — vertical for transmitting, Beverage wires for receiving;

IC-751A, plus similarly ancient Alpha amplifier.

Chris's E-mail address is [sp7giq@pro.onet.pl].

Kazimierz SP2FAX is 47 years old and got his license more than 30 years ago. Soon thereafter, he founded a club (SP2PDI) with a serious DX and contest approach right in his home town of Bydgoszcz, Poland. A number of cubical quads were built, but it seems that they were difficult to keep in the air.



Photo A. Chris SP7GIQ shows off his shack in Lask, Poland.



Photo B. SP7GIQ's antennas are really up there.

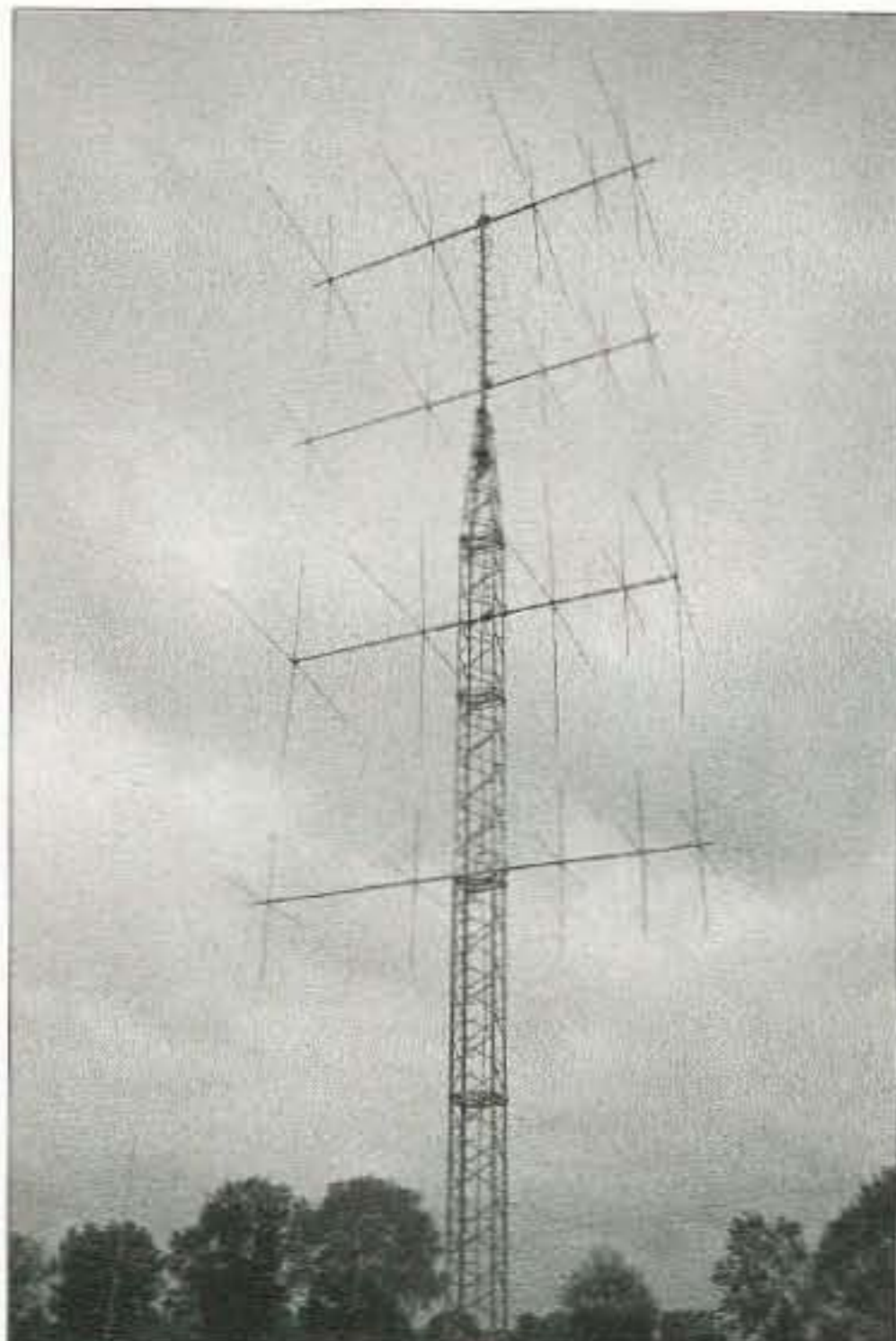


Photo C. SP7GIQ's stacked 5-element quads.

In 1981, all amateur radio activity was suspended in Poland by martial law, and Kazimierz closed his mind and heart to ham radio — but only until 1995, when he came back to our hobby in a grand manner. He bought a piece of land, after first checking the ground conductivity charts. He set up a few towers with large yagi arrays.

Refer to **Photos D** and **E** to see what he has today:

10m — 6-element yagi at 32m, 6-element yagi at 23m;

15m — 6-element yagi at 32m, 6-element yagi at 20m;

20m — 6-element yagi at 46m, 6-element yagi at 24m, 3-element yagi fixed south;

40m — 3-element yagi at 44m;

80m, 160m — vertical for transmitting, Beverage wires for receiving;

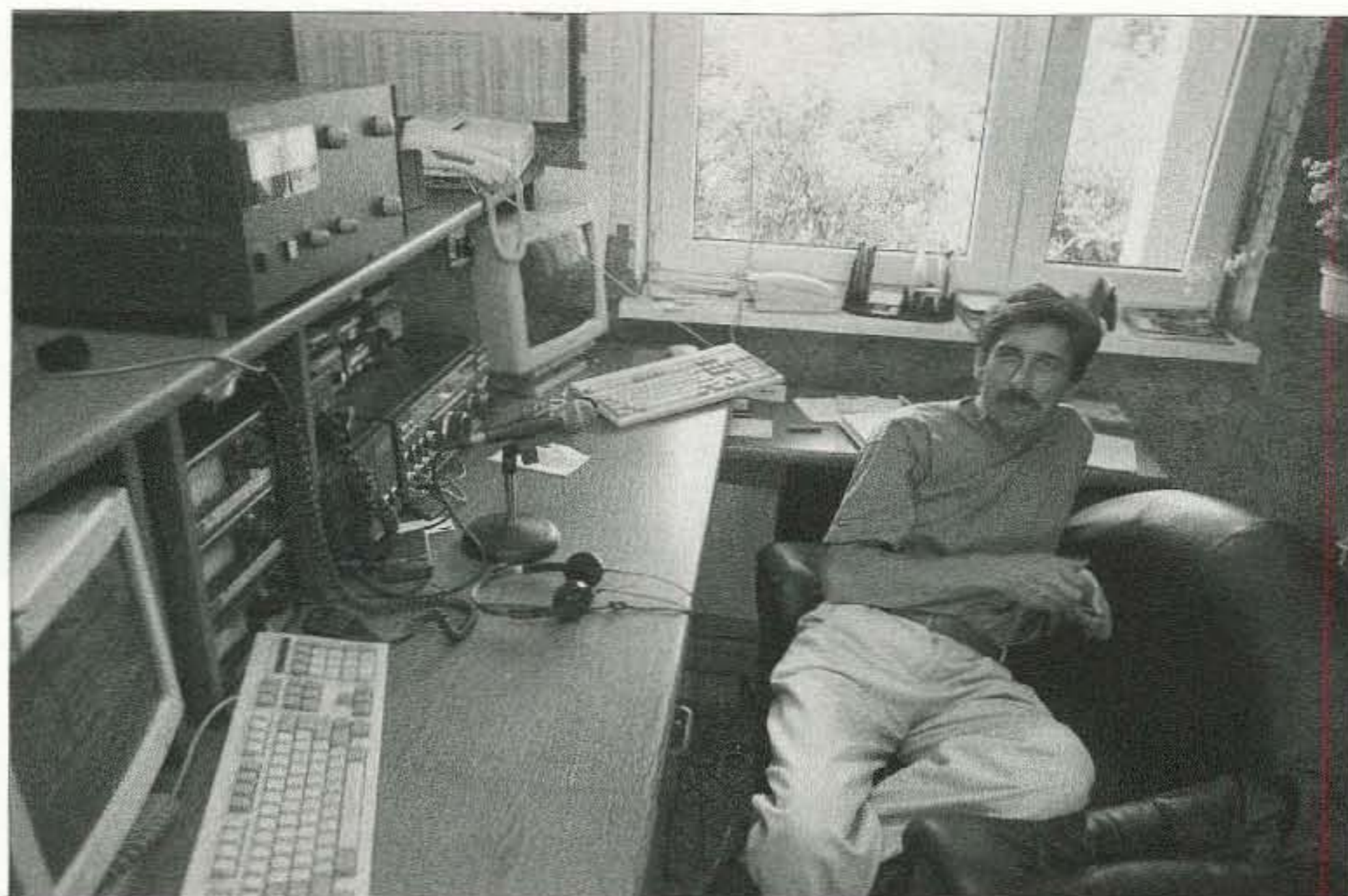


Photo D. Kazimierz SP2FAX relaxes in his shack in Bydgoszcz, Poland.



Photo E. SP2FAX's large yagi arrays suit the scale of his home.

FT-1000, plus a home-brew amplifier.

His E-mail address is [sp2fax@poczta.wp.pl].

73

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VTVMs and FETVMs

Theory and practice.

When the loading presented by a volt-ohm-milliammeter (VOM) is too great, the vacuum tube voltmeter (VTVM) or field effect transistor voltmeter (FETVM) is there to save the day, or at least save the time needed to calculate the loading effects.

The VTVM has been largely supplanted by the FETVM; they use the same principles but different components. Vacuum tubes are hard to come by and expensive compared to field effect transistors (FETs), which in many respects are better. Since vacuum tubes are almost passé, the emphasis here will be on FETVMs. A design example is given for an FETVM.

Both the vacuum tube and N-channel FET are voltage-operated devices that require a positive supply: They respond to the voltage on their input, the voltage on the grid for a tube and the voltage on the gate for a FET. Both offer an almost infinite impedance. The FET actually comes closer to being an infinite impedance than the vacuum tube. The input resistance of an FET is several orders of magnitude greater

than the grid current of a tube. Grid current is typically a microamp, while gate current is typically a picoamp. A picoamp of gate current can be ignored except when you have to pick the fly specs out of the pepper for an electrometer, an ultra-high-resistance voltmeter.

Some of you new techs may not be familiar with tubes, and some of you old guys may have forgotten some of the fine details. In any event, the grid in a tube intercepts some electrons, and while there are only a few electrons intercepted, they represent maybe a μA or so of current, but into a 1 meg grid resistor that's a volt. That can't be ignored.

In a VTVM contact current is usually balanced out by another similar tube working into an equal grid resistance. For example, a 12AU7 dual triode is often used. One half for the actual voltmeter and the other half just to balance out the contact grid current. Of course, contact current could be balanced out manually, but given the drift of tubes, that would be a cumbersome solution.

Both FETs and vacuum tubes look like an infinite resistance to the circuit under test. The voltage is indicated on

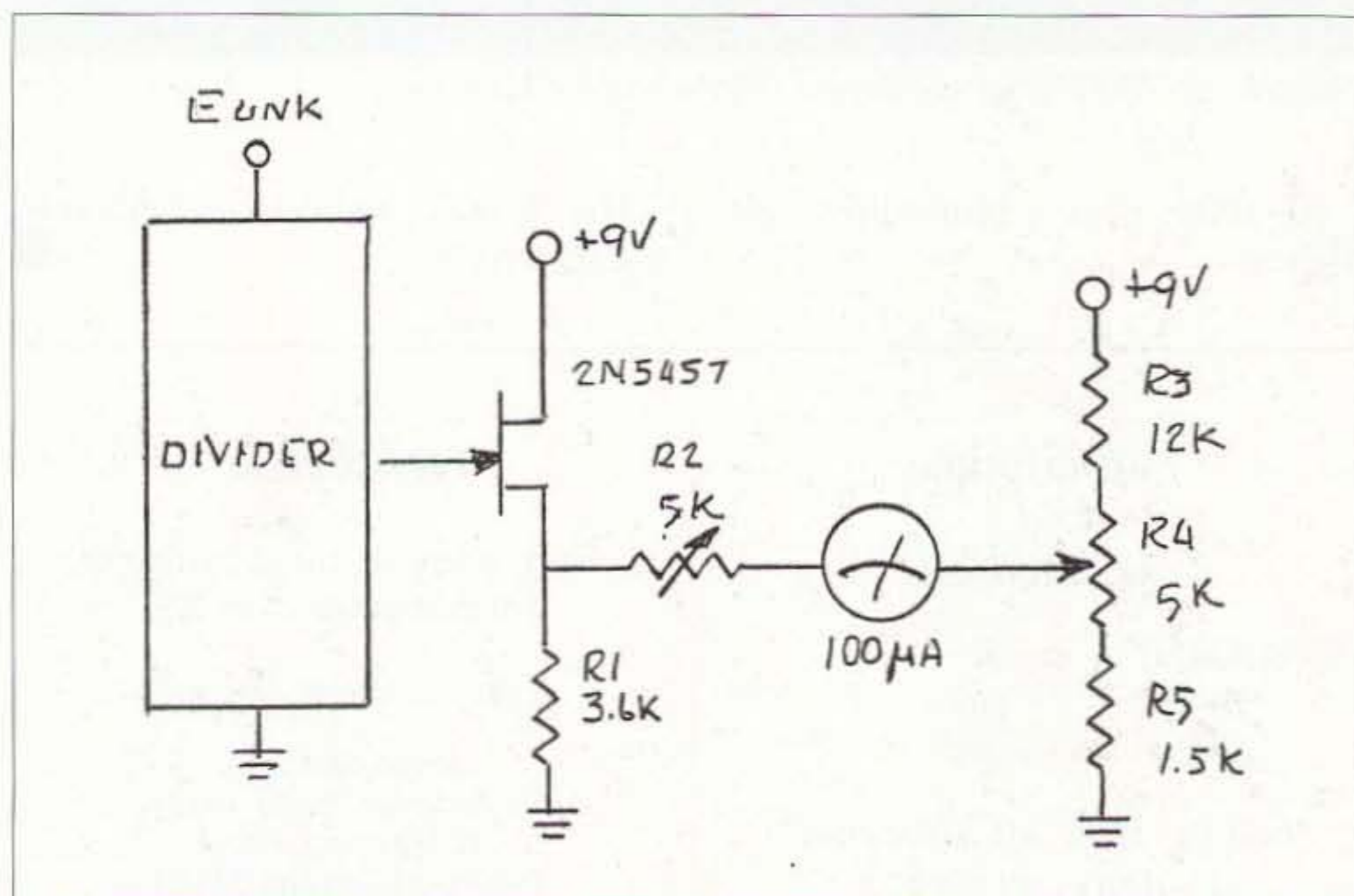


Fig. 1. A simple FETVM can have sensitivities of 1 volt full scale.

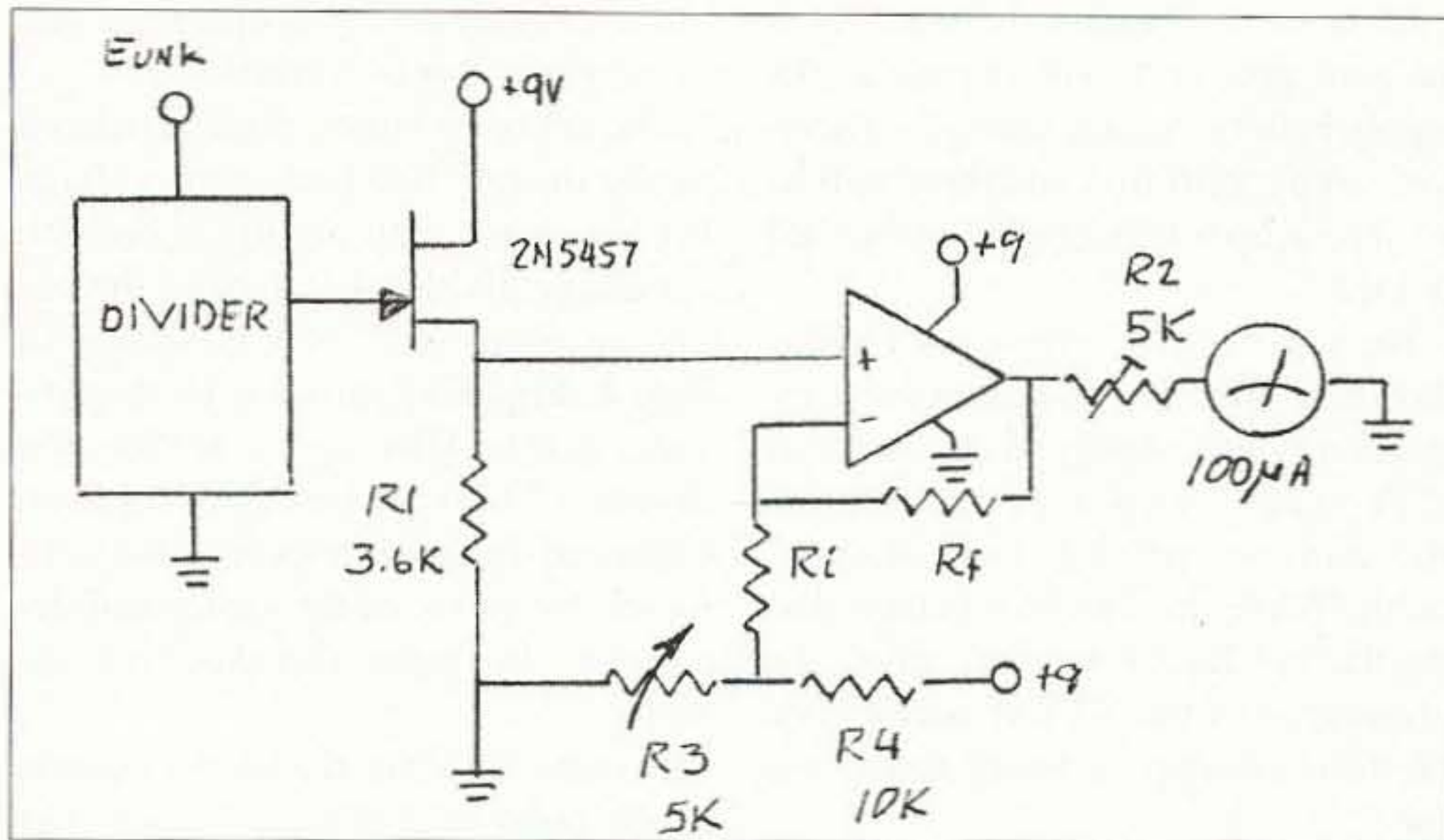


Fig. 2. Higher sensitivity can be achieved with an op-amp driving the galvanometer.

a conventional d'Arsonval galvanometer (named after the French physicist, Arsene d'Arsonval). The galvanometer requires a small current of 50 µA to 1 mA to deflect the voltage indicating needle. The tube or FET essentially isolates the galvanometer from the voltage being measured.

The FETVM is simpler than its vacuum tube counterpart because there is practically no contact current to be balanced out and it operates with a single battery supply. Fig. 1 shows a possible FETVM. The circuit is basically a bridge with one side of the bridge composed of an FET source follower and the other side a resistance divider. A variable calibration resistor R₂ in series with the galvanometer sets the current or deflection for a given gate voltage. The galvanometer connects to a zeroing pot R₃ in the divider side of the bridge. The source follower circuit is used instead of an amplifier because of the improved stability as a result of the 100% negative feedback. An amplifier can provide gain and increased sensitivity, but a bias voltage is needed. A source resistor can provide the bias but it would cause a loss in gain. The complications of a separate battery weigh against it. The source follower seems the better choice.

The zero pot is adjusted for zero when the input is shorted. The calibration control is a one-time adjustment to indicate a known voltage applied to the input. The known voltage is usually a battery, but a divider on the

supply can also be considered until a calibrated source like a standard cell is available.

In the circuit shown in Fig. 1, the 3.6k source resistance R₂ controls the source current of the FET and the gain. The gain of a source follower is often assumed to be unity, but in fact it is always less than one.

The gain of a source follower is $V_{G_{sf}} = G_m R_s / (1 + G_m R_s)$.

The G_m of the FET is $G_m = 2I_D / (V_{off} - V_{gs})$, where I_D is drain current, and V_{off} is the voltage needed to reduce the drain current to zero. V_{gs} is the gate-to-source voltage that produces I_D .

V_{off} is not always given in the data sheets but it can be easily measured: Measure the drain current as the gate is made increasingly more negative (the source is made more positive with respect to the gate) until the current is zero or at least less than 1 µA. For a typical 2N5457 V_{off} is 3.06V and V_{gs} is 1.81V for $I_D = 0.5$ mA. These conditions will exist when R₁ is 3.6k. Under these conditions G_m will be 8×10^{-4} , and the voltage gain of the source follower $V_{G_{sf}}$ 0.74. When 1 volt is applied to the input, the source voltage increases 0.74V to 2.55 volts. The current in the 1k galvanometer will be 100 µA when the voltage at the arm of R₄ is 1.81V, and R₂ plus the galvanometer is approximately 7.4k.

Measuring voltages greater than 1 volt requires a voltage divider that reduces the unknown voltage to 1 volt at the gate. The voltage divider essentially

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determines the input resistance of the meter and the scales of the meter. The meter's scales usually have a ratio of 1 to 3. Part of the divider is usually a built-in 1 meg resistor in the probe that isolates the circuit under test from the distributed capacitance of the divider.

For high input resistance dividers, precision high-value resistances are needed. High-value precision resistors are hard to come by, but Victoreen, Cleveland, OH, tel. (216) 248-9300, has high-voltage resistors available with values in the hundreds of megs. Obtaining and maintaining a high resistance is primarily a problem of layout and cleanliness. Leakage across a switch or PC board will lower the input resistance and upset the accuracy. Most VTVMs have input resistances of 10 megs, which is a compromise of what is practical with what is possible. Since FETs have much lower contact current, they can have much-higher-resistance input dividers.

Higher sensitivity in a source follower meter can be obtained with an op amp driving the galvanometer as shown in Fig. 2. The op amp's noninverting gain is $1 + R_f/R_i$, and the input resistance is essentially infinite. The inverting input becomes $(1 + R_f/R_i)E_i$ in the output. When the noninverting input voltage is +1.81V, and the inverting input is +0.181V, the output is zero. Op amp gains of 10 or so can result in full-scale sensitivities of 0.1V.

R2 is the calibration rheostat, R4 is the zero pot. Zero will change as the supply battery voltage changes. Therefore, adjust zero first and there will be no interaction between adjusting R4 and R2.

The schematic of a typical VTVM is shown in Fig. 3. A vacuum tube requires a power supply in the range of 150V to 250V as well as a heater supply, and is operated from the AC mains. While this can be a bother, during the heyday of vacuum tubes, the advantages of the VTVM outweighed the disadvantages of being tied to the line.

In Fig. 3, the two halves of a 12AU7 are used as a differential cathode follower. The input to V1A is the unknown voltage and the input to V1B is contact voltage. The pot R3 balances out the differences in voltages at the cathodes of V1A and V1B. Assuming equal grid currents and equal R1 and R2, the cathode currents and cathode voltages will be equal when R3 is centered and no current will flow in the galvanometer. A voltage on the grid of V1A will increase the cathode voltage and upset the balance, and a current will flow in the galvanometer. The rheostat R4, the calibration control in series with the galvanometer, determines how much current flows for a given imbalance. R5 ensures a constant current to the differential amplifier and reduces the variations

in the cathode follower operation due to supply voltages' variations.

The unknown input voltage is reduced to the design standard input voltage for the meter with a voltage divider. A voltage divider that divides the unknown input to 1 volt is shown in Fig. 4. Fig. 4(a) shows a 10 meg divider while 4(b) shows a 100 meg divider. The voltage divider has no influence on the operation of the voltmeter except to set the scales and determine the input resistance of the meter.

In many VTVMs, the lowest range is in the order of 3 volts full-scale. The sensitivity of the VTVM or FETVM depends on the gain of the tubes or FET and sensitivity of the galvanometer. An FETVM can have sensitivities of less than 1 volt without benefit of an op amp.

Op amps can provide gain that increases the sensitivity of the meter to 10mV. Op amps can be married to VTVMs, but it's not a good match because an extra regulated low supply is needed. An FET marries to an op amp much more readily. Solid state op amps were not even on the horizon when vacuum tubes ruled, and the sensitivity of the usual VTVM was not particularly high. Now, with FETs and op amps, tubes have been pushed into the background. FETVMs are now the high-resistance analog instrument of choice. 73

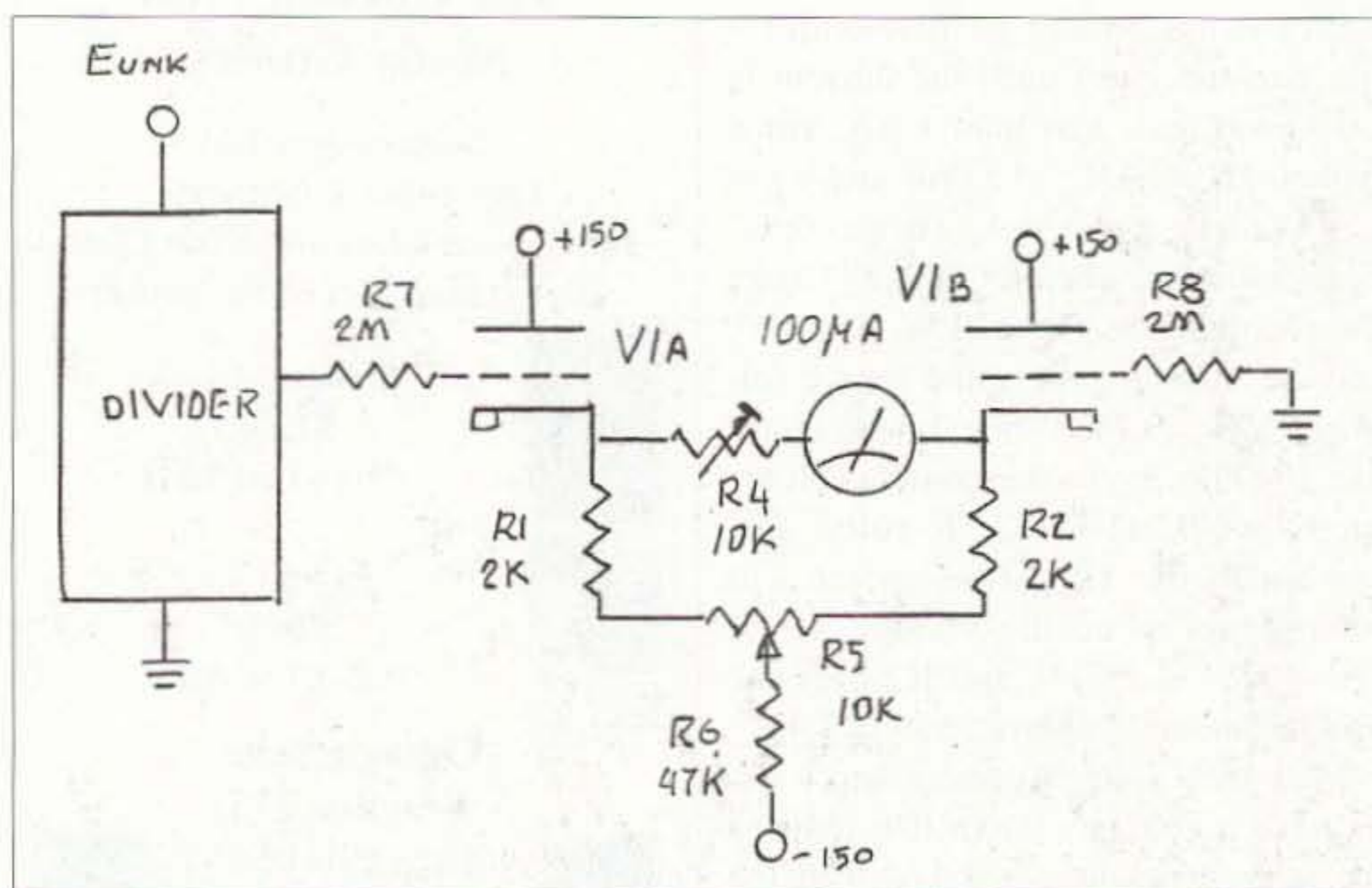


Fig. 3. A typical VTVM uses a dual triode.

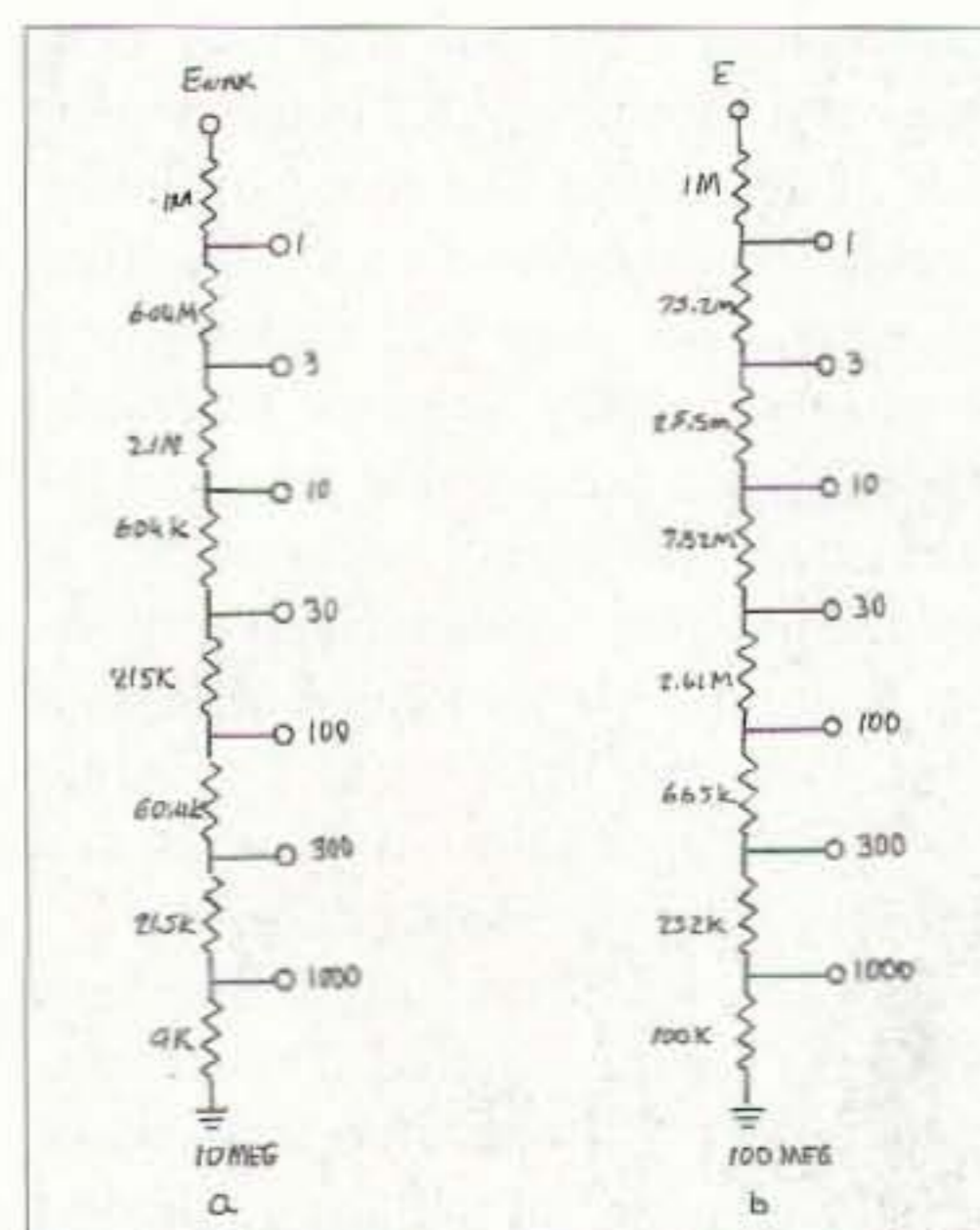


Fig. 4. A voltage divider usually has 1 and 3 scale ranges.

Phil Whitchurch G3SWH
 21 Dickensons Grove
 Congresbury
 Bristol
 BS49 5HQ
 United Kingdom

The ABCs of IRCs

Just what ARE International Reply Coupons, anyway?

Having worked that new country, IOTA, or whatever you've been chasing, you will quite likely want to get his QSL in written confirmation of the QSO. One of the most convenient ways to obtain your much-wanted card, particularly from a foreign station or his QSL manager, is by the use of International Reply Coupons (IRC).

Unfortunately, much myth and misinformation surrounds what is and is not a "correctly" stamped and valid IRC, which is often compounded by different countries postal administrations' interpretation of the rules, so the purpose of this article is to set the record straight.

An IRC is a device by which a person in one member country of the Universal Postal Union (UPU) can prepay the return airmail postage cost of a letter of a specific maximum weight from a different UPU member country. At

the time of writing and in theory at least, IRCs are exchangeable in all countries with the exception of Taiwan. UPU member countries may decide not to sell IRCs, but their exchange is compulsory in all countries.

There are three types of IRCs in wide circulation: There are two versions of the type C 22 and the more modern type CN 01 (old C 22). The front text of all versions is printed entirely in French, but there is a translated version in English as well as Arabic, Chinese, German, Russian,

and Spanish on the reverse (Fig. 1). The earlier versions of the C 22 (Fig. 2), which was available for sale until the early 1990s (and which are still in circulation today), says that "this coupon is exchangeable in any country of the Universal Postal Union for one or more postage stamps representing the minimum postage for an unregistered letter sent by surface to a foreign country." The more modern CN 01 (Fig. 3) and the C 22 (Fig. 4) both say exactly

Continued on page 28

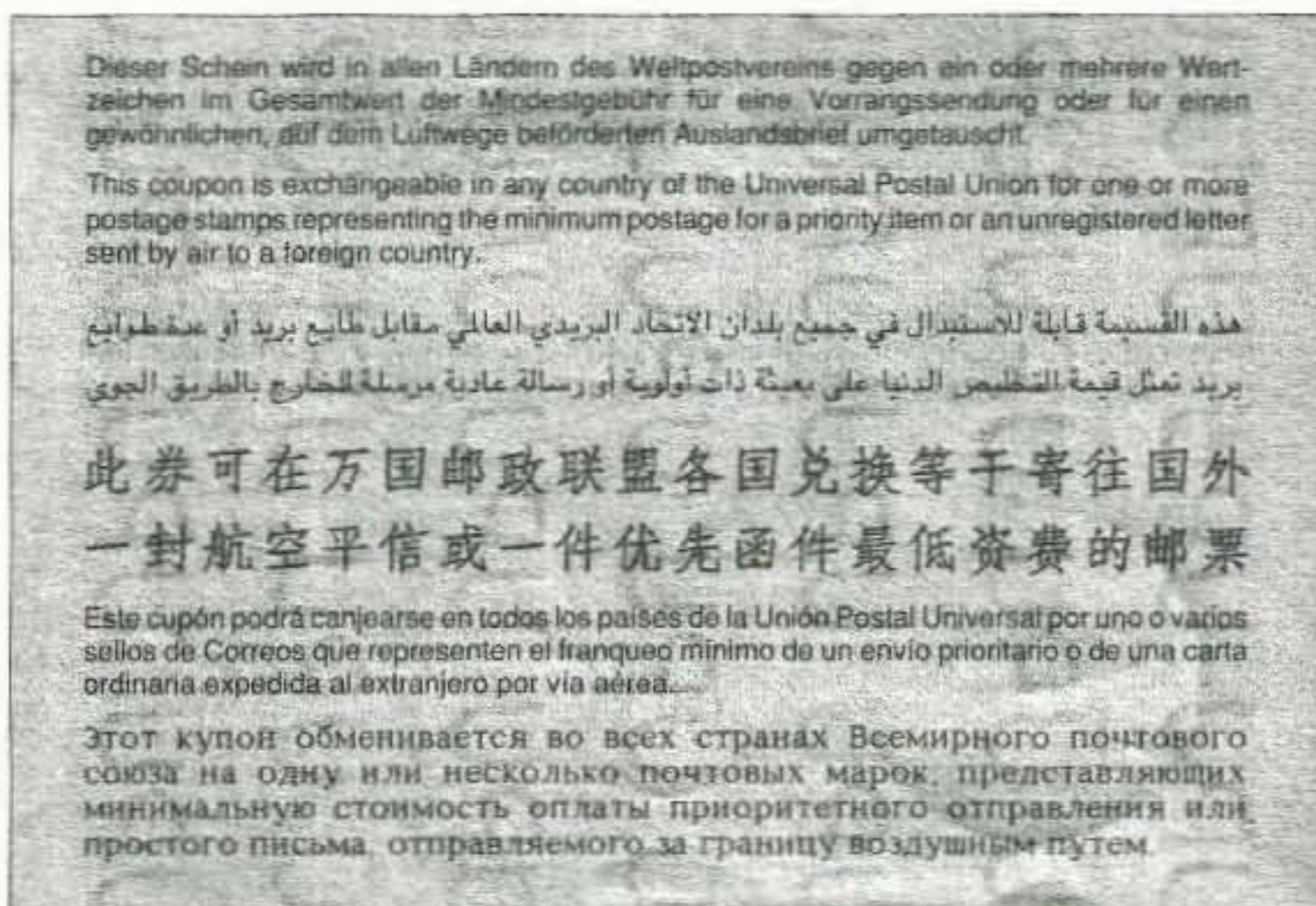


Fig. 1. The reverse side is a translated version of the front text in English as well as Arabic, Chinese, German, Russian, and Spanish.



Fig. 2. The front side of the earlier versions of the C 22, which was available for sale until the early 1990s.



Fig. 3. The front side of the more modern CN 01.



Fig. 4. The front side of the more recent versions of the C 22.

The ABCs of IRCs

continued from page 27

the same, except that the word "surface" has been replaced by "air."

The present CN 01 style was on sale until 31st December 2001. On 1st January 2002, a completely new style of IRC was introduced — also known as the CN 01. This new type of IRC is larger than those presently in circulation and will remain valid until 31st December 2006. The name of the country of origin will be printed on these coupons as a matter of course. Also printed on them, amongst other things, will be a standardized UPU bar code containing the ISO code of the country and the date of printing. Each country's postal administration will have the option of printing the selling price on the coupon itself.

There is, at present, no theoretical

limit to the period of exchange for IRCs, although postal officers can, not unreasonably, satisfy themselves as to their genuineness, particularly in respect of the older versions. In my own experience and if properly stamped, either type is generally accepted without question in exchange for the current minimum airmail postage. This may change in the light of the new style of CN 01.

IRC's can be bought "new" over the counter of the larger post offices at a current cost of £0.60 each and may be hand-stamped in the left-hand box by the issuing office. This box is marked "Empreinte de contrôle du pays d'origine (facultative)." This means: "Control stamp of the country of origin (optional)." Some IRCs have the name of the country of origin preprinted in red in the left-hand box (Fig. 5). Even with this preprinted information, there

can be a hand stamp from the issuing office over this writing. Contrary to popular opinion, the hand stamping by the issuing office or the overprinting by the country of origin is optional and the lack of this detail does not invalidate the IRC. Ideally, and where used, the hand stamp should include the date of issue, but this is not essential. For some unknown reason, IRCs issued in France do not always bear the date of issue, but merely the name of the issuing office (Fig. 6).

When presented in exchange for postage stamps, the receiving office should legibly date-stamp the right-hand box. This is a mandatory requirement to validate the IRC. This box is marked "Timbre de bureau qui effectue l'échange." This means: "Stamp of the office making the exchange." One IRC is currently exchangeable in the U.K. for £0.45 worth of postage stamps or an aérogramme.



Fig. 5. Some IRCs have the name of the country of origin preprinted in red in the left-hand box.



Fig. 6. Some IRCs issued in France do not always bear the date of issue — merely the name of the issuing office.



Fig. 7. The issuing office may affix a postage stamp in the middle box, but only to indicate or supplement the price of the IRC.



Fig. 8. This IRC is potentially worthless as it bears no hand stamp from the issuing office.

The center box is intended to show the price paid for the IRC and is marked "Prix de vente (indication facultative)." This means: "Selling price (optional information)." The post office may fix a postage stamp in this box, but only to indicate or supplement the price of the IRC (Fig. 7) — not a date stamp such as would be used in

the left-hand box. The price of IRCs in the USA recently rocketed from \$1.05 each to \$1.75, and the U.S. postal authorities are using up their old stock by fixing additional stamps to make up the value. In many countries this value is already preprinted, usually in red; in others, it is left blank. Either is acceptable.

Unfortunately, many of the post office employees in many countries do not understand the rules and stamp the wrong box by mistake, fail to stamp any box at all, or refuse to exchange IRCs (whether or not they are correctly stamped) for postage stamps. The official policy of the UPU is that "if the IRC is incorrectly stamped, the

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Fig. 9. This IRC is potentially worthless as it has been stamped in the right-hand box.

validity or otherwise of the coupon has to be examined on a case by case basis." However, it is fair to say that unstamped or incorrectly stamped IRCs are generally worthless and, under normal circumstances, cannot be exchanged for postage stamps. Local and unofficial exceptions to the rules do exist, but do not expect to receive a direct reply if you use worthless IRCs. Examples of potentially worthless IRCs are shown in Figs. 8 and 9.

Some administrations, such as in Germany, require the actual postal items to be handed over the counter at the same time as the IRCs and will not merely exchange them for loose stamps.

To account for variations in international currency exchange rates, administration costs, etc., "new" IRCs generally cost over 70% more than the

face value of postage stamps for which they can be exchanged. The actual selling price is fixed by the postal administrations concerned, but must not be less than an internationally agreed minimum value. IRCs purchased new in the US for \$1.75 can still only be exchanged for \$0.80 worth of postage stamps. Secondhand IRCs circulate widely in the US for \$1 each. Recently, I have had several American amateurs approach me to buy "secondhand" IRCs at about \$0.90 each! However, this only becomes economical when large numbers of IRCs are involved.

QSL managers will usually filter out and dispose of incorrectly stamped IRCs, but will offer for sale correctly stamped and valid "second hand" IRCs. Such "secondhand" IRCs are sometimes available from U.K.-based



Fig. 10. An IRC originally issued in Cleveland, Ohio, in 1969 which was sent to me in 1998 for a 9MØC QSL.

IRC's originally issued in 1963 and 1969! See Figs. 10 and 11.

Some difficulties arise in deciding exactly how many IRCs to send with an application for a DX station's QSL card, as the definition of "minimum postage" varies widely between postal administrations. In the U.K., it currently means 20 grams to a European destination or 10 grams to an intercontinental destination. In the U.S., it currently means 0.5 ounces to an intercontinental destination. Other criteria apply in Germany and Japan, for example. The best approach is to include a minimum of one IRC if you require a single card from an address in the same continent, and a minimum of two IRCs if you require a single card from an address in another continent. If you make more than one QSO or require more than one card, then you should increase the number of IRCs accordingly on the basis that each additional one- or two-sided QSL will weigh approximately 5 grams and a four-sided one approximately 10 grams. If you are in any doubt, then include an additional IRC!

Alternatives

The upshot of all this is that IRCs are not a particularly good value for the money, especially when bought over the post office counter and even on a "secondhand" basis. You cannot then rely on them being accepted for

QSL managers at around £0.55 each. These circulate widely within the amateur radio community as "ham currency," without ever being exchanged for postage stamps, and it is not uncommon to receive IRCs with date stamps several years old. In 1998, whilst processing the 9MØC QSL cards I received some



Fig. 11. An even older IRC, issued in Vancouver, Canada, in 1963, also sent to me in 1998 for a 9MØC QSL.

2001 ANNUAL INDEX

Subject/Article	Description	Author	Issue/Pg.
Antennas			
Antenna Tuning at the Speed of Light	8-channel fiber optic control system.	WA6TLK	SEP 10
Arachnida Warcum	Triband delta loop 30/18/12 M	VE3XI (SK)	APR 16
Build Yourself an NVIS	Talk to near stations on HF	VE2EQL	MAR 18
Guessless Beam Pointing	Modify a desk-size globe of the world.	W9PJF	MAR 34
Subdivision Subterfuge	Antenna photo essay	KD5IDU	DEC 17
Ye Olde Fishpole Vertical	Some things never change	HL1/N8HI	DEC 32
ATV/SSTV			
The Digital Port	SSTV 2001	KB7NO	FEB 51
Kiwi TV — Pt. 1	ATV 23cm FM Receiver	ZL1AAN	JAN 23
Kiwi TV — Pt. 2	ATV Exciter	ZL1AAN	JAN 26
Circuits			
All About Class D Amplifiers	What you do know can't hurt you.	W2GOM/7	FEB 18
DTMF Remote Controlling	Remote control your electrical systems.	Sanati	OCT 25
IC-706 Goes to Heil	Mate your Icom rig with a Heil headset	W5RK	DEC 37
Need a Noise Blanker?	Add to any SWL, ham, or CB receiver	Sellen	FEB 35
Transistor Bias: The Secret Story	Shore up your shaky transistor theory	W2GOM/7	JAN 18
Construction			
Beginner's Battery Charger	A simple project to get you going.	W2GOM/7	FEB 38
Build This Narrowband Tunable Filter	for receiving PSK31 signals	N2DCH	SEP 24
Build This Variable AC Bench Supply	If you can find a Variac transformer	K8IHQ	MAR 23
Crystal Oven Controller	Build this solid state regulator	WA4WDL	FEB 32
EZ-Build Preselector	Use an old broadcast Xcvr. tuning cap.	N2DCH	JUN 10
Inside Digital TV/VCR Tuners	Part 5: Decimal-to-binary conversion	W6WTU	JAN 14
Inside Digital TV/VCR Tuners	Part 6: Making your own PC boards.	W6WTU	FEB 25
Inside Digital TV/VCR Tuners	Part 7: Conclusion	W6WTU	MAR 19
Kiwi TV — Pt. 1	ATV 23cm FM Receiver	ZL1AAN	JAN 23
Kiwi TV — Pt. 2	ATV Exciter	ZL1AAN	JAN 26
Microwind to the Rescue!	Keep your emergency battery charged	WA8YKN	DEC 10
Modular Remote Coax Switch	HF switching system	K8IHQ	MAY 10
Way Cool Rocket Project, Part 1	70cm rocketborne radio telemetry	N4XVF	FEB 10
Way Cool Rocket Project, Part 2	433 MHz telemetry receiving ant.	N4XVF	MAR 10
Way Cool Rocket Project, Conclusion	70cm rocketborne radio telemetry	N4XVF	APR 18
CW, Code			
Morse Code Decoder Chart	Clever chart — NOT for taking the test.	Byers	JUN 54
Digital Modes			
"How High's the Water, Mama?"	Packet public service project	KC7IZH	MAY 16
The Digital Port	IZ8BLY Stream software	KB7NO	JAN 53
The Digital Port	SSTV 2001	KB7NO	FEB 51
The Digital Port	DigiPanning	KB7NO	MAR 50
The Digital Port	More New Stuff	KB7NO	APR 40
The Digital Port	Meet SSTV-PAL and MMSSTV	KB7NO	MAY 54
The Digital Port	Join the Digital Revolution!	KB7NO	JUN 41
The Digital Port	More New Stuff	KB7NO	JUL 40
The Digital Port	MixW2	KB7NO	AUG 42
The Digital Port	WinLink 2000 and the Airmail Package	KB7NO	SEP 41
The Digital Port	Cutting-edge hamware from DXLab	KB7NO	OCT 47
The Digital Port	Hams Make Good Use of High-Tech	KB7NO	DEC 46
DX			
Bear Island on the Air	Off the coast of North Carolina	KD4PBJ	OCT 36
"CQ ET!"	The UFO Watchtower DXpedition	WA3QLW	AUG 12
DX Forum	Changes in the Wind	N6NR	APR 46
DX Forum	Whither e-QSLs?	N6NR	OCT 42
IOTA — AS096	That's St. Mary's Island to you ...	VU2SBJ	DEC 20
Sabah — Land Below the Wind	DXpedition to 9M6	G3SWH	APR 10
SV8 from the Geranium	Mykonos is a great DXpedition	G3SWH	JAN 10
The Antenna That Never Was	Sri Lanka DXpedition	G3SWH	JUL 10
Editorials			
Never Say Die	Two Triple Zip; Yes, You Can Help!	W2NSD/1	JAN 4
Never Say Die	CAFR, Reaching That 78%	W2NSD/1	FEB 4
Never Say Die	Dayton 2001; Transfusions	W2NSD/1	MAR 4

Never Say Die	Mooned; Couple-a-Quotes	W2NSD/1	APR 4
Never Say Die	Die De Die; ITU 2003?; Money Talks	W2NSD/1	MAY 4
Never Say Die	Me, a Cash Cow?; Lake Wobe ...	W2NSD/1	JUN 4
Never Say Die	Yeah, More Mooning; Birthdays	W2NSD/1	JUL 4
Never Say Die	Abraham Lincoln; Another Conspiracy	W2NSD/1	AUG 4
Never Say Die	Ham Club Talks; Another Birthday	W2NSD/1	SEP 4
Never Say Die	Stagnant; Teaching	W2NSD/1	OCT 4
Never Say Die	A Call to Arms; The Challenge	W2NSD/1	NOV 4
Never Say Die	Surviving Bioterror; The Silver Bullet	W2NSD/1	DEC 4
Education			
Way Cool Rocket Project, Part 1	70cm rocketborne radio telemetry	N4XVF	FEB 10
Way Cool Rocket Project, Part 2	433 MHz telemetry receiving ant.	N4XVF	MAR 10
Way Cool Rocket Project, Conclusion	70cm rocketborne radio telemetry	N4XVF	APR 18
Emergency Preparations			
Disaster Overkill	How prepared are you?	KLØXK	APR 23
Do YOU Want to Help Out?	Organizations	KE8YN/4	JAN 52
One More Hospital Test	This time, you play doctor.	N8SUA	SEP 27
On the Go	Springtime SkyWarn	KE8YN/Ø	APR 48
On the Go	"Proudly Serving Those Who Serve"	KE8YN/Ø	AUG 37
On the Go	You be safe out there!	KE8YN/Ø	OCT 54
Field Day			
Field Day 2000 with the Xerox ARC	Field Day in El Segundo CA	W6WTU	JUN 32
Field Day Follies	Reprinted from The Hertzian Herald	K8JWR	JUN 35
Hamsats	Summer and Field Day!	W5ACM	JUN 44
Hamsats	Field Day 2001	W5ACM	SEP 34
Gadgets			
Movable Microphone Boom	Why not operate like a pro?!	W4DXV	SEP 20
General Interest			
Amazon Death Flight	Missionaries shot down by Peruvians	W8NXD	AUG 10
"Back later today, dear...."	Tomorrow's hamfest today	VK3CQE	AUG 29
Bookbind THIS! — Part 1	Get organized, and save money too.	W6WTU	MAR 31
Bookbind THIS! — Part 2	Bindings	W6WTU	APR 29
Bookbind THIS! — Part 3	Conclusion	W6WTU	MAY 32
Bring Back the Magic!	Is this guy living in a dream world?	G3LDI	JUN 20
Cleanin' and Climbin'	Hams get involved again.	W6WTU	OCT 33
Gold Is Where You Find It!	My first on-the-air experience.	W2UW	SEP 31
Hamfest Loser	Reprinted from The Hertzian Herald	K8JWR	JUN 52
Helsinki or Buzz!	Trip to OH-land	G3SWH	DEC 38
"How High's the Water, Mama?"	Packet public service project	KC7IZH	MAY 16
On the Go	Just What Does "Amateur" Mean?	KE8YN/Ø	MAY 47
On the Go	Get the ham radio message out.	KE8YN/Ø	DEC 53
Radio Brat	Bill Jackson W6HDP	W2GOM/7	JUN 36
SK Night — the REAL Meaning!	This guy is pretty spooky.	AA2JZ	OCT 40
Travels with Henryk — Part 1	SMØJHF shares photos and fun	SMØJHF	DEC 30
The Builder's Dozen	Uncommon uses for common stuff.	AA2JZ	DEC 36
Vaya Con (Ra)Dios — Part 3	Madrid and Valencia	WB2AQC	JAN 29
When Computers Were Only Dreams ...	You read about them in 73.	K1NUN	SEP 28
Mobile/Portable			
On the Go	Pocket APRS	KE8YN/Ø	JUL 47
On the Go	The Right Tool	KE8YN/Ø	SEP 40
New Products (by manufacturer)			
Alinco	DJ-596 Dual-Band HT	Staff	OCT 48
Alinco USA	DJ-X2000 HT Scanning Receiver	Staff	FEB 48
Alinco	DJ-X3 Scanning Receiver	Staff	DEC 48
Alinco	EJ-43U Digital Voice Comm. board	Staff	OCT 48
Am-Com Inc.	Frequent Buyer's Club	Staff	SEP 48
AOR	AR8600 Wide-Range Receiver	Staff	MAY 48
Bliss Z MatchMaster	Motorized HF tuners	Staff	SEP 48
Buckmaster	HamCall CD-ROM	Staff	MAY 48
Creative Services Software	Log Windows version 3.07.33	Staff	JUL 48
Creative Services Software	PkTerm '99 Version 1.5	Staff	DEC 48
Creative Services Software	SafeTenna for 2m	Staff	SEP 48
Cutting Edge Enterprises	The Hold-It NEO™	Staff	JAN 48
Gordon West Radio School	Code Learning Instructor Cassettes	Staff	JAN 48
Gordon West Radio School	Code Learning Instructor Cassettes	Staff	MAR 48

Hamcalc	Version 48 software on CD-ROM	Staff	FEB 48
Hamcalc	Version 50 software on CD-ROM	Staff	MAY 48
Icom	IC-910H satellite radio	Staff	MAR 48
Kenwood	Group Video Offer	Staff	MAY 48
MFJ Enterprises, Inc.	Antennas: From the Ground Up	Cebik	MAR 48
MFJ Enterprises, Inc.	MFJ-297 Professional-grade Desk Mic	Staff	JAN 48
MFJ enterprises, Inc.	MFJ-394 Left Ear boom mic	Staff	JAN 48
MFJ Enterprises, Inc.	MFJ-434 Contest Voice Keyer	Staff	JAN 48
MFJ Enterprises, Inc.	MFJ-1717PL Back-of Radio Antenna	Staff	FEB 48
MFJ Enterprises, Inc.	MFJ-4312 Regulated Power Supply	Staff	FEB 48
MFJ Enterprises, Inc.	MFJ-4322 power supplies	Staff	FEB 48
Morse Express	Christmas Key	Staff	DEC 48
Oak Hills Research	OHR 100A QRP CW transceiver	Staff	JAN 48
Palm Radio	Mini Paddle System (Morse Express)	Staff	OCT 48
Rockwell Collins	Propagation Software	Staff	JUL 48
SGC	SG-239 Smartuner Antenna Coupler	Staff	JUL 48
Universal Radio	A Family Affair — The R.L. Drake story	Staff	MAR 48
Universal Radio	Grundig Satellit— All Models ...	Staff	MAR 48
Wireless Industry Assn. & N5CNN	Ham Radio Market Web Site	Staff	SEP 48

Power Supplies

Bare Bones Battery Booster	Constant current charger	NØGJ	DEC 23
Build This Variable AC Bench Supply	If you can find a Variac transformer	K8IHQ	MAR 23
Power Supplies Explained	The esoteric facts.	W2GOM/7	JUL 16
The Cheapest Supplies Ever	Surplus computer power supplies	W6WTU	SEP 10
The Wall-Wart Bible	Troubleshooting techniques	KJ4W	AUG 14

QRP

QRP	On to the HW-9	WB8VGE	FEB 54
QRP	More HW-9	WB8VGE	MAR 43
QRP	Remembering the "Drift-o-matic"	WB8VGE	APR 54
QRP	Neat Stuff Wish List	WB8VGE	AUG 40
QRP	Antenna Talk	WB8VGE	SEP 45
QRP	Troubleshooting	WB8VGE	OCT 46
QRP	QRP-pourri	WB8VGE	DEC 45
QRP Asylum That Almost Closed	The mad building spree continues	NY9D	OCT 30
QRP Asylum Update	The latest from our build-crazy ham ...	NY9D	JUL 23
QRP Drives Ham Nuts	Mini reviews	NY9D	MAR 28

Radio Direction Finding, Fox Hunts

Homing In	A New Millennium for Foxhunting	KØOV	JAN 47
Homing In	Albuquerque Invites the World ...	KØOV	FEB 46
Homing In	Your RDF Questions Answered	KØOV	MAR 39
Homing In	Foxhunting: Melbourne to Nottingham	KØOV	APR 51
Homing In	Find Foxes and Fight RFI with RDF	KØOV	MAY 36
Homing In	RDF Secret Weapon Revealed	KØOV	JUN 47
Homing In	Secrets of the RDF Whirligig	KØOV	JUL 43
Homing In	Bringing RDF and Am. Radio to Teens	KØOV	AUG 46
Homing In	Texas Teens Track Transmitters ...	KØOV	SEP 36
Homing In	Wildlife tracking update ...	KØOV	OCT 55
Homing In	ARDF Championships, Part 1	KØOV	DEC 54

Repeaters

Portable Personal Repeater	Handy, inexpensive, and fun!	WB6IQN	FEB 23
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Reprints

Field Day Follies	Reprinted from The Hertzian Herald	K8JWR	JUN 35
Hamfest Loser	Reprinted from The Hertzian Herald	K8JWR	JUN 52
Read All About It!	Part 5 ... from The Hertzian Herald	K8JWR	MAR 56
Read All About It!	Part 6 ... from The Hertzian Herald	K8JWR	APR 32
Read All About It!	Part 7 ... from The Hertzian Herald	K8JWR	JUN 24
Read All About It!	Part 8 ... from The Hertzian Herald	K8JWR	JUL 34
Read All About It!	Part 9 ... from The Hertzian Herald	K8JWR	AUG 33
Read All About It!	Part 10 ... from The Hertzian Herald	K8JWR	SEP 22
The History of Ham Radio	Part 4: The early 1920s	W9CI (SK)	MAR 53
The History of Ham Radio	Part 5: The first convention.	W9CI (SK)	APR 36
The History of Ham Radio	Part 6: Across the Atlantic	W9CI (SK)	JUN 28
The History of Ham Radio	Parts 7 & 8: Broadcast and early '20s	W9CI (SK)	JUL 50
The History of Ham Radio	Parts 9 & 10: Portable; experimenting	W9CI (SK)	AUG 50
The History of Ham Radio	Parts 11 & 12: More 1920s; The IARU	W9CI (SK)	SEP 50

Reviews (by manufacturer)

Hamtronics	Air Hamtronics	N6NR	MAY 44
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Idiom Press	Thumbs Up for ROTOR-EZ	K5LAD	JUL 31
Kenwood	Kenwood's Hot New TS-2000, PT. 1	N6NR	MAY 23
Kenwood	Kenwood's Hot New TS-2000, PT. 2	N6NR	JUN 13
Outreach	Up-'n'-at-'em Stealth Vertical	WB3CEH	JUN 18
Raibeam	Antennas	K7GCO	DEC 24
Small Wonder	Build the PSK-20 QRP Kit	W4DXV	SEP 18
Telex/Hy-Gain	AS-2259 man-pack antenna	VE2EQL	AUG 27
Reviews (by product)			
Outreach 500 antenna	Up-'n'-at-'em Stealth Vertical	WB3CEH	JUN 18
PSK-20 QRP Kit	This transceiver is a Small Wonder.	W4DXV	SEP 18
QRP Drives Ham Nuts	Mini kit reviews	NY9D	MAR 28
Raibeam antennas	RF Inferno	K7GCO	DEC 24
R-121 Aviation Receiver	Air Hamtronics	N6NR	MAY 44
ROTOR-EZ	Thumbs Up for ROTOR-EZ	K5LAD	JUL 31
TS-2000	Kenwood's Hot New TS-2000, PT. 1	N6NR	MAY 23
TS-2000	Kenwood's Hot New TS-2000, PT. 2	N6NR	JUN 13
AS-2259 man-pack antenna	Surplus Find ...	VE2EQL	AUG 27
Satellite Operation, EME, Space			
All Aboard for ARISS ...	Amateur Radio on the ISS	KA3HDO	NOV 40
A Modest Proposal	S-band has come of age.	G3RUH	NOV 50
AMSAT, Where to Next?	The prez tells us.	VE3FRH	NOV 58
Build the FODTrack	A low-cost tracking interface.	KA0YOS	NOV 26
Hamsats	AMSAT 2000 Space Symposium	W5ACM	JAN 43
Hamsats	Aloft at Last — AMSAT-OSCAR-40	W5ACM	FEB 43
Hamsats	AO-40 Update	W5ACM	MAR 46
Hamsats	SUNSAT Sunset	W5ACM	APR 44
Hamsats	AO-40 at Home	W5ACM	MAY 52
Hamsats	Summer and Field Day!	W5ACM	JUN 44
Hamsats	Hams in Space	W5ACM	JUL 38
Hamsats	Modes Explained	W5ACM	AUG 38
Hamsats	Field Day 2001	W5ACM	SEP 34
Hamsats	Welcome, Newcomers!	W5ACM	NOV 10
Hamsats	New hamsats in orbit	W5ACM	DEC 51
Hamsats Awards	Join the fun!	KK5DO	NOV 46
Microwave Antennas for AO-40	The expert speaks.	GM4PLM	NOV 17
Modifying the TranSystem 3733	For Mode S	KA0YOS	NOV 24
Practical RF Ground Stations	For AMSAT AO-40	GM4PLM	NOV 11
Risky Business	A way to describe designing AR sats.	K5NRK	NOV 53
The PCSat APRS Satellite	More fun on the horizon ...	WB4APR	NOV 33
What IS an EasySat, Anyway?	Now you know.	K5OE	NOV 29
Software			
Inside Digital TV/VCR Tuners	Part 5: Decimal-to-binary BASIC	W6WTU	JAN 14
Test Equipment			
\$5 Infrared Remote Tester	Test infrared transmitting devices.	WA9PYH	MAR 26
Beginner's PS Tester	Try this variable active load.	WB9YBM	DEC 40
CTCSS Encoder-Decoder Test Device	Useful piece of equipment.	W6WTU	OCT 16
Tutorials			
All About Class D Amplifiers	What you do know can't hurt you.	W2GOM/7	FEB 18
Bookbind THIS! — Part 1	Get organized, and save money, too.	W6WTU	MAR 31
Bookbind THIS! — Part 2	Bindings	W6WTU	APR 29
Bookbind THIS! — Part 3	Conclusion	W6WTU	MAY 32
Inside Digital TV/VCR Tuners	Part 5: Decimal-to-binary conversion	W6WTU	JAN 14
Inside Digital TV/VCR Tuners	Part 6: Making your own PC boards.	W6WTU	FEB 25
Inside Digital TV/VCR Tuners	Part 7: Conclusion	W6WTU	MAR 19
On the Go	Attention, Newcomers!	KE8YN/Ø	JUN 46
Preventive Brain Surgery for Icom Xcvrs	Protect your Icom's memory.	KI4RK	MAY 40
Return of the Wavemeter	Nostalgia? Fun project? Or both?	W6WTU	AUG 19
The Wall-Wart Bible	Troubleshooting techniques	KJ4W	AUG 14
Transistor Bias: The Secret Story	Shore up your shaky transistor theory	W2GOM/7	JAN 18
VOM Primer	Volt-Ohm-Milliammeter overview	W2GOM/7	DEC 28
Your Long-Lost Transistor Notebook	Part 1: Collecting data	W6WTU	JUL 27
Your Long-Lost Transistor Notebook	Part 2: Characteristic curves	W6WTU	AUG 24
Your Long-Lost Transistor Notebook	Part 3: Power dissipation	W6WTU	SEP 14
Your Long-Lost Transistor Notebook	Part 4: Calculating resistor values	W6WTU	OCT 21
VHF/UHF			
Above & Beyond	Channel Master 11.7 to 12.2 GHz LNB	WB6IGP	DEC 42

The Peet Brothers Ultimeter 2000

A weather station with hams in mind.

There is a peculiar fascination among ham radio operators for the weather. Among hobbyists, perhaps only pilots and fishermen share such a passion for knowing what the weather is doing and what that might mean for the future.

Many ham radio practices are based on the condition of the sky, the sunspot cycle, and the time of day. There are also various myths. For example, most hams believe that antennas constructed during bad weather will perform better than those erected under blue skies and sunshine. Perhaps some of it is because of the problems with QRN, the noise created on the radio caused by storms. Of course, there is nothing as impressive as watching every coax connection tossed outside on Field Day when thunder is heard in the distance.

As weather spotters for the National Weather Service, we have the perfect excuse to chase Mother Nature when she is having a bad day. Of course, SkyWarn, our weather spotting service, is an important service performed by the Amateur Radio Service, as well as one of the most exciting roles we fulfill.

I admit that I am just as much of a weather nut as the next ham, and as such there was one thing I knew I needed to add to the ham shack — a weather station. Today it is possible to connect weather-sensing devices to a computer and monitor the results on a continuing basis. As any meteorologist

will tell you, the discrete readings may be interesting, but the trend may be more helpful in determining what the weather may be in the future. Of course, the professionals have a few other tools available, such as weather satellites and Doppler radar, but you get the general idea. On the other hand, there are certain tools that have always been the mainstays for any weather station, and even without the multimillion dollar pieces, a good weather station can be designed.

The best news is that the tools needed to monitor the weather are not only easy to use and easy to interpret, but they lend themselves to interconnection via amateur radio. The most common mode for weather reporting is APRS — the Automatic Position Reporting System — which was originally developed by Bob Bruninga WB4APR. Since APRS automatically indicates the location of a given station, it already provides one of the key data points for collecting weather

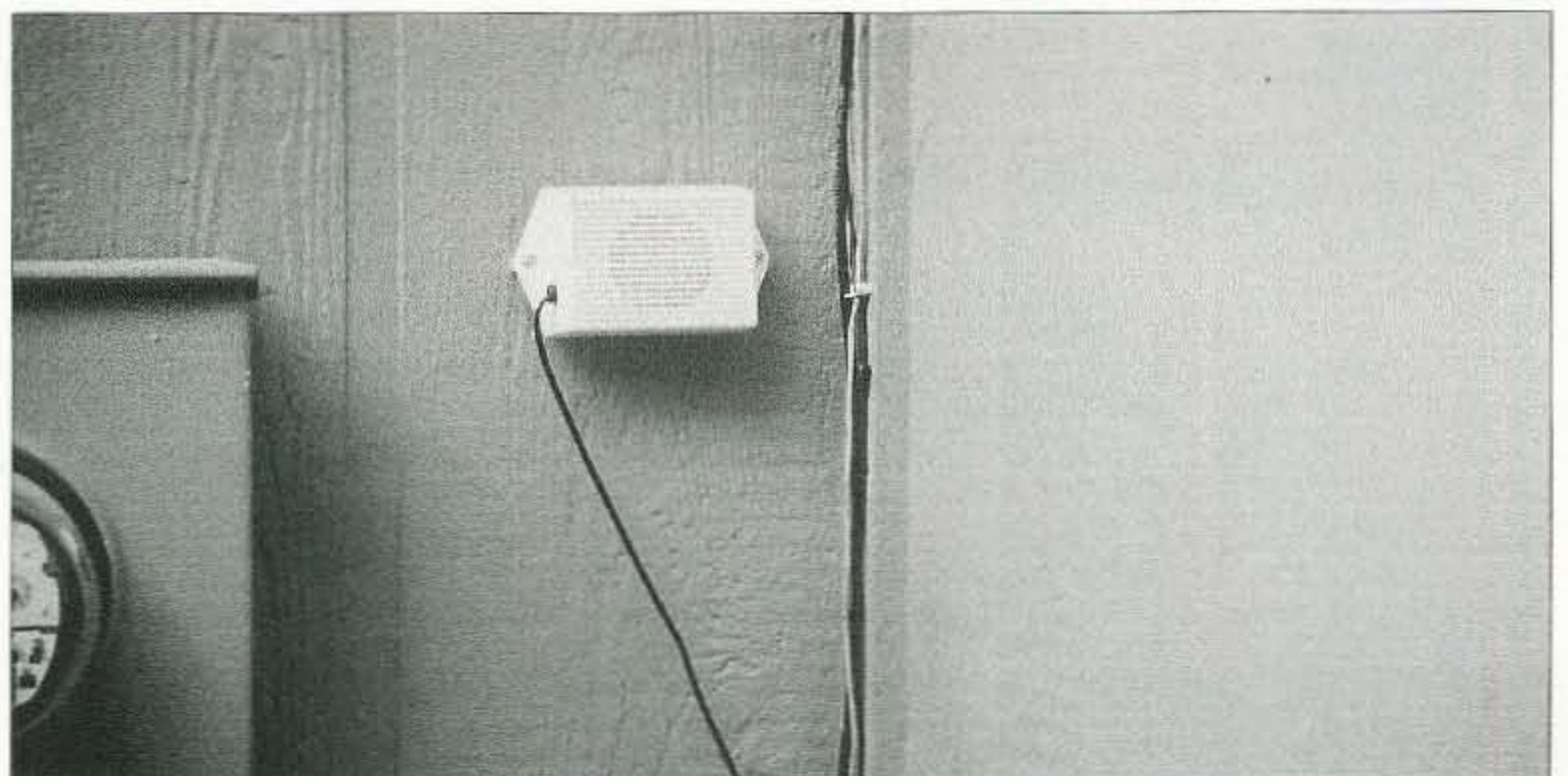


Photo A. One of the attempted locations for the temperature/humidity sensor. Warm air from the air conditioning unit required it to be moved. When the final location is determined, make sure you leave a loop of cable so that moisture can drip off the cable.

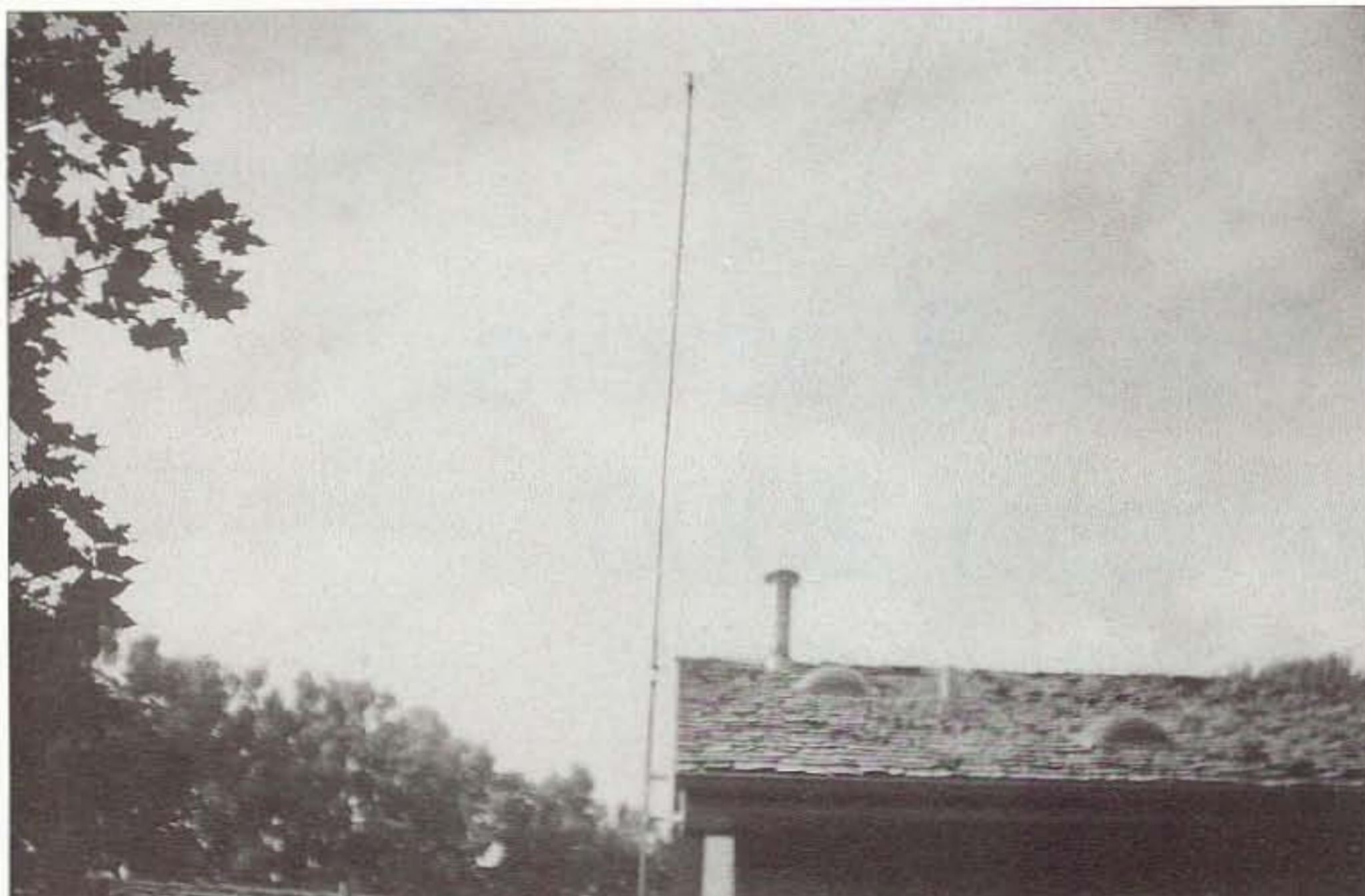


Photo B. Wind speed and direction detector mounted on television mast to adequately clear turbulence as wind crosses the roof. Notice the balun attached to the mast at the roof top level — allows for the mast to do double duty.

information. It is possible to use APRS to display weather information to other ham stations and via IGate stations, for this information to be available through the Internet. Because of APRS, the station location is shown on a map displayed on a computer. You can click on the station icon to access the weather information, or you can set the APRS program to display all weather data, and even limit the display to weather stations!

Many APRS programs have the ability to accept hand-entered weather data, but most of us would prefer not

to make a periodic trip to the thermometer, barometer, etc., and then enter that information into the computer. Hams are, after all, gadget nuts, and there are appropriate technological tools to perform these services for us. Although there are a number of manufacturers, I had heard a number of positive attributes about Peet Brothers and decided to see if their weather station could meet my needs. The Peet Brothers Ultimeter® 2000 appeared to meet virtually every requirement I might have for the home weather station. It is a modular system



Photo C. From the front of the house, the wind vane is visible, but not intrusive.

that is easy to assemble, easy to use, and extremely easy to interface with an APRS station.

The U-2000 is composed of a junction box, a display unit, and an impressive selection of sensors. The junction box is a type of a hub that provides a unit into which the other units are connected. It is also where the power supply is connected, and lends itself to being located in an out-of-the-way location. This means that the usual clutter of wires we find with computers and radios does not need to be right in the middle of the ham shack. It can be wall-mounted, although I elected to place mine above the ceiling tiles of the drop ceiling in the ham shack. Only two cables might need to be located in a visible area: the power supply with its “wall wart”-type transformer, and the cable that connects to the display unit. If properly installed and carefully located, this is a device that even the XYL could tolerate or even enjoy.

When I first received my unit, I pawed through the box like a seven-year-old at Christmas. The configuration I received included quite an array of components. There were the basic units plus a temperature sensor, a combination temperature and humidity detector, a wind gauge and a rain gauge. I examined each item. Then, holding my heartfelt desires in check, I pulled out the instruction manual. I have to admit that this is one of the easiest-to-read manuals I’ve ever had the pleasure to use. It is well written in real English and is geared toward the person who just got a weather station, not toward other engineers. At 47 pages, it manages to provide all the relevant information without a lot of extraneous trivia. There is even a “Quick Start Guide for those who don’t have time to read instructions (and those who do).” This is enough to get things started without taking the time to read the whole manual. Or, if you do read the whole manual, you can claim that you only read the Quick Start and keep your reputation as a technological guru intact.

There is almost no assembly required for this equipment. The various units need to be interconnected, of

course, but almost everything is ready to go from the box. The wind gauge is a combination anemometer to measure wind speed and weather vane to determine wind direction. The anemometer utilizes three cups that revolve in the presence of a wind. The cups need to be installed, but that is a job that requires no tools and takes only a few minutes. There are clear directions in the manual ensuring that they are installed in the proper orientation. If you purchase the optional rain gauge, the body must be removed from the base and the base mounted on a suitable sheet of plywood, plastic, or other material. For all intents and purposes, that is the extent of the assembly. Other than that, it is an exercise in connecting cables.

Most of the cables use the same plug and jack arrangement as modular telephones. Others have a different configuration to prevent inadvertently confusing cables and connecting them where they don't belong. Probably the most important message from the manual was to connect everything together before unwinding the cables in order to test each item. They even recommend that if extension cables are going to be used, they be placed in the circuit during the testing phase.

Being an honored graduate of the School of Murphy's Law, this seemed like good advice. I ran through the tests as indicated in the manual, and each item seemed to function properly. This raised my confidence level so I felt that when I decided on a final location, this equipment would work properly.

There is a battery compartment on the back of the display unit, and I had installed the required 9-volt battery without a second thought. What I had overlooked in the manual is that the battery serves the same function as the battery in the average alarm clock. It provides a backup but is not intended to operate the unit for any extended period of time. When I went back to the unit a few days later, I was greeted by a nonworking unit. A new battery and plugging in the power supply solved the problem. It is the little things that must be watched, and I decided that I

really needed to take a few minutes to read through the short owner's manual.

Satisfied by the manner in which everything seemed to work, and with my familiarity with the U-2000, I began to give some thought as to how I would install the various components. My neighborhood has had covenants and restrictions that have expired, but I did not want to make a highly visible statement that would offend my neighbors. On the other hand, there are certain requirements and recommendations that are clearly enumerated in the manual. I took the manual out to the back porch, and alternated between reading the manual and walking around the back yard staring at the roof. It was late on Sunday, and I knew I had at least a week until I'd have time to start the installation of the sensors. If any of my neighbors had been watching when I was grilling dinner a couple of nights later, they probably would have wondered why the roof attracted my attention as much as what was on the grill. I wanted to make sure that each sensor was mounted so as to give the most accurate reading.

My expectation as to what would be easy and what would be a challenge was not quite accurate. I expected the wind gauge to present the biggest challenge, and although there were a few issues, it went up relatively easily. On

the other hand, the temperature sensor seemed to present no visible challenges, but did provide a few interesting twists and turns.

I decided that the easiest part to install would be the temperature sensor. Actually, there are two choices: a discrete temperature sensor and a combination temperature and humidity sensor. I highly recommend the combination unit, because humidity is a very useful weather indicator and both are extremely easy to install. The temperature indicator is a small cylindrical probe that requires only one screw. The combination unit is a small box mounted with two screws onto standoffs to a wall or other flat surface so that air can flow all around the unit. It must be located so that it is not exposed to direct sunlight and somewhat protected from rain and snow. One recommended location is at the top of a wall under an eave, which was the first location I tried. Installation was relatively quick and painless. At least four feet of the cable needs to be outside to ensure accurate readings. Finally, add a drip loop, a section of the cable that droops below the sensor so that moisture can drip from the low point without getting into the sensor. I carefully dressed the cable by attaching it to the wall with cable clamps, and

Continued on page 38

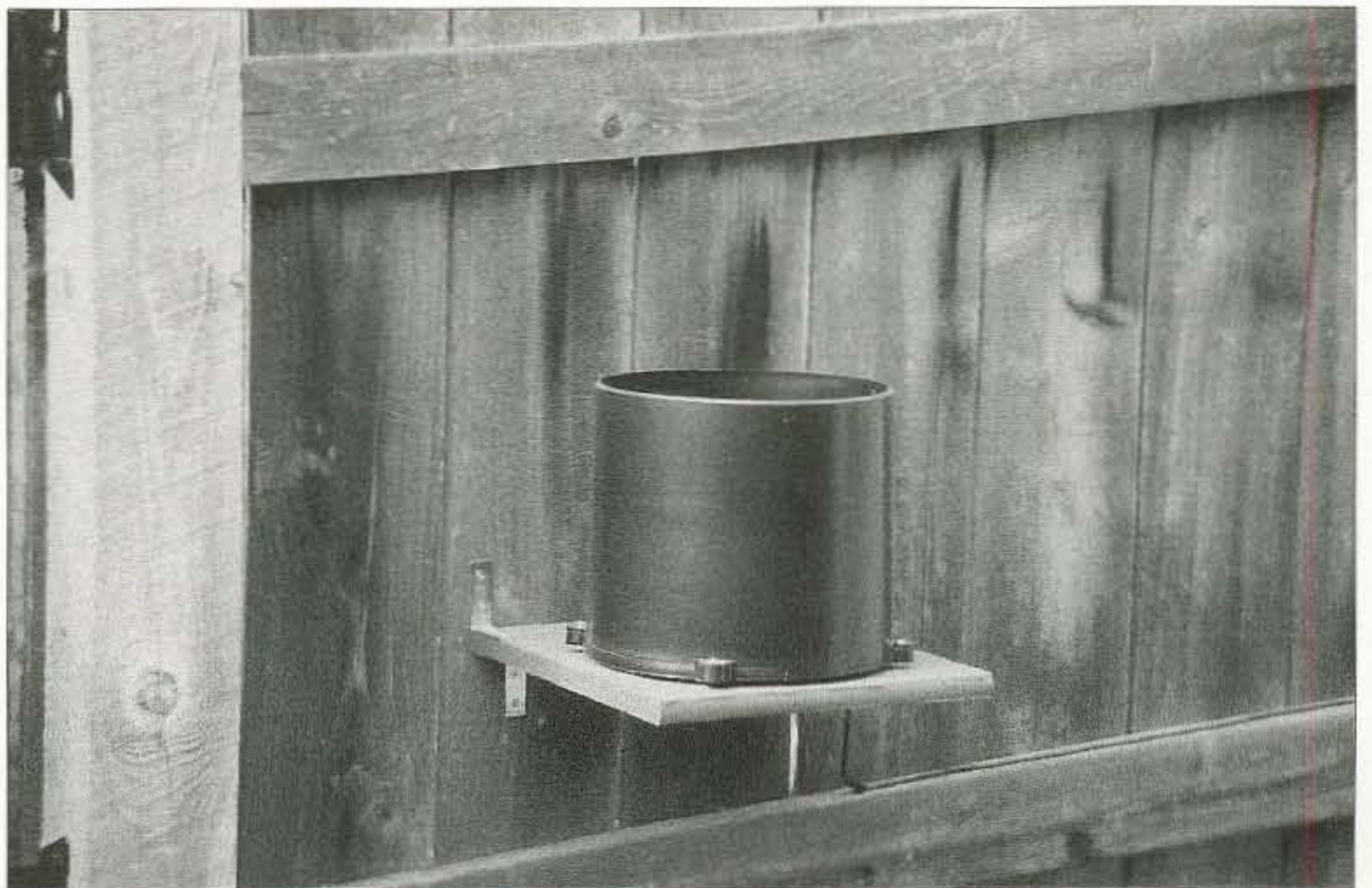


Photo D. Rain detector mounted on back of privacy fence. It would be better in the open, but this keeps it a little more secure from my playful three-year-old son.



Photo E. The "brains" of the Peet Brothers Ultimeter 2000, showing display of the data and the control panel. The unit is connected to the computer below and from there to the TNC and 2-meter rig for APRS operation.

The Peet Brothers Ultimeter 2000

continued from page 37

moved on to my next task. Unfortunately, I hadn't completely thought through my sensor location.

Under an eave may be a good location, but where I had installed the sensor was at a junction of a wall and a short outcropping that met at a 90-degree angle. This allowed air to stagnate in the location. Even worse was the fact that the location was in the flow pattern of the air conditioner compressor. As summer temperatures rose, the sensor began to read about ten degrees too high because of the hot air from the air conditioner. I had to move it twice before I was satisfied with the results. My advice? When locating the temperature and humidity detector, install it but leave the cables loose. The owners' manual calls for at least four feet of cable to be located outside, so plan on at least that much. Give the unit about a week so that you can compare your temperatures with the weather bureau and other weather stations. If you're within a few degrees, then you probably have it located properly. Once you're confident in your location, then dress the cables accordingly.

Lessons learned from the temperature and humidity sensor? Keep the

unit out of direct sunlight, allow for adequate airflow around the unit, and keep it out of unusual air flows. These include pockets of trapped air, or air discharged from a heating or cooling unit.

My next step was the wind gauge. This looks a lot more impressive than it really is, but careful thought is appropriate. The wind gauge needs to be mounted high enough so that it is reading direct wind, not wind that has changed course over a rooftop or other obstruction. This is generally going to require that the wind gauge be mounted at least five feet above the roof. Don't expect to use the chimney as a mount, because the fumes produced in a furnace or fireplace during combustion are highly corrosive and will have a negative impact on your wind gauge. Heavy walled pipes, soil stacks, etc., are also not recommended because the wind gauge works by magnetic action and thick ferrous materials can have a significant impact. PVC or other plastic pipe is too flexible, and any sway can cause reading errors. The mounting material of choice is antenna mast such as would be used for a lightweight beam or TV antenna (remember those?).

I expected to use one ten-foot section of TV mast located at the peak of my roof to get the wind sensor well

above the roof. Unfortunately, there was not enough wood on the fascia at the peak to mount the standoff hardware. After a lot of head scratching, I moved the location to the back of the house, where there was enough material to hold my lag bolts. It looked like it was adequately above the roof line, although I confess I did not crawl around the roof with a tape measure.

Naturally, the distance from the wind gauge to the junction box was about 15 feet longer than the included cable. This is a relatively easy problem to solve, but it must be approached with care and thought. As I mentioned earlier, many of the cables use modular plugs identical to those used in telephones. Extension cables are available from Peet Brothers, or you can use telephone cables. If you use off-the-shelf telephone cables, it is important to make sure they have four conductors and not merely two, as is the case in some "bargain" cables. I decided that I would make my own cables using a heavier-duty cable and attaching the modular plugs with a plug-crimping tool. This seemed to go well, although double-checking the orientation and conductivity is critical. I used (what I believed was) a high-quality connector between the wind gauge cable and my extension. I then wrapped the connection with the popular nonhardening black putty-like coax seal. I do not recommend this, since I began to have erroneous readings within a week. Turns out that the coax seal got soft enough in the summer sun to ooze into the connector and cover some of the connecting points. After cleaning up the connectors, I wrapped the connecting block with electrical tape and then added the coax seal over top of the tape. This seemed to work much better.

My readings still were somewhat suspect, though. They appeared to read correctly from some directions but not from others. This seemed to indicate that the wind gauge was mounted too low and I was getting some turbulence from the roof. Time for one more trip to the roof to add a second ten-foot section of antenna mast. This seemed to do the trick.

Companionship

The ideal companion for the Peet Brothers Ultimeter 2000 is WinAPRS. The latest version at the time of this writing is 2.5.1, which interfaces well to the weather station. Keith and Mark Sproul have been doing a fantastic job of keeping this software up to date. Some of the latest features I like include the ability to interface to a download of the FCC database so that clicking on a station icon can be used to identify the ham by name and address. Kind of nice when tracking mobile stations or for determining details about weather reporting stations.

You can set the parameters that you want displayed for other weather stations, and with one button click into weather mode. By doing this, only weather stations and their data is displayed. It is also possible to display zones under weather advisories with a single button. This shows areas experiencing watches and warnings.

The latest downloads are available at [<http://www.tapr.org>], or [<http://www.aprs.rutgers.edu>].

Lessons learned from the wind gauge? When in doubt, put the unit a little higher. Make sure that if you use an extension to the cable it is robust, has all the right wires and connectors, and is well protected from all the elements, not just moisture. One other thing to mention is that the wind gauge must be properly oriented to the north. The mount is marked on the gauge itself, but this is not visible from ten or twenty feet below. Once you mount the wind gauge on the mast, mark the "North" at the bottom of the mast to make your life easier.

The last piece to add outside the house was the rain gauge. This looks like a small bucket with a wire running from the bottom. As I mentioned earlier, it will need to be attached to a base of some type. I chose inch plywood. When you take the rain gauge apart to mount the base, you'll see how the mechanism works. The bucket is really a

large funnel that feeds into a "see-saw arrangement" spoon that allows the rain to be measured in increments of 0.01 inch. The rain gauge must be mounted level, and ideally it will be located well out in the open. Rain, as we all know, rarely falls straight down. I did not have a truly open location, and out of deference to the neighborhood, I mounted it on the back of the privacy fence. Not ideal, but it is in a location where my three-year-old son cannot reach it and (hopefully) will not use it as a basketball goal. I would mount it on the roof, but am concerned that if it got clogged with leaves or became the site for a nest, I might not be aware of that. I mounted the plywood base to the fence with galvanized "L" brackets.

Lessons learned from the rain gauge. Either this was getting easier, or I was getting smarter.

The barometer was the easiest of all. A sensor within the display unit itself measures the barometric pressure. There is no installation requirement, but it is necessary to calibrate it to the

correct barometric pressure. Barometric pressure varies with altitude, so this needs to be calibrated to the local weather station. I tuned the two-meter scanner to the local NOAA weather station and waited for the barometric pressure to be announced. It seems that NOAA announces barometric pressure in inches of mercury and APRS in my area uses millimeters. Fortunately, the Peet Brothers U-2000 can be set to the commonly used measurements, so I calibrated the unit to the weather bureau in inches, then switched it to read in millimeters.

I carefully routed all the wires, including the power supply, to the junction box. I mounted the display unit on the desk stand supplied with the kit and placed it on top of my APRS computer. I now had a working weather station.

The LCD display requires a few key pieces of data to be entered in order to provide accurate information. This

Continued on page 57



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Me 'n' M.E.

This month, you are among the first to know I have finally succumbed to the lure of modern-day technology. I am writing this January column on the new whiz-bang 1.2 GHz wonder-machine.

It took a long time to convince me of the necessity. No, it is not a Christmas present, though the XYL said it was, even if the purchase was in August. I think the push came as she saw how much ham software was accumulating on the hard drive of "her" last year's Christmas present. I had found plenty of software to fit the needs of the speed-challenged ham computer user, but I kept looking at the new stuff you guys were interested in and much of this was faring poorly on the old 120 MHz machine.

The new machine showed me some features I had never before experienced on certain software. That is fun and I will tell you about them as I explore.

The transition did not occur as smoothly as one would hope. The fancy new hardware only comes with the Millennium Edition (M.E.) operating system installed. Seems as though a Windows™ operating system should act about like previous systems and the last one of those I had take a dive on me was Windows 3.1.

Surprise! It took about a week and M.E. crashed, as in "deader than a doornail." Previous phone calls to the Help line of the manufacturer had led me to believe I should explore restoration myself. I dug out the disk marked M.E. restoration and hunted for documentation. Instructions appeared to dwindle after the "insert disk" portion.

I persisted. It was not exactly a walk in the park, but by crawling inside the head of the designer of the disk, it came off pretty well. I found it was possible to restore the entire operating system and that, other than two ham programs, all were intact and ready to use following the learning experience. Pretty slick. Estimated recovery operation time — two hours.

As I didn't understand everything I saw when I was through with the major part of the recovery, I called the manufacturer Help line again. It is good to keep them apprised

of your activities. They are often curious what people actually do with their equipment, and our ham applications mostly threaten their sense of control. I wonder if a ham ever answers a nonham computer component Help line. It would be nice to be on the same page with someone just once.

Suspicious confirmed! I was dealing with a group who were nearly as much in the dark as I was. When I told them what I was doing, their response was an incredulous, "You ran the recovery disk and got it going all by yourself?" I got the feeling they were having trouble leading folks through this exercise over the phone. Just a surmise on my part, mind you, but the confidence level diminished after that conversation.

Anyway, it appeared I was headed for a long battle with a lemon computer. But ... strangely, that seems to be in the past. Maybe M.E. just had to become accustomed to Nevada air, but it is working superbly and getting better by the day. 'Nuff said on the woes of new computer buying. I don't know where a person should purchase a new computer. I think the sales programs are a bit overkill, and the promised service is something you have to force the issue on, regardless of the vendor. I will refrain from mentioning the name of this one.

I did purchase a 19-inch monitor. This is the really necessary new feature, almost as much so as the faster CPU. I have not explored all the ham programs as yet, but I am finding much greater operating convenience with this added space. Of course, it occupies a much larger footprint than the teensy 15" monitor. I see that can be alleviated with just another measly \$1k or so for a flat monitor, but there is a budget. I also looked at a 22" monitor, but those folks were still a bit too proud of that size for me to even consider it.

One of the remarkable things about the M.E. operating system is most of my previous

software works just as well as it did on Win95 and 98. Not all, but as an instance, I happen to like this old version of Microsoft™ Word which was written originally for Windows 3.1 and it is running just fine on this system as well as it did on 95 and 98. I see no advantage, for my purposes, to upgrade to anything else. Plus, I don't like the idea of having to run an Internet browser to make a word processor function. No one has adequately defended that nonsense to me as yet.

(Since I made the last statement, I found the spell check module got lost on installation. Tried a quick fix. Maybe there is none. Had to do the check on another computer. Darn, don't quite have that homey feeling yet.)

As I mentioned, I have not had a chance to install and run all the ham software available as yet. MixW 2 works great, and it is one where some of the features are finally coming to life with the new speed. It was working adequately for casual communications at 120 MHz, but now it does all the basic stuff and, bit by bit, I am finding things such as the connection to the Webcluster works where it never did before.

More freebies for you

WinWarbler and the other DXLab freeware works just fine as far as I have gone with them at this writing. There are more new and wondrous works on the DXLab site. I see rig control has expanded to Kenwood and Yaesu. That should bring a whole new group of followers to some very nice software.

Plus, I see the new release of WinWarbler 2.0.0 in the past few days has added new modes. Well, at this writing, it appears RTTY has arrived in the soundcard mode using the MMTTY Engine. But — there is a Big Plus which I will have to defer experimenting with for a week or so.

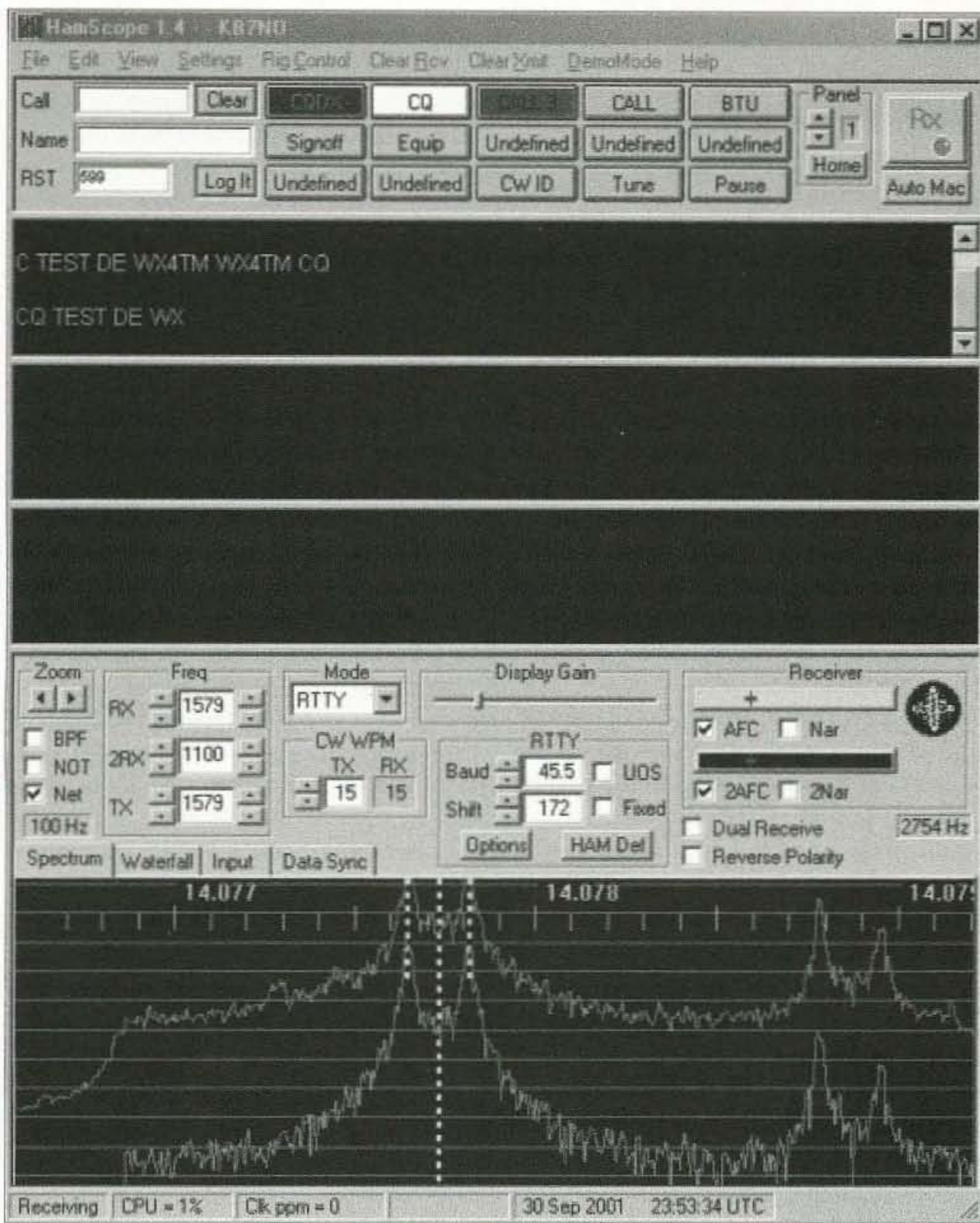


Fig. 1. HamScope 1.4 screenshot — This is a somewhat skewed shot (see text) of the HamScope format using the spectrum display instead of the waterfall. This is a very nice spectrum display with the sensitivity adjustable from the “front” of the screen. The waterfall option is very good also. Easily tuned with either option. The two top panes are for receive, and in PSK31, you can easily track two signals at a time. The third pane is the compose area where you type ahead while the other station is transmitting. This was displayed on the 19-inch monitor. This and the rig control screenshot were on the monitor at the same time. The image was cropped and became two images in order to fit the page and retain the sought-after resolution. This is a slick little package of freeware in use by a lot of satisfied hams.

It will also control the PK-232MBX or the KAM controller. I am led to understand that this allows full control of these controllers by using DOS commands. Script files are in evidence to make this all come together. This means you can work RTTY, Pactor, CW, or whatever mode your controller provides. Sounds intriguing. Maybe a better phrase would include amazing. Consider the cost of the update — free!

Another popular piece of software doesn't seem to want to cooperate and that is Zakanaka. I think the Zakanaka program did not install, and then as I looked at the

instructions I found the Logger software and the Zakanaka run primarily on 95 and 98, so if you are using these packages, M.E. is not for that combo.

I installed the last full version of Logger and it functions except it does not talk to the rig. This is not a big problem if all I want to do is log QSOs manually. There are alternatives to Logger, but it was always a faithful program in earlier operating systems.

A lesson in graphics

You may have noticed some poor quality

in the screenshots I supply to 73 in the past few months. They called several times and I was at a loss to fix the resolution of the images for them. It was finally made clear to me that they needed more pixels per inch.

It was a struggle and I thought I found the answer. After shuffling through the graphics program controls (plus the Help file), I found a pixel “adjustment” box. The first experiment yielded a high resolution image that would have been fine except it was about 10 megabytes in size. Makes a problem with transport by any method. So I continued and made a discovery to store in the back of your mind.

After a lot of compromises, I think I have a combo that will be acceptable. The old images looked and printed just fine here, but after they were saved and put on a disk the results were pretty lackluster.

What I found was that the graphics program I am using, Paint Shop Pro 6, resizes images, stores them in various popular formats, and allows more editing than I can become proficient in; but seems to not resize smaller and retain definition. I discovered the ideal resolution is available when the image is the same dimension as the original.

So, for this month's images, I skewed the dimensions of the HamScope panel to come as close as possible to a “fit” on the magazine page. I was using a 12-inch ruler on the monitor as I did so. I copied the screen to the clipboard (with the “Print Screen”) and pasted it to the graphics program. It retained its dimension as well as its sharpness. Therefore, I believe you will see a definite improvement in this month's screenshots.

Thought this might be something for those who seek the best definition for computer images, especially those who dabble with SSTV. Although I doubt the SSTV-transmitted images would benefit, it is possible you may find some value with other uses for your digital camera output.

Yet another homebrew interface approach

I had an enlightening chat with a ham on PSK the other evening. He was doing a first-of-its-kind lash-up as far as I can imagine. If I understood correctly, he was running the output sound of his computer program to the speaker and picking it up with a boom mike to feed it into his rig.

Believe it or not, his signal was fairly clean, even had a decent IMD reading, and was printing well on the monitor. I am not sure what he was using to key the rig. The

turnovers were not immediate, but he was communicating first rate once he got all the switches and, I think, he said he had a towel wrapped around the mic-speaker setup. Perhaps the turnover time included towel placement.

I have to give credit where credit is due. This ham figured out a method to do something just a little bit innovative and stuck with it until he made it work. I admire that, even if you took what I said to mean I was making fun. I wasn't. This is part of what ham radio is about, experimenting.

Most of what we do here is experimenting, even when it is with a known product. Consider this month's go-around with the new computer. The only afterthought on that area is something that goes unexplained. The computer would crash in its automatic "sleep" mode (when it gets all quiet and the monitor goes dark). Since disabling that feature, there have been no crashes or other visible problems with the computer. I think that tells a story but lacks proof. Something to keep in the back of the mind.

Latest on HamScope

Back to the program I chose for this month, HamScope by Glen KD5HIO. This is a highly refined update of the software package in its original form. I wrote about this program in the April 2001 column. I believe that was version 1.21. The latest is version 1.4, and the screen layout has changed, with many added features along with some bug removal.

Now there are the dual-receive panes, allowing two signals to be tracked simultaneously, and there are quite a few new buttons for your operating convenience and pleasure. One of the subtle new features is a "Log it" button. Once I had a QSO wrapped up, I clicked this button and a small window came up, giving me a choice of where to save the ADIF file the program generated.

I agreed with the program's choice and, sure enough, there is a file with all the contact information I need in the correct format to import to a regular logging program of my choice. I followed the trail and read the info just to be certain. Pretty simple.

Another great leap forward is the capability to use the MMTTY engine for RTTY. This article was written during an RTTY contest. I didn't have time to participate, but spent about 15 minutes observing the copy quality. There is a definite advantage available in RTTY reception with a soundcard and this program overlay.

What I found was that amongst the normal high activity of a RTTY contest, the massive input to a "wide-open filter" setting confuses the issue. I discovered that clicking the RTTY in the rig control panel automatically set the Icom filter at 350 Hz. Now it was necessary to reach over and turn the knob to get a signal within the passband. With the signal all alone as it entered the soundcard, the copy became nearly perfect.

I thought perhaps it was my imagination, so I clicked back to the sideband or open filter mode and the same signal was obliterated by a stronger signal a few hundred hertz away. Usually, with casual RTTY operation from this station, I do not need the narrow filter because there is such limited RTTY activity, but this was a good application of the modern, computerized, near-instant optimization. I was impressed.

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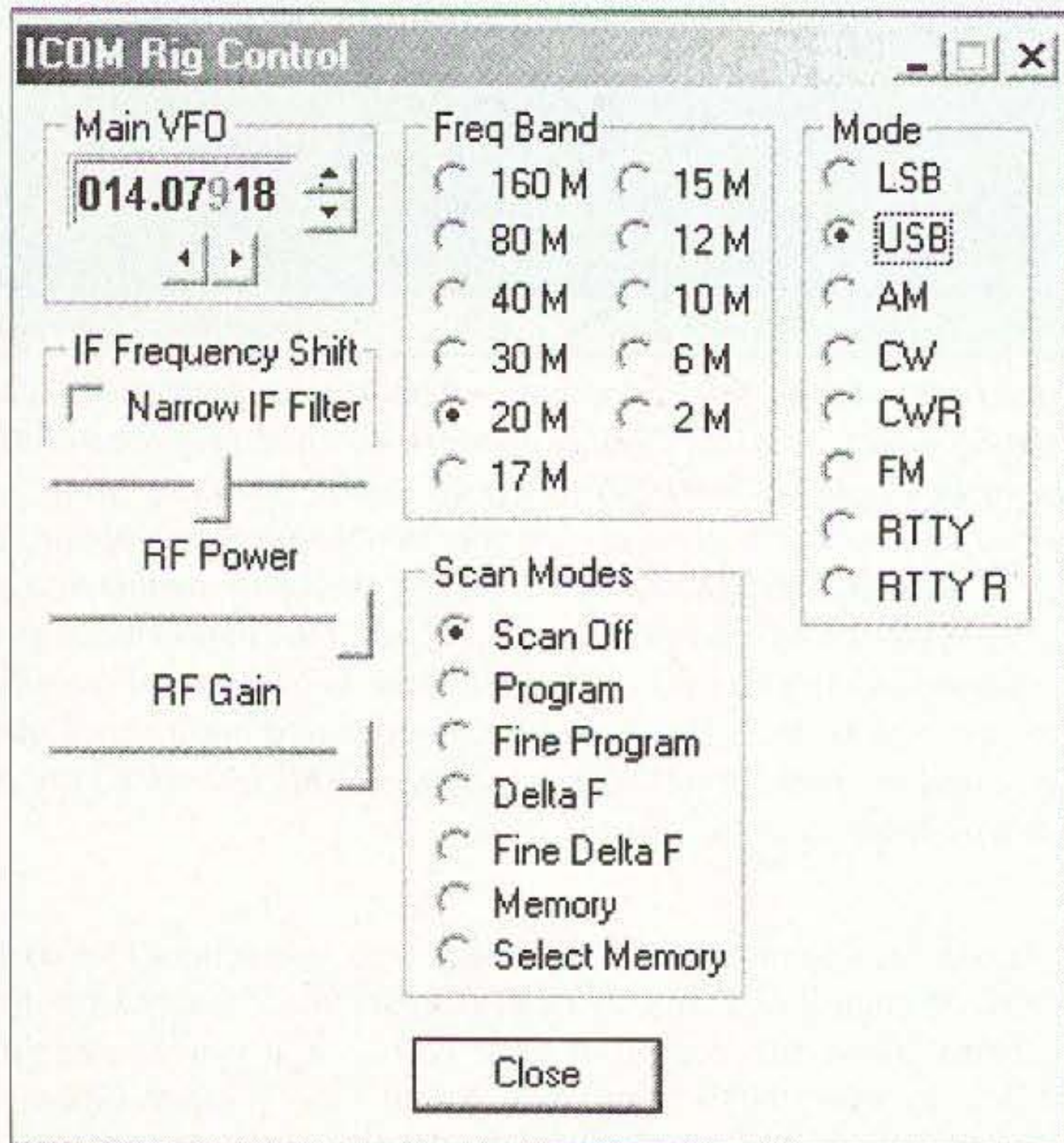
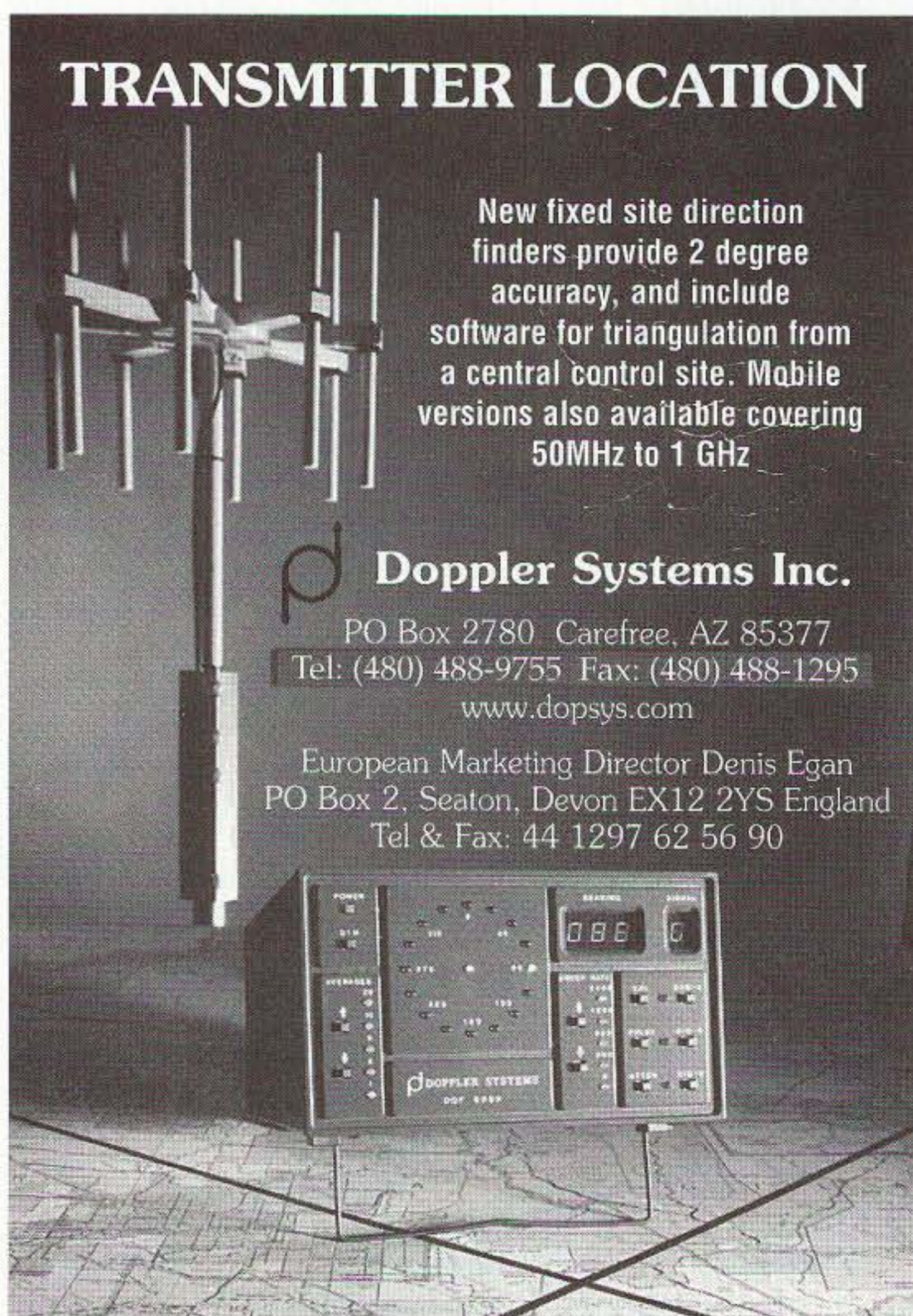


Fig. 2. Rig control with HamScope — The rig control panel is shown separately here although it was along side the panel shown in the other screenshot. Necessary footwork to get good resolution (see text). It functions very well with the Icom. It also works with Kenwood, Yaesu, and Pegasus. With the Icom, the bands, modes, and filters are available at a click. Variable adjustments include RF gain and IF frequency shift. Once you get used to using a panel like this you begin to feel stressed when you have to reach over to twist a real knob. Very convenient.

So I had to do a little experimenting. It was proved that strong RTTY can clobber another RTTY signal and we could fix that with a filter. After a bit of hunting during this busy period, I found a few PSK31 sigs on 20 and the RTTY folk were being polite and leaving a small window for "that other mode" but staying close with strong signals.

I did a little quick manual filter adjusting

to see if it improved the copy on the monitor. It appeared to help, at least at first. Then I turned off the filter and the copy continued just fine. Conclusion? It should have been a longer test, but it appears the PSK31 signal is not bothered nearly as much by the adjacent big gun as the RTTY signal. Maybe this is not a fair test, but that was the way it looked. Although I must admit, I have seen

cases of overdriven PSK signals blanking out the whole PSK notch. Just food for thought.

After all is said and done, the HamScope 1.4 works very well. You just have to try it for yourself. It does PSK31, QPSK, RTTY, CW, MFSK16, and FEC. I have conversed over the air with hams who were using HamScope in one or the other of most of these modes, and they all seem to be satisfied users.

Something new for you on the Web

The other day, I received a pleasant surprise in the E-mail from Bob WA2HNG. Bob has assembled a very nice "Ham Radio" Web site with lots of information for the ham or those interested in the hobby. See the URL in this month's chart.

On the opening page, the list includes "73 Magazine's Infamous Chart — Internet Sources of Ham Radio Information and Programs." Click on that and there it is, ready to be used. You can simply click the links and get to the URLs instead of having to type them in, and try to avoid those errors. I am sure many of you will find this Web page quite valuable.

I haven't read through Bob's creation very thoroughly as yet. He lists what software he uses in his station. I don't think he states it is "the best," but simply that it is software that is easy to install, configure, and use. I have to agree with his approach. I like to do things that are easiest, at least at first. Then, after I get my feet wet, I like to try something with more bells and whistles. A lot of hams are in the same boat, so his suggestions make sense. Gets people going without making things hard.

I suppose I have favorites, but it is one of those things like my wife says about grandchildren. She says her favorite, "is the one she is with at the moment." I like that. No matter how I compare programs, what may seem best to me may not fit another's fancy. It is not a matter of making enemies through endorsements. If, for instance, I were to give a thumbs-down to Zakanaka because it won't run under this operating system, that would serve no purpose because I have seen that software work like gangbusters on another machine right here in this shack, and I talk to many hams who use it every day.

I guess I have to tell a story that has been in the back of my mind for a couple of years concerning Zakanaka and Logger. I complained on the reflector for those two programs that I could not get them to work together on the old computer. As some of you familiar with the author of those two

Source for:	Web address (URL):
Mix W Soundcard program for PSK31, RTTY, new modes, MTTY, FSK31, more	http://tav.kiev.ua/~nick/mixw2/ www.nvbb.net/~jaffejm/mixwpage.htm
FREE MMHam site — MTTY — MMSSTV	www.geocities.com/mmhamsoft/
FREE VK7AAB — SSTV-PAL — PSK-PAL	http://users.origin.net.au/~crac/
Much ham info w/SSTV downloads	www.conknet.com/~kb1hj/index.htm
TrueTTY — Sound card RTTY w/ PSK31	www.dxsoft.com/mitrty.htm
Pasokon SSTV programs & hardware	www.ultranet.com/~sstv/lite.html
PSK31 — Free — and much PSK info	http://aintel.bi.ehu.es/psk31.html
Interface for digital - rigs to computers	www.westmountainradio.com/RIGblaster.htm
Soundcard interface info — includes Alinco	www.packetradio.com/psk31.htm
Interface info for DIY digital hams	www.qsl.net/wm2u/interface.html
WinWarbler info and DXLab Suite	www.qsl.net/winwarbler/
MFSK-related tech info — how it works	www.qsl.net/zl1bpu/
Throb — New — lots of info	www.lsear.freemove.co.uk/ www.btinternet.com/~g3vfp/
Download Logger, also Zakanaka	http://www.qsl.net/kc4elo/
PSKGNR — Front end for PSK31	www.al-williams.com/wd5gnr/pskgnr.htm
DigiPan — PSK31 — easy to use	http://members.home.com/hteller/digipan/
TAPR — Lots of info	www.tapr.org
TNC to radio wiring help	http://freeweb.pdq.net/medcall/ztx/
ChromaPIX and ChromaSound DSP software	www.siliconpixels.com
Creative Services S/W Multimode w/PSK	http://www.cssincorp.com/products.htm
Timewave DSP & AEA (prev.) products	www.timewave.com
Auto tuner and other kits	www.lidgelectronics.com
XPWare — TNC software with sample DL	www.goodnet.com/~gjohnson/
RCKRtty Windows program with free DL	http://www.rckrty.de/
HF serial modem plans & RTTY & Pactor	http://home.att.net/~k7szl/
SV2AGW free Win95 programs	www.raag.org/index1.htm
Source for BayPac BP-2M & APRS	www.tigertronics.com/
Int'l Visual Communications Assn. — nonprofit org. dedicated to SSTV	www.mindspring.com/~sstv/
Hellschreiber & MT63 & MFSK16 (Stream)	http://iz8bly.sysonline.it
HamScope — multimode w/ MFSK16	http://users.mesatop.com/~ghansen/
YPLog shareware log — rig control — free demo	www.nucleus.com/~field/
WinLink 2000 System info	www.winlink.org/k4cjr/
Airmail — free program to use WinLink 2000	www.arimail2000.com/
The Chart NOW ON THE WEB	www.geocities.com/normandy214/ham_radio.htm

Table 1. The Infamous Chart — updated monthly.

Continued on page 58

Annual Meeting

Every year AMSAT, the Radio Amateur Satellite Corporation, holds a symposium and annual meeting. It's an opportunity to review the events of the past year, discuss current operations and plan for the future. Although the tragic events in New York and Washington, DC, on September 11th caused the cancellation of many other events around the country requiring travel, the AMSAT gathering went forward on schedule.

AMSAT President Robin Haighton VE3FRH said it well in his October President's Letter. "Following the terrible incidents of September 11th, I was worried that some of you might decide to cancel your reservations, and that we would have a smaller gathering — but no! The numbers of registrants continued to rise and we had a very good turnout, comparable with other years. For me, this showed the true resolve of our members not to be intimidated, and may I thank each and every one of you who attended."

Thursday

Satellite enthusiasts began arriving at the Holiday Inn Select in Decatur, Georgia, early on Thursday, October 4th. No presentations were scheduled, but it was a great opportunity to register, meet, and eat with other AMSAT folks, and try out W4O (Whiskey 4 OSCAR), the full-featured satellite station that the event coordinators had set up in the hospitality room.

Friday

The Host Committee Chair Steve Diggs W4EPI got things started at 9 a.m. AMSAT President Robin Haighton VE3FRH followed by welcoming all of the participants and attendees. The AMSAT Symposium and Annual Meeting is not a hamfest, but is similar to a gathering of professional engineers that just happen to be hams with a passion for cutting-edge, space-based communications. A few displays were in evidence just outside the main meeting room for The SETI League (Search for Extraterrestrial Intelligence), APRS (Bob Bruninga WB4APR's Automatic Position Reporting System), Kenwood, and AMSAT. Bob K5GNA had 2.4 GHz downconverter systems and components for sale, and various dishes and helix antennas were just out for "show and tell."

The first presentation began with a live demonstration. Bob Bruninga WB4APR took the symposium outside to monitor a pass of PCSat, one of the new hamsats

launched from Kodiak, Alaska, on September 30th. Bob easily monitored the packet data from PCSat with his Kenwood TH-D7 handie-talkie. See last month's HAMSATS and Bob's Web page [<http://web.usna.navy.mil/~bruninga/pcsat.html>] for more information about PCSat.

The rest of the morning was filled with thought-provoking and informative topics. Gould Smith WA4SXM discussed AO-40 (AMSAT OSCAR-40) telemetry from generation to interpretation. Steve Bible N7HPR provided an update on the EasyTrak Rotor controller project. Jerry Brown K5OE talked about YAHE (Yet Another Helix Experiment). His rather tongue-in-cheek description of his 2.4 GHz helical antenna experiments concluded that a helix antenna is fine as a dish feed, but not as a stand-alone antenna for AO-40 reception. It just doesn't have enough gain.

Bruce Paige kicked off the afternoon with information about the AMSAT Awards Program, and a new certificate called the



Photo A. Whiskey Four Oscar was available for satellite contacts by AMSAT Symposium attendees during the event in Decatur, Georgia.



Photo B. Bob Bruninga WB4APR demonstrates a simple computer rotor interface for PCSat tracking.

AMSAT Elmer Award that promotes contacts with new satellite operators and schools. You can find out more about the AMSAT awards in Bruce's article in the November 2001 Special Satellite Issue of 73 or via the AMSAT Web site at [<http://www.amsat.org>].

Other Friday afternoon and evening talks included Phil Karn KA9Q's description of an efficient digital mode transponder, 2001: A Moonbounce Odyssey by Paul Shuch N6TX, a Beginner's Guide to Satellite Ham Radio by Gould Smith WA4SXM, SETI@Home and AMSAT by Dr. Tom Clark W3IWI, and a forum preview of the systems proposed for the next major AMSAT satellite. The new satellite program was referred to as Project JJ, named for Dick Jansson WD4FAB and Lyle Johnson WA7GXD.

Saturday

Activities got started early on Saturday morning. With the success of the K-band transmitter (24.048 GHz) on AO-40, many hamsat enthusiasts have set their sights on receiving the high microwave signals. A 24 GHz Working Group discussion ensued at 7:30 a.m. There are very few commercial sources for receive equipment designed to receive this ham band. The gear from DB6NT is well-designed and effective, but it is expensive. Various ideas on how to get on this band without melting down credit cards were presented in a relatively open group brainstorming session. Some of the ideas presented can be found on the Web at [<http://www.sunsun.net/ao40/>]. Other 24 GHz information can also be found at [<http://www.oh2aue.pp.fi/jalati.htm>].

Frank Bauer KA3HDO, AMSAT VP of Human Spaceflight Operations, updated symposium attendees on the many firsts achieved with ham radio on the International Space Station. Tony Montiero AA2TX described new features in the Instant Tune software. Joe Fitzgerald KM1P offered some thought-provoking possibilities on how to receive the LASER transmissions from AO-40 if and when they are activated. Ed Cole AL7EB described his home system for Mode S (2.4 GHz) reception from Alaska.

After a break for lunch, Jerry Brown K5OE gave a serious talk on optimizing 2.4 GHz reception using short helix antennas in conjunction with screened MDS semi-dishes. The typical 2.1 GHz terrestrial TV downconverter needs minor modifications to be useful for AO-40 reception, but Jerry provided some fixes to make them work better. The satellite signal is circularly polarized. The typical downconverter antenna is linear. By using a small helix and covering the grill work of the typical reflector with hardware cloth or screen, reception can be quickly enhanced by at least 4 dB. Jerry's paper in the *Proceedings of the AMSAT-NA 19th Space Symposium and AMSAT-NA Annual Meeting* (available from AMSAT and the ARRL for \$15.00) tells it all. You can also check out the details on his Web site at [<http://members.aol.com/k5oe/>].

Other afternoon talks and activities included United States Naval Academy Cubesat Ideas by Bob Bruninga WB4APR, Software Designed Radios by Steve Bible N7HPR, Satellite Links: Things You Should Know by Jan King W3GEY, and an AO-40 Status Discussion hosted by AO-40 designers, builders, controllers, and data collectors. It was a great day!

Due to a last-minute cancellation, Stacey Mills W4SM was given the opportunity to step forward with no notice and become the speaker for the evening banquet. He did, and it was excellent. Stacey is one of the few hams around the world who sends commands to AO-40 to set schedules, activate systems, and run experiments. It is a very involved task. He distilled the process to terms that all

Continued on page 46



Photo C. Howard G6LVB brought a complete AO-40 station from "across the pond" to the AMSAT Meeting. He set up in the hotel parking lot and made contacts, lots of them.



Photo D. A close-up of one of Howard G6LVB's 2.4 GHz downconverters positioned in front of his Umbrellantenna. What was an umbrella is now a dish antenna covered with metal fabric.



Photo E. Jerry Brown K5OE gave two talks concerning the use of helix antennas for 2.4 GHz satellite operation.

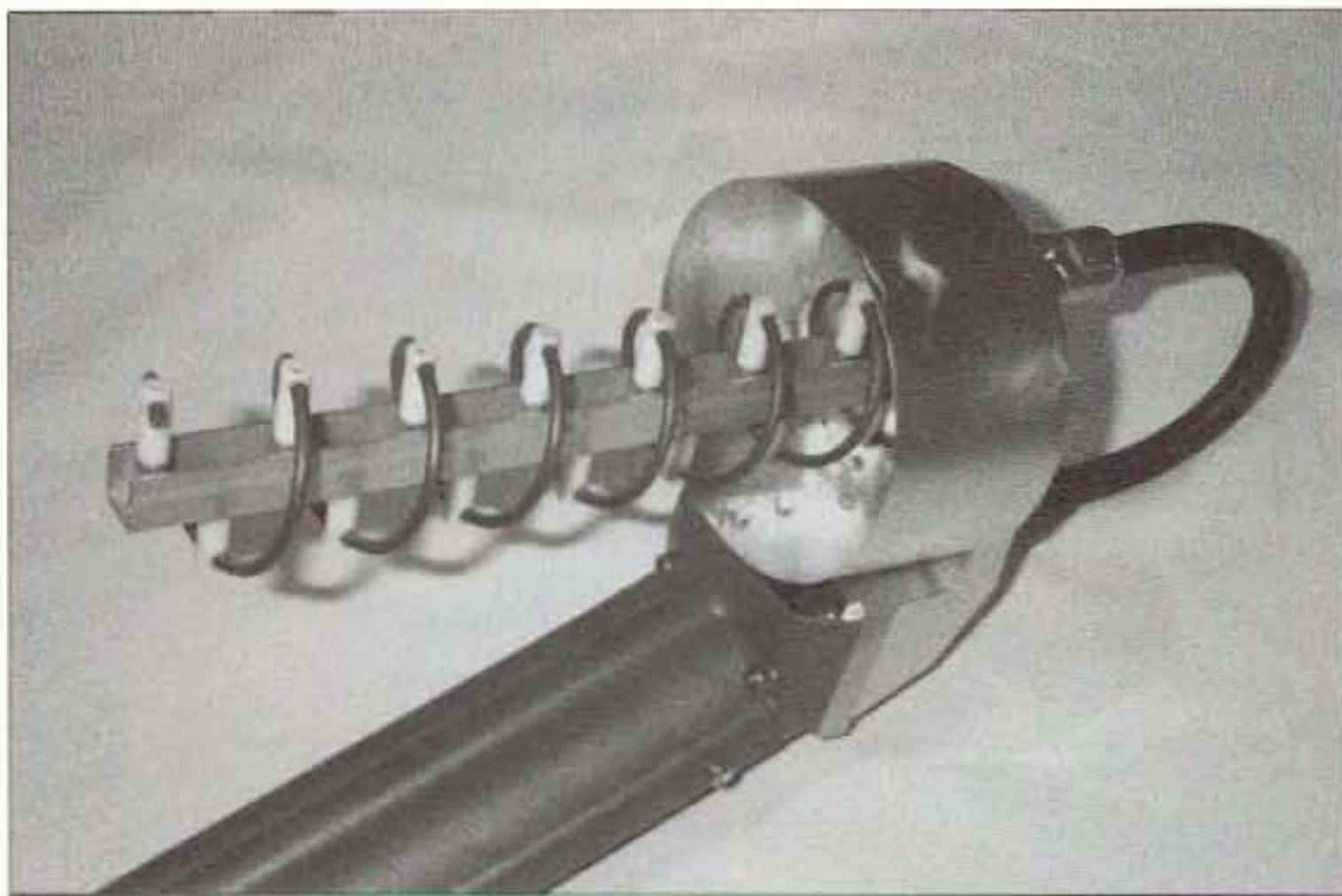


Photo F. Close-up view of a helix feed designed and built by Dick Jansson WD4FAB for use with shallow dish reflectors.

HAMSATS

continued from page 45

could understand and provided some insight into the magnitude of the job.

Saturday concluded with prizes, lots of

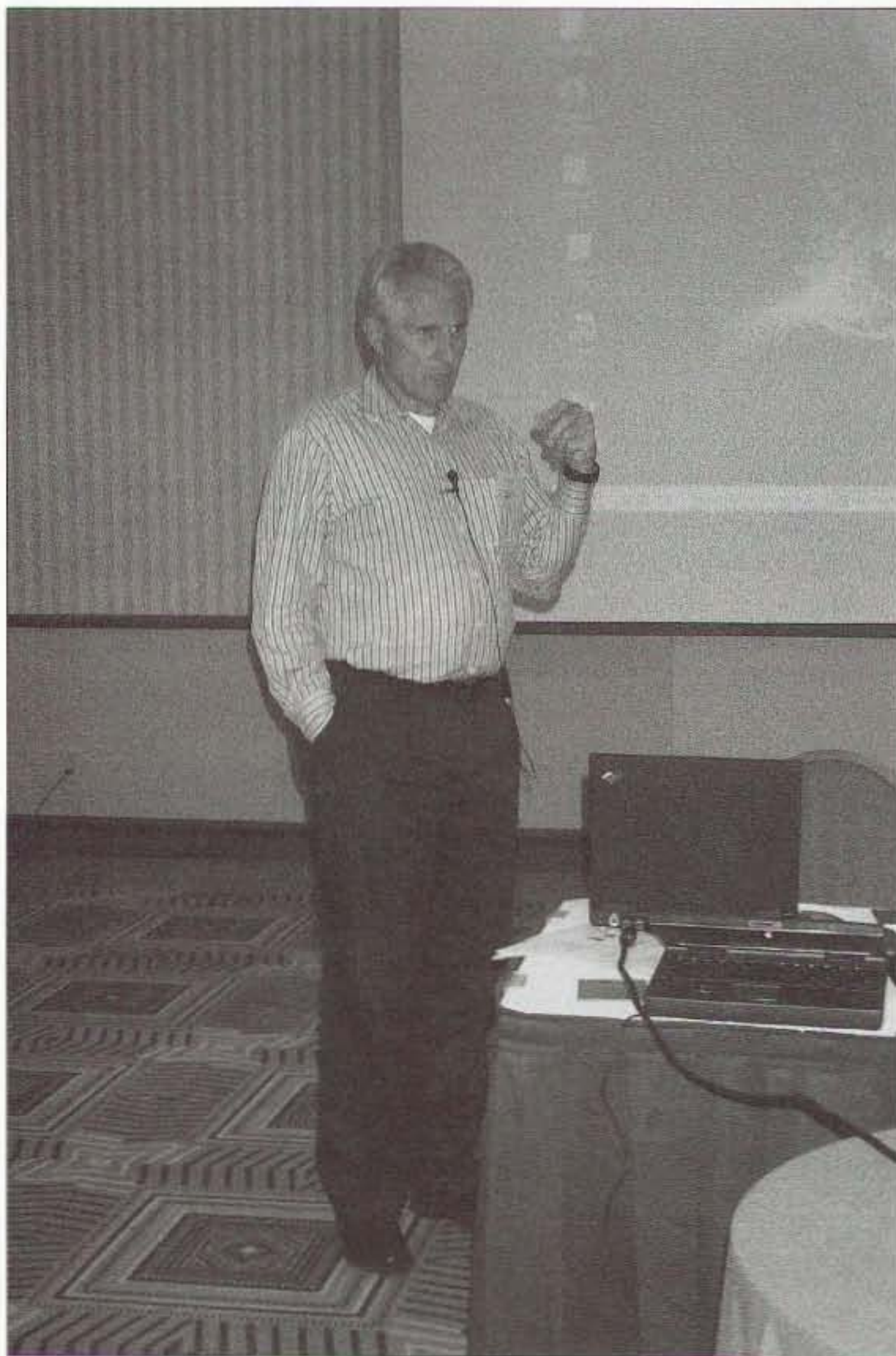


Photo H. AMSAT satellite designer and builder Jan King W3GEY talked on *Satellite Links: Things You Should Know (But, Were Afraid to Ask)* at the 2001 AMSAT Space Symposium and Annual Meeting.

them. Ranging from coffee mugs to expensive microwave gear and radios, almost everyone got something. The Atlanta/Decatur AMSAT group did a fantastic job.

Sunday

Once again activities got off to an early start, this time with a Field Operations Breakfast hosted by Barry Baines WD4ASW.

This was soon followed by an International Amateur Radio Union Meeting chaired by Hans Van de Groenendaal ZS6AKV. For those who could attend, the fun began at 9 a.m. with a tour of the Fernbank Science

Center. For the rest, it was time for the AMSAT Board of Directors Meeting. As the AMSAT gathering was winding down around noon, the Board Meeting was just getting into full swing. With the exception of about an hour of closed-session discussion, the Board meeting was open to AMSAT members, and was quite interesting as future projects were presented, finances analyzed and problems solved. The process lasted through Monday. A complete transcript is printed in the *AMSAT Journal* that is sent to all AMSAT members.

AMSAT moves on

While operations and experiments continue with AO-40, AMSAT-NA is investigating future opportunities. AO-40

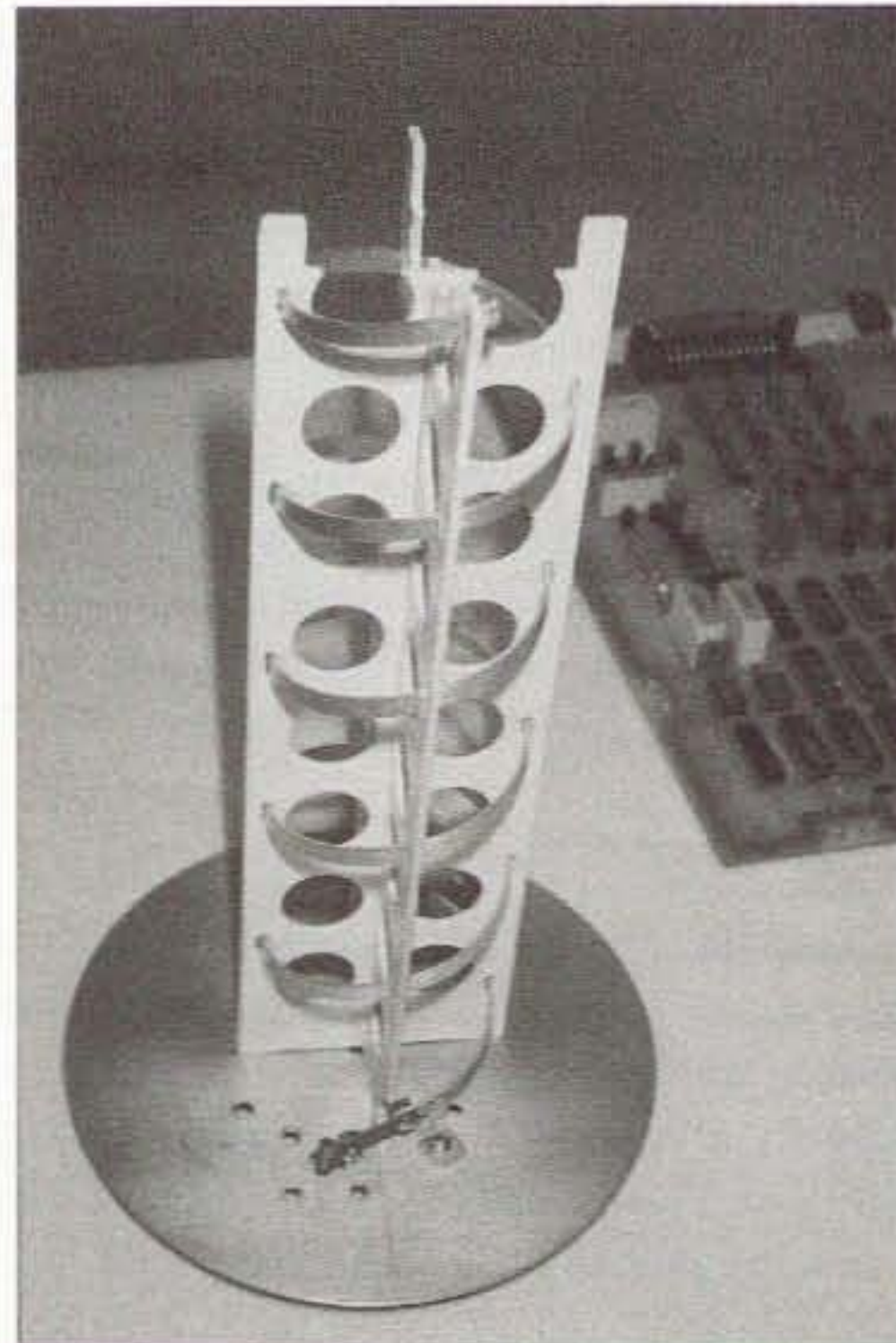


Photo G. This is the engineering model of the helix that is currently in use on AO-40 for the S-band (2.4 GHz) downlink.

activity is directed by AMSAT-DL (Germany). The AMSAT-NA future focus is distributed among at least three possibilities, including what is now known as Project JJ, an advanced analog and digital microsat, and opportunities to build systems for inclusion on the space station and satellites built by other groups. The future promises to be exciting. 73

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ARDF Championships, Part 2: The World Comes to Duke City

By any measure, the first USA ARDF Championships exceeded everyone's expectations. Radio-orientees from ten states and three other countries converged on Albuquerque, New Mexico, from July 31 through August 4 to learn new ARDF techniques, practice their skills, and compete to see who is best in the country at this new (to us) Amateur Radio sport. This month, "Homing In" concludes its coverage of this historic event.

When our 13 colonies were united by the Declaration of Independence in 1776, Albuquerque had already been in existence for 70 years. Spanish settlers, who arrived there just after the *Mayflower* landed in the east, named the town after the Duke of Albuquerque, the viceroy of New Spain. That's why the locals call it "Duke City."

In the 21st century, this town on the Rio Grande has become a city of about 400,000. The Kodak International Balloon Festival brings in thousands of visitors every October. Finance, commerce, and military research take place all year long. So do ham radio hidden transmitter hunts, both on foot (foxhunts, radio-orienting, ARDF) and in vehicles (T-hunts).

The Albuquerque Amateur Radio Club (AARC) was incorporated in 1963, but there was plenty of ham activity before that, including foxhunts on 10 and 75 meters. The recent resurgence in radio direction finding (RDF) can be traced to Kevin Kelly N6QAB, who learned it in southern California and got it started in Duke City when

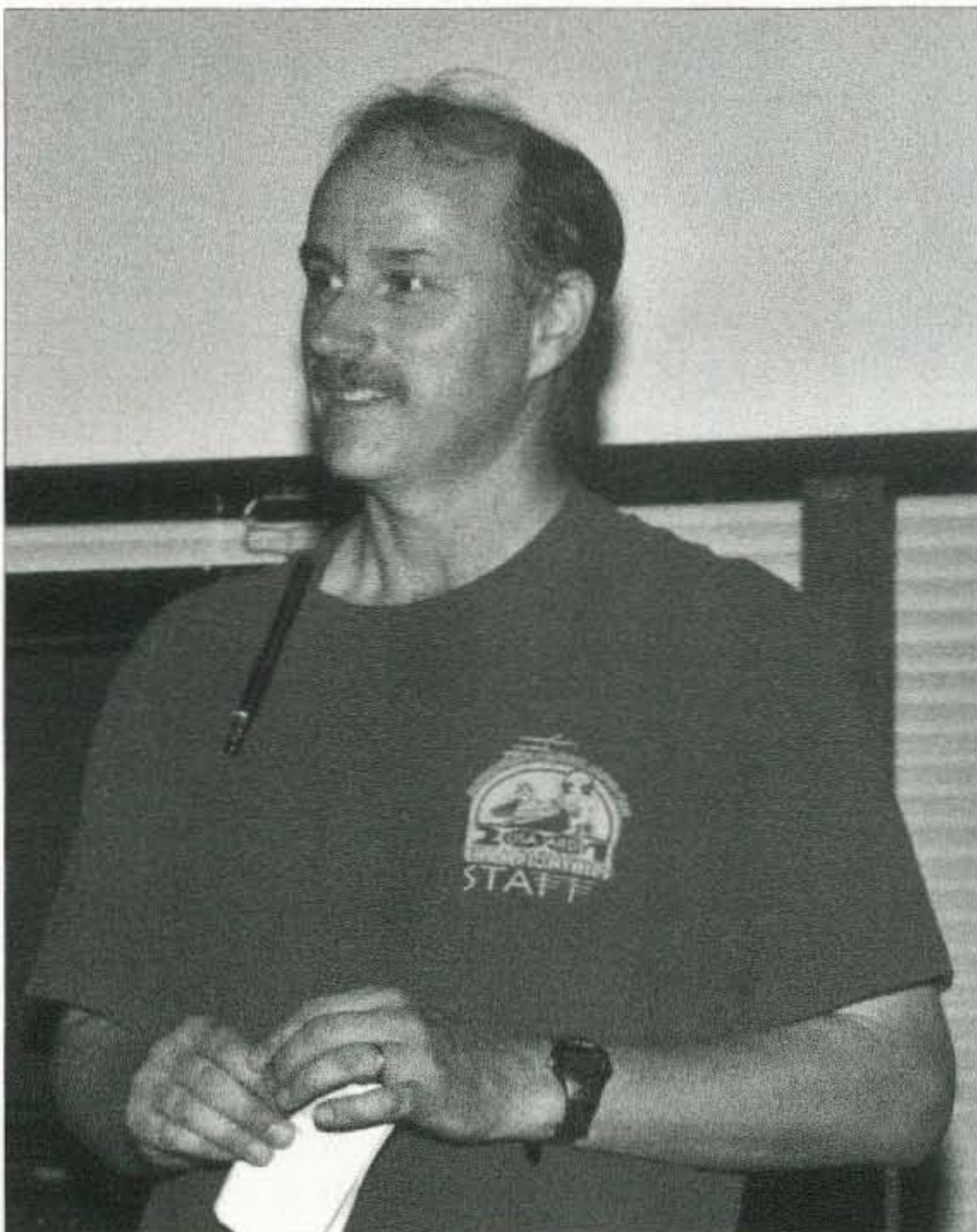


Photo A. Event Chair Jerry Boyd WB8WFK headed up the excellent team of volunteers that put on the Championships.

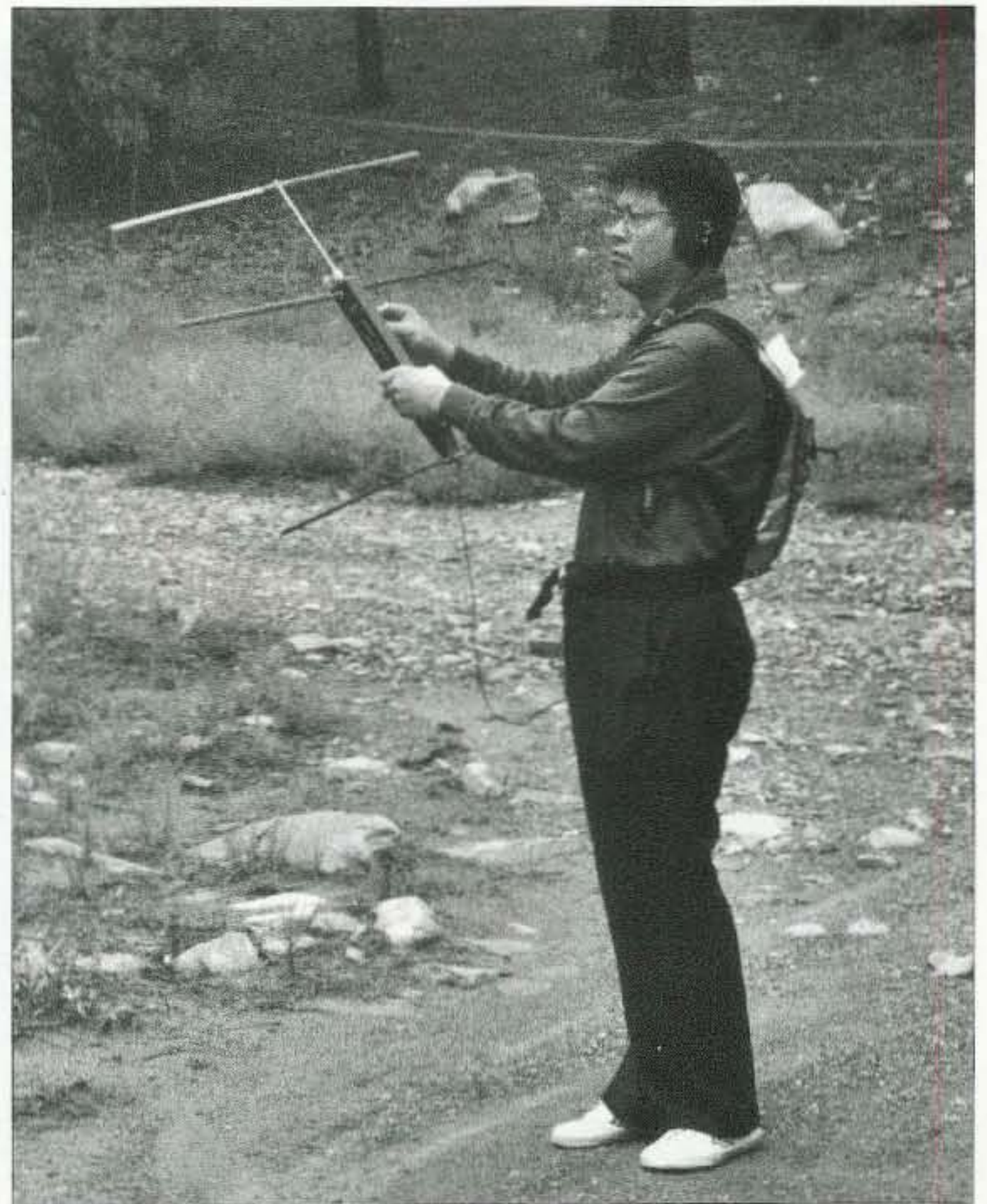


Photo B. Xu Ning sets out on two meters wearing a hydrapack on his back. It helped him next day on the 2m hunt, when he became lost.



Photo C. Feng Chang BG1FC, China's Team Trainer, examines my foxboxes and explains their features in Chinese to the others at the practice session on campus.

he moved there about a decade ago. I visited at that time and featured the foxhunters of Albuquerque in a "Homing In" article.¹ Another Albuquerque hunter, Jerry Boyd WB8WFK (**Photo A**), especially liked foxhunting on foot. Jerry traveled to Portland, Oregon, in 1999 for the first IARU

Region 2 ARDF Championships, bringing a high-performance 80-meter ARDF set of his own design.²

When the opportunity arose to host USA's first-ever national ARDF championships of radio-orienting, Jerry convinced his fellow club members how much fun it would

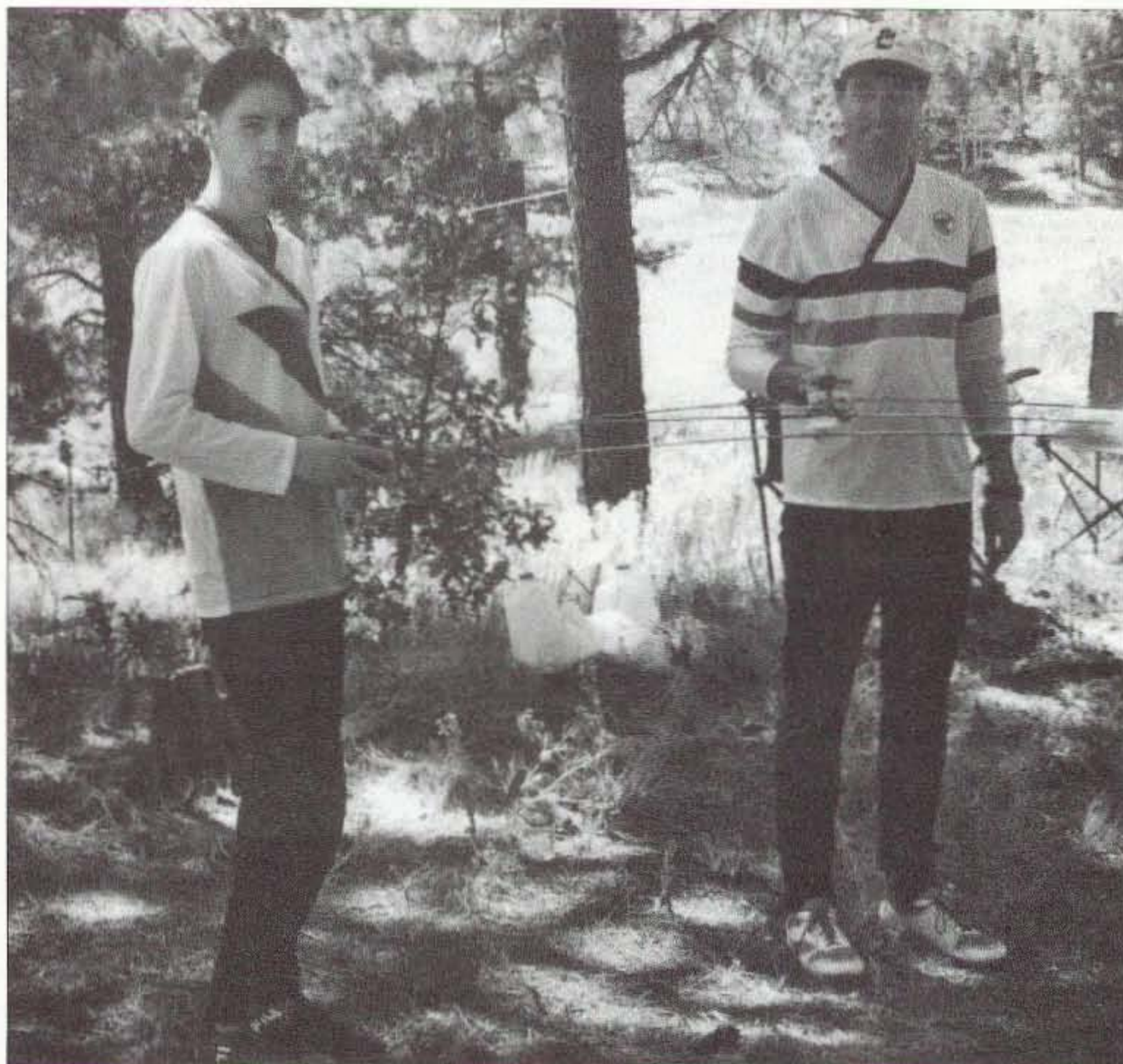


Photo D. Adam Scammell VK3YDF (left) and Bruce Paterson VK3TJN came from Australia to Albuquerque on the first leg of their around-the-world ARDF tour.

be. A committee was formed as club officers and others stepped forward to make it happen. Scott Stevenson KC5VVB volunteered to organize the starting line operations. Club President Mike Eaton K5MJE agreed to handle the finish line. Mike Pendley K5ATM saw to all the details of getting housing, food, and meeting rooms at the University of New Mexico campus near downtown Albuquerque. Mike's son Jon was placed in charge of the youth volunteers who provided communications on Family Radio Service frequencies at the finish line, as part of his Eagle Scout project. Brian Milesosky N5ZGT took responsibility for the awards banquet.

WB8WFK saved one of the most tedious tasks for himself — the maps. For competitive wilderness orienteering, an ordinary USGS topographical map isn't good enough. Orienteering maps must show the thickness and runability of the entire area, as well as details such as trails, fences, and rootstock. A standard format has been published by United States Orienteering Federation. Once it's all on paper, the entire area must be thoroughly field-checked against the map for accuracy. Assisting Jerry in producing and checking the excellent 3-color maps were K5QQ, KC5KH, K5HAB, and WB5IDL from the New Mexico SAR Support Team, plus Jerry's kids, Gail, Megan, and Taylor.

As a member of an active search-and-rescue group, WB8WFK realized the potential dangers for radio-orienters in the mountains of New Mexico. For some competitors, this would be their first time in a full-sized venue. If they got lost, the combination of altitude and overhead sun could cause severe dehydration. Encountering a wild animal such as a bear was a distinct possibility, too.

AARC took many steps to ensure everyone's health and safety. Each person was given a hydrapack that could be strapped on to provide over a half gallon of water, ready to sip at any time through a tube and valve (**Photo B**). Water and juice were available at start and finish points, and there was a water station on each course at transmitters 3, 4, and 5. First Aid was close by at start and finish, along with an aid station in the middle of each course at a trail intersection prominently marked on competitors' maps.

Each water pack had a whistle attached. All volunteers and competitors were urged to pay attention for whistles and act immediately to summon help if one was heard.

Continued on page 50

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R.S.#	page	R.S.#	page	R.S.#	page	R.S.#	page
• Alinco	CV2	99	Communication Concepts	13	160	Micro Computer Concepts	19
• Alinco	CV3		• Communications		193	Morse Tutor Gold	57
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• Am-Com, Inc.	56	10	Communications			• Omega Sales	17
16 Astron Corporation	2		Specialists, Inc.	13		• Omega Sales	25
• ATOC Amateur		13	Doppler Systems	42		• Omega Sales	46
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• ATOC Amateur			• Ham Ambassadors	29		• Radio Book Shop	8
Distributing LLC	CV3		• Ham Mall	13		• Radio Book Shop	21
42 Bilal Company	25		• Hamtronics, Inc.	9		• Radio Book Shop	23
168 Buckmaster Publishing	21	42	Isotron	25		• Radio Book Shop	42
56 Buckmaster Publishing	25		• Michigan Radio	49		• Radio Book Shop	49
						• Radio Book Shop	54
						• Radio Book Shop	56
						• Radio Book Shop	57
						• Radio Book Shop	59
						• Radio Book Shop	63
						34 Ramsey Electronics	3
						254 Ross Distributing	21
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Photo E. Volodymyr Griedov UT5UAZ is so excited after receiving his gold medal for two meters that he's upstaged AARC President Mike Eaton K5MJE in this photo. UT5UAZ also received a silver medal for the 80m hunt.



Photo F. Serhiy Zarubin of Ukraine won gold on 80m and silver on 2m. At the closing banquet, he took the mike to thank everyone for their hospitality.

HOMING IN

continued from page 48

China, Australia, and Ukraine

Last month's "Homing In" introduced the stateside competitors and listed all medal winners in the USA-only standings. Now let's meet the rest of the radio-athletes. It's traditional for foxhunters to visit other countries' national ARDF championships, so AARC was ready to treat them all with traditional southwestern hospitality.

The biggest group of overseas visitors came from the People's Republic of China. They were led by Han Zhaofang BG1HZF, Deputy Secretary of the Chinese Radiosports Association (CRSA), which hosted the 2000 ARDF World Championships.³ Mr. Han served as translator for most of the rest of his countrymen, all of whom were adult males. Their Team Manager was Yan Chenggen, a prominent organizer of ARDF events in China.

Feng Chang BG1FC and Hou Huimin were the only other experienced radio-orientees in the 12-member Chinese delegation (**Photo C**). Wei Deying and Yang Yongsheng represented the Provincial Radio Regulatory Bureau, China's equivalent of the FCC. Dai Jun, the youngest, is a military communications engineer. The rest are schoolmasters and education ministers who oversee student ARDF programs. For instance, Ren Dexiang has fostered ARDF training in local schools for 20 years.

After the Albuquerque events, the entire Chinese team flew to Victoria, British Columbia, where they participated in the Friendship Radiosports Games, a biennial event sponsored by the Friendship Amateur Radio Society.⁴ There, they competed in a two-meter foxhunt against teams from USA, Japan, and Canada.



Photo G. Hou Huimin dashes to the two-meter finish. He didn't win a medal on that band, but next day he captured gold in the 80-meter hunt.

Medal	2m Winners	80m Winners
M19, 4 foxes		
Gold	Jay Thompson W6JAY	Jay Thompson W6JAY
M21, 5 foxes		
Gold	Volodymyr Griedov UT5UAZ	Serhiy Zarubin
Silver	Serhiy Zarubin	Volodymyr Griedov UT5UAZ
Bronze	Bruce Paterson VK3TJN	Gyuri Nagi KF6YKN
M40, 4 foxes		
Gold	Dale Hunt WB6BYU	Dale Hunt WB6BYU
Silver	Charles Scharlau NZØI	Scott Moore KF6IKO
Bronze	Kevin Haywood N4MGB	Charles Scharlau NZØI
M50, 4 foxes		
Gold	Dick Arnett WB4SUV	Hou Huimin
Silver	Larry Benko WØQE	Dick Arnett WB4SUV
Bronze	Robert Frey WA6EZV	Robert Frey WA6EZV
M60, 3 foxes		
Gold	Harley Leach KI7XF	Harley Leach KI7XF

Table 1. Overall standings and medal winners by category.

Representing Australia were two young men from Melbourne, Bruce Paterson VK3TJN and Adam Scammell VK3YDF (Photo D). The homebrew RDF gear they brought was of great interest to all "techies" among the competitors. For them, Albuquerque was just one stop on a round-the-world odyssey that included the Friendship Radiosports Games, the German National ARDF Championships in Bavaria, the IARU Region 3 Championships in Mongolia, and a tour of China.

Locality	Participants	Total Medals	Gold
Cincinnati, OH	2	8	3
Los Angeles, CA	7	7	4
Denver, CO	3	4	0
Atlanta, GA	4	3	0
Independents	7	16	10

Table 2. Number of participants and medals won from four USA metropolitan areas. Independents were the sole representatives of their home areas.

A six-member team from Mongolia also registered for the Championships. Because of visa and travel problems, none of them got to New Mexico in time for the foxhunts.

Albuquerque's location in southwestern USA made travel easier from Asia and the Pacific, as compared to Europe. Nevertheless, two young ARDF experts from Ukraine made their way to Duke City. Volodymyr Griedov UT5UAZ (Photo E) and Serhiy Zarubin (Photo F) now have many new stateside friends. Serhiy is still in this country teaching ARDF techniques to southern California hams as I write.

So who won?

To no one's surprise, the two world-class Ukrainians turned in the best overall performances on both bands, finding all five foxes in less than 55 minutes each day. Serhiy completed the 80-meter hunt in less than 37 minutes! The two Australians also did very well in the same category (M21, males of any age, five foxes required). Bruce took the bronze on two meters with a time under 61 minutes and Adam placed fourth on 80m by completing the course in less than 58 minutes. For the USA, Gyuri Nagi HA3PA/KF6YKN was right behind VK3TJN on two meters. Next day, Gyuri took the M21 bronze on 80 meters by crossing the finish in under 50 minutes.

Five USA and three Chinese runners squared off in the M40 category (males ages 40-49, four foxes required). Dale Hunt WB6BYU took gold on both bands with times under 83 minutes. Charles Scharlau NZØI, in his first formal ARDF event, grabbed silver on 2m and bronze on 80m with under-2-hour times. Scott Moore KF6IKO earned silver on 80m and Kevin Haywood N4MGB got bronze on 2m. None of the Chinese medaled in this category.

It was also USA-versus-China in the M50 category (males aged 50-59, four foxes required). Hou Huimin of China went from last place in the 2m hunt to gold medal winner on 80m (Photo G). The other top positions in this category were a hard-fought contest between Dick Arnett WB4SUV, Bob Frey WA6EZV and Larry Benko WØQE. Dick took gold on 2m and silver on 80m. Larry was silver medalist on 2m. Bob got bronze on both bands.

Table 1 lists all medal winners in the overall standings. Separate medals were awarded to the best stateside competitors, as listed in last month's "Homing In."

Among participants from areas of the USA that have regular ARDF practice sessions, there was lots of interest (and rivalry) to see which of these places would provide

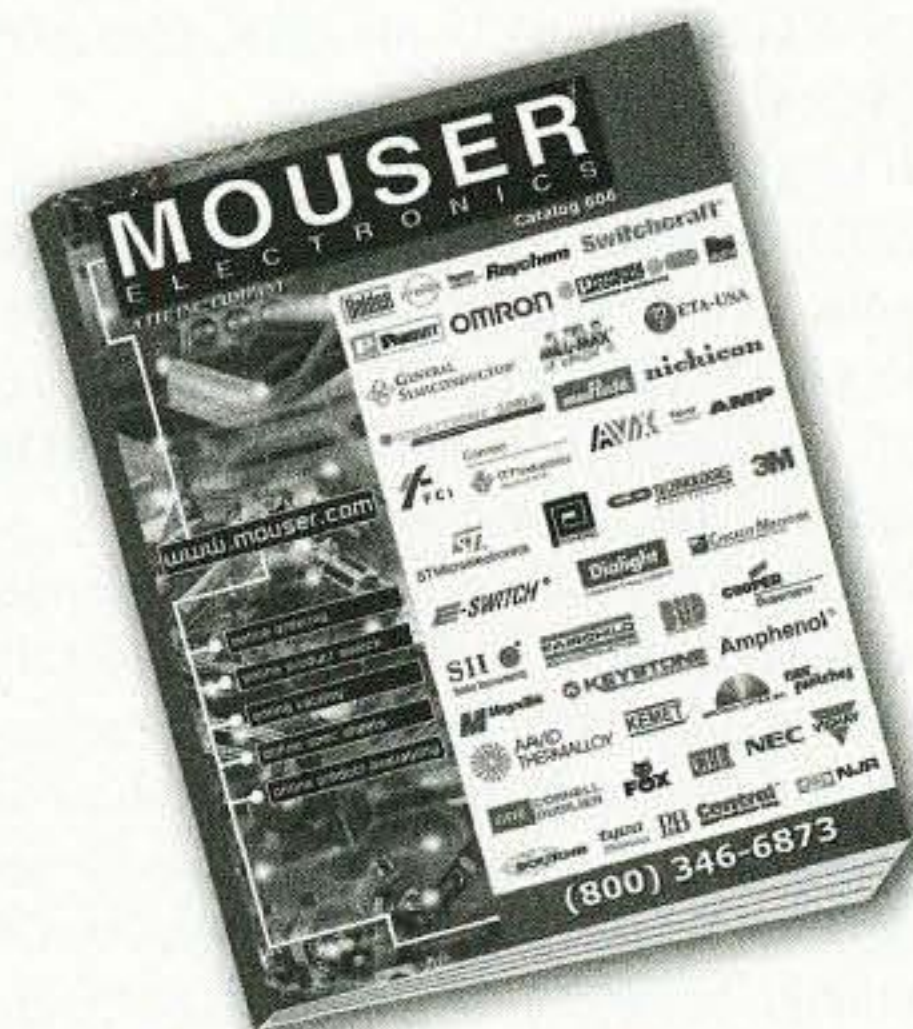
the most winners. Table 2 gives the total medal count for stateside localities with more than one competitor in Albuquerque. It was a close race between the two participants from Cincinnati and the seven from southern California, but the seven independent USA hunters that were the sole representatives of their localities or were from places without ARDF programs did best of all.

Can this be topped?

A hearty "Well done!" and thank-you to AARC and its event leaders, as named above. Thanks to ARRL President Jim Haynie W5JBP and Southwestern Division Vice-Director Art Goddard W6XD for attending and supporting. Thanks to the organizational and corporate sponsors who donated everything from busses to raffle prizes. And thanks to everyone who attended for their interest, enthusiasm, and positive attitude.

For the exact times and standings of every competitor, plus more photos, warm up your Web browser. Start with the "Homing In" site (URL at top) for a summary and over a hundred photos. Almost everyone

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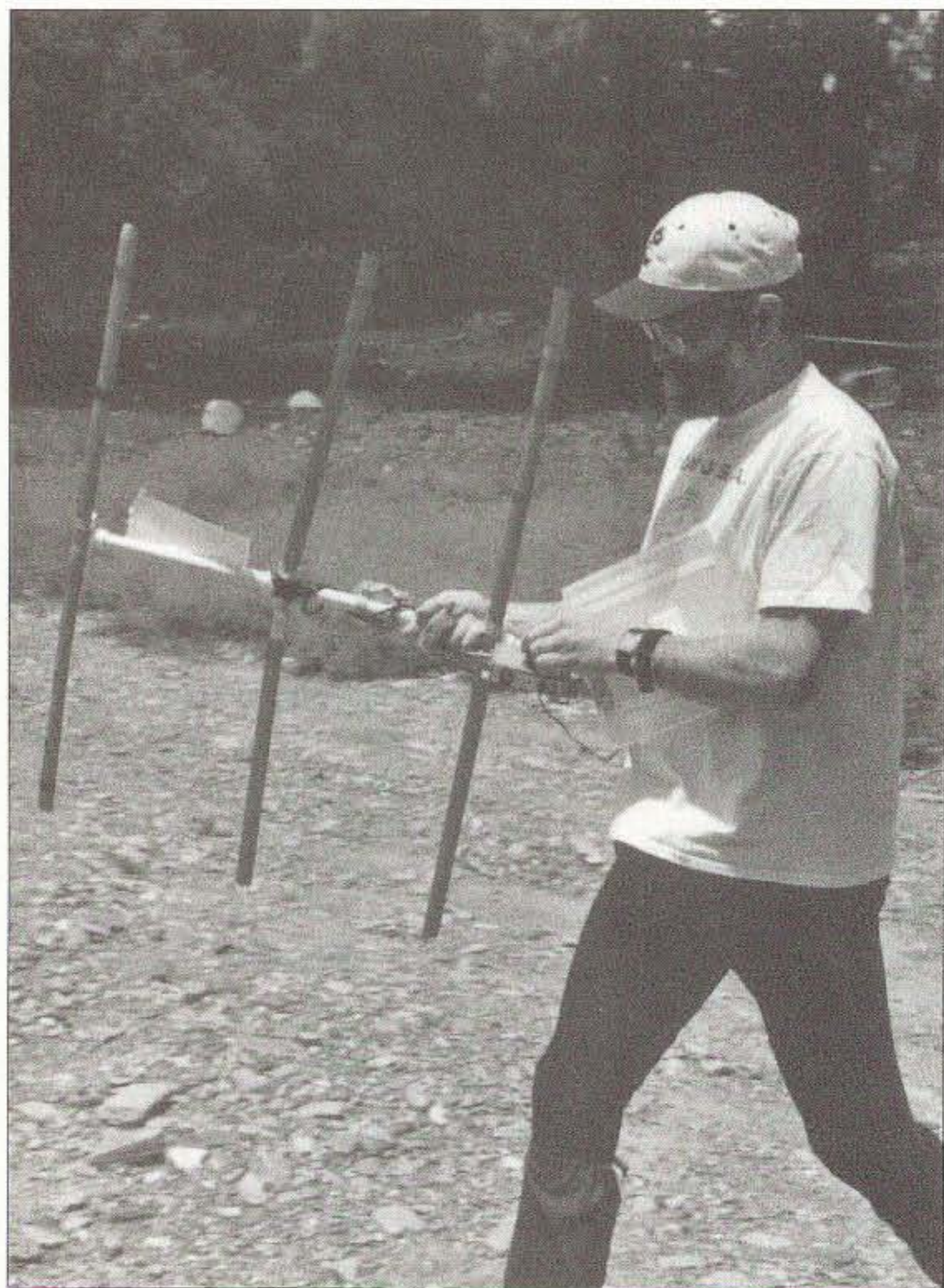


Photo H. Dale Hunt WB6BYU rushes out of the starting corridor in the 2m hunt. In October, Dale became IARU's ARDF Coordinator for Region 2.

Many foxhunters have raised concerns about the time and expense of attending both the USA Championships and the World Championships in the same year, so the USA National will be a relatively inexpensive weekend event. It will get under way on Friday afternoon with a practice event, followed on Saturday by the main two-meter hunt and on Sunday by the 80-meter hunt. In addition to the hunts, there will be a cookout on Friday evening, a dinner on Saturday night, and an award ceremony following the 80m hunt, all included in the registration fee. Lodging options include cabins in the park and campgrounds with RV hookups. There are

who attended is pictured at least once. There's also a link to AARC's 2001 ARDF Championships Web site, which has photos by N5ZGT and W6XD, plus PDF files with all the official results.

If you missed all the fun in Albuquerque, you'll have another opportunity to compete against USA's best in just a few months. Georgia Orienteering Club (GAOC) has been selected to host the next USA ARDF Championships in the spring of 2002.

National ARDF championships are normally held in late summer or early fall. However, the 2002 ARDF World Championships will take place in Slovakia in early September. To permit plenty of time for selection of Team USA and overseas travel planning, the 2002 USA Championships are being moved to spring.

The Second USA ARDF/Radio-Orienteering Championships will be April 19-21, 2002, at F.D. Roosevelt State Park near Pine Mountain, Georgia, approximately 90 minutes southwest of Atlanta. Standard international rules will be used for these foxhunts, which are all on foot in beautiful woods near Callaway Gardens.

also many local motels and bed-and-breakfast inns.

USA ARDF Championships are open to anyone, beginner or expert. Competitors in Georgia will be placed in the same age/gender categories as in Albuquerque, with awards for winners in each category. Laurie Searle KG4FDM of GAOC will be the Meet Director. Sam Smith N4MAP will set the ARDF courses. Offers for positions on Team USA for the 2002 World Championships will be based on several factors, including individual performances in Atlanta and Albuquerque.

For more details and registration information, see the 2002 USA ARDF Championships Web site, which you can reach in just a couple of clicks from the "Homing In" Web site. If you're not on the Web, send a self-addressed stamped envelope to me and I'll reply with paper copies.

New coordinator for all the Americas

In early 1998, American Radio Relay League's leaders recognized the growing interest in international style on-foot

foxhunting by passing a resolution at the Board of Directors meeting. It authorized the appointment of a volunteer USA ARDF Coordinator to promote radio-orienteering within the USA and to oversee ARDF activities such as the USA ARDF Championships. I accepted the appointment to that post. Then in June 1999, I received a similar appointment by the International Amateur Radio Union (IARU) as volunteer ARDF Coordinator for all of North, Central, and South America (IARU Region 2).

That's too much work for one person to do well, so I have been seeking someone else to take on the international responsibilities. At last, I'm pleased to announce that the new IARU Region 2 ARDF Coordinator is Dale Hunt WB6BYU of Yamhill, Oregon (**Photo H**). His appointment was made last spring by outgoing IARU R2 President Tom Atkins VE3CDM and was approved by IARU at its Region 2 general meeting in Guatemala City last October.

WB6BYU has been active in transmitter hunting for many years, competing on foot formally for the first time at the 1997 Friendship Radiosports Games near Tokyo. He led Team USA at the 1998 ARDF World Championships in Hungary and was the first person from Region 2 to serve on the International Jury at the 2000 ARDF World Championships in China. In 1999, he was the prime mover behind the first IARU R2 ARDF Championships in Portland, Oregon, sponsored by the Friendship Amateur Radio Society.⁵

I am continuing as USA's ARDF Coordinator, to develop radio-orienteering further in the States. My current responsibilities include planning national ARDF Championships for 2002 and 2003, as well as organizing Team USA for the 2002 ARDF World Championships in Slovakia. I will work closely with WB6BYU in making arrangements for the next IARU Region 2 ARDF Championships.

WB6BYU will represent the Western Hemisphere at meetings of IARU ARDF officials worldwide. Equally important will be his mission to bring the sport to more of the 39 countries whose national Amateur Radio societies belong to IARU Region 2. Of them, only USA and Canada have their own national ARDF Coordinators, so Dale's plate will be very full. You can help by talking up ARDF in your QSOs on the DX bands, especially with stations in Central and South America.

Dale and I welcome your ideas for bringing ARDF to more hams throughout the USA and the Americas. Write to me at the

Continued on page 58

Power for Emergency Operations

When it comes to emergency communications, there is no doubt that the most difficult issue to manage is power. Your radio and your antenna will probably not undergo any fundamental changes, but the usual source of electricity to power your radio may no longer be available.

Let's face it, we tend to take the 117-volt AC power that is in our homes for granted, but virtually any emergency can take the AC power off-line. Storms, earthquakes, and industrial accidents have always been a factor, but in this day and age we can no longer rule out intentional disruptions such as terrorist acts. Every ham who expects to provide communications in an emergency should have a reliable backup power source. The ideal backup or emergency power source should be reliable, of course, but it should be as close to invisible as possible. In other words, an ideal source would require little or no maintenance, be self-regulating, and would be instantly available when needed.

Some sources, such as generators, can produce a reasonable amount of power, but they do require a high degree of maintenance. They must be kept fueled. If they are not used on a regular basis, the fuel needs to have certain additives mixed in to provide for easy starting. Often they must be moved from their storage location to an

operating position and then connected to the equipment before they can be used. They have their advantages, but maybe there are better options.

Batteries are an option, of course, especially since so much ham equipment can be run at voltages around 12 volts. Unfortunately, the chore of keeping batteries charged and switching over to the batteries makes them inconvenient. Automobile batteries provide a high level of current but not a long life. Traditional lead-acid batteries, whether automotive or "deep cycle," produce hydrogen gas, which can be explosive in an enclosed space. Gel cells provide many of the advantages of lead-acid batteries, but the acid cannot be spilled and there is less gas production. Generally, these can be used indoors with no major problems. Unfortunately, hooking a gel cell battery to the 13.8-volt power supply will probably do more to destroy the battery than to provide adequate emergency power.

What if there were a way to maintain a battery so that it was immediately available

and constantly kept charged? You could hook your radio to the battery and charger. The combination would provide power from the charger for routine operations. If power were interrupted, the battery would immediately take over as the primary source. The most you might have to do is switch from high power to low power on the transmitter. That would make life much simpler. But batteries can be difficult to maintain at a peak charge without causing damage to the battery by overcharging.

Killing the battery, by definition, defeats the goal of having a ready power source available. What we need is a battery charger that is specifically designed to work with gel-cell batteries that is smart enough to know what the battery needs. It needs to sense whether the battery can be charged and what current or voltage needs to be applied to charge it. Finally, it needs to be able to determine when the battery is completely charged and terminate the charging current.

Continued on page 58

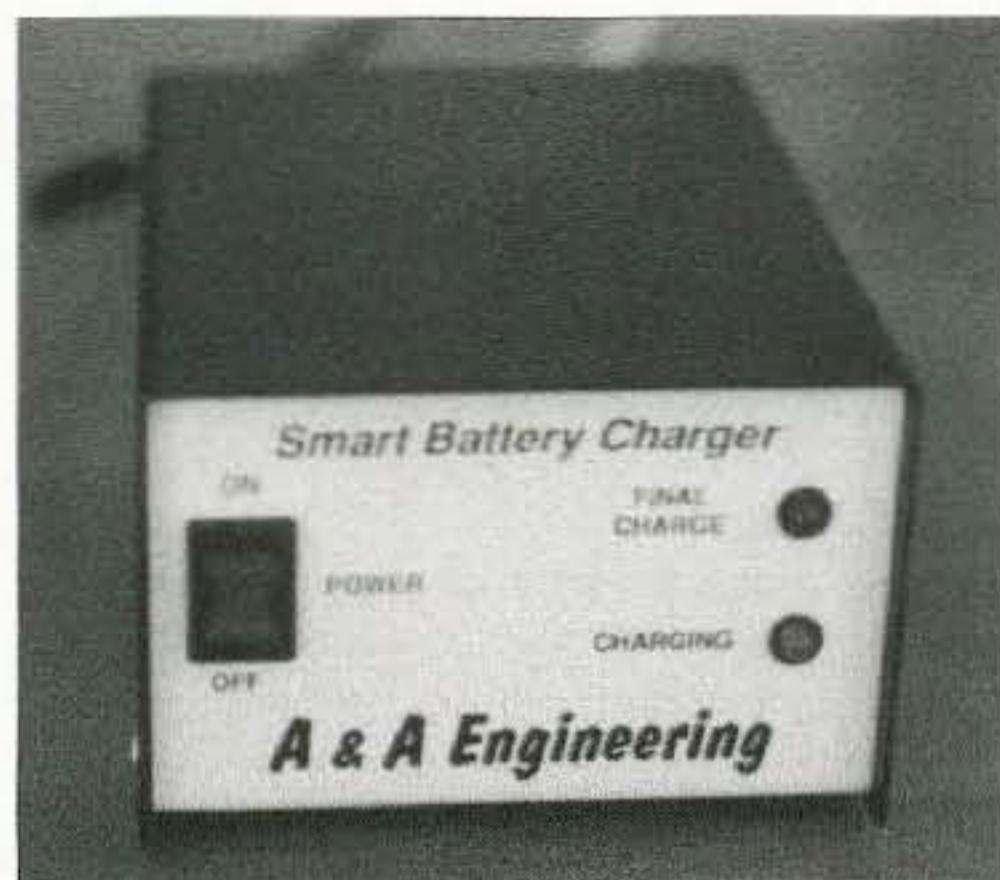


Photo A. Small, clean and uncluttered in appearance, the A & A Smart Battery Charger can save you a headache when a storm or other incident removes your main power source.

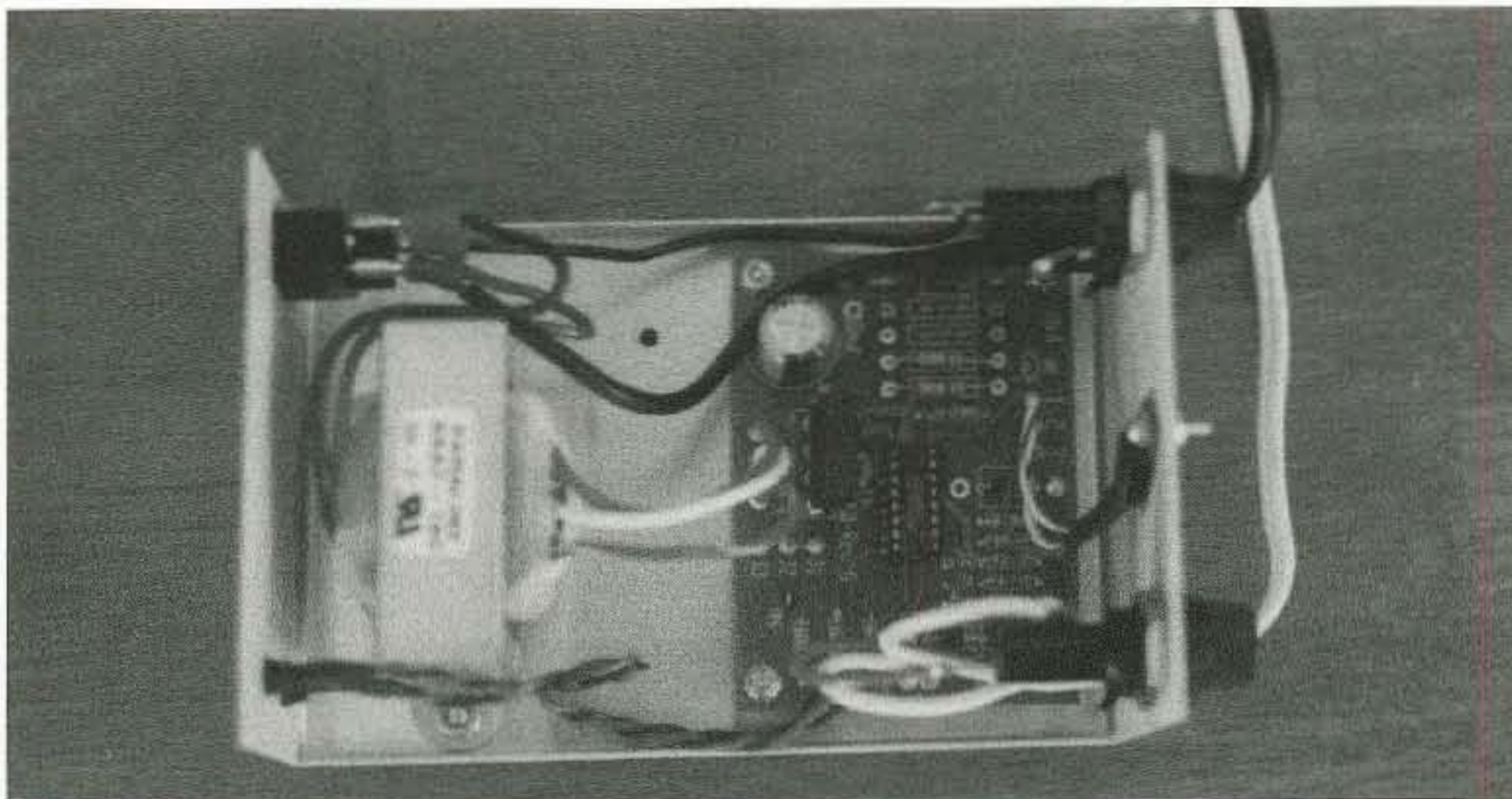


Photo B. The main components in the Smart Battery Charger include the transformer and the printed circuit board. Assembly is straightforward and uncluttered.

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 April issue, we should receive it by January 31. Provide a clear, concise summary of the essential details about your Calendar Event.

JAN 11, 12

FT. MYERS, FL The Fort Myers ARC, Inc., will host their Southwest Florida Hamfest & Computer Show at Shady Oaks Community Center, 3280 Marion St., Ft. Myers FL, Friday 1 p.m.–9 p.m., and Saturday 9 a.m.–3 p.m. Set up will begin Friday, January 11th from 10 a.m.–4 p.m., and Saturday January 12th from 7 a.m.–9 a.m. Talk-in on 146.880 MHz. Registration is \$5 per person, good for both days. Please include SASE for advanced tickets, otherwise tickets will be held at the door. Vendor tables are \$15 per 8 ft. table (2 days). Electric is \$5 for 2 days. All vendors must buy an admission ticket. No tables reserved without payment. Children 12 and under are admitted free, but must be supervised. Tailgating, \$10 for the first space (includes 1 admission ticket). \$5 each for extra spaces. On-site security will be provided. Lots of free parking available. Handicap parking next to the building. FMARC supports FCC regulations and will not permit selling uncertified or modified equipment during the show. For information, contact *G.E. Sammons WA4DQE* at 941-936-1431, or E-mail [*wa4dqe@juno.com*]. For table info, contact *Earl Spencer K4FQU* at 941-332-1503, or E-mail [*k4fqu@juno.com*]. Write for tickets or tables to *FMARC, P.O. Box 61183, Fort Myers FL 33906*. Motels are available nearby.

JAN 19

ST. JOSEPH, MO The 12th annual Northwest Missouri Winter Hamfest, co-sponsored by the Missouri Valley ARC and the Ray-Clay ARC, will be held 8 a.m.–3 p.m. at the Ramada Inn in St. Joseph MO. The motel is located at I-29 and Frederick Ave. (Exit 47 on I-29). Special room rates are offered for hamfest participants. Talk-in on 146.85 and 444.925. VE exams, major exhibitors and flea market all indoors. Free parking. Advance tickets \$2 each or 3 for \$5; at the door, \$3 each or 2 for

\$5. Pre-registration requests received after January 6th will be held at the door. Swap tables \$10 each for the first two tables. Commercial exhibitors are welcome, write for details: *Northwest Missouri Winter Hamfest, c/o Neal WBØHNO or Carlene KAØIKS Makawski, 3704 Meadowoak Ln., St. Joseph MO 64503*. E-mail [*nem3238@ccp.com*]; or phone: 816-279-3406.

JAN 20

HAZEL PARK, MI The Hazel Park ARC's 36th Annual Swap & Shop will be held at the Hazel Park High School, 23400 Hughes St., Hazel Park MI, 8 a.m.–2 p.m. General admission is \$5 in advance or at the door. Plenty of free parking. Tables \$14. Reservations for tables must be received with a check. No reservations by phone. Talk-in on 146.64(-), the DART rpt. For info about the swap, tickets, or table reservations, mail to *HPARC, P.O. Box 368, Hazel Park MI 48030*.

JAN 26

LOCKPORT, NY A Hamfest/Auction will be presented by the Lockport ARA, Inc., at Eagles Hall, 6614 Lincoln Ave., corner of Davison Rd., starting at 8 a.m. Vendor set up at 7 a.m. The auction starts at 12 noon. Talk-in on 146.820(-) 107.2 PL. Admission \$5, tables \$5 per 8 ft. table. Food will be available. Contact Event Chairman *Duane Robinson W2DLR, P.O. Box 142, Ransomville NY 14131*, phone: 716-791-4096, E-mail [*W2DLRHAM@AOL.COM*]. Visit the Web site at [*http://lara.hamgate.net*].

JAN 27

DOVER, OH The Tusco ARC Hamfest will be held Sunday, January 27th, at the Ohio National Guard Armory, 2800 North Wooster Ave., Dover OH 44622, 8 a.m.–1 p.m. Set up at 6 a.m. Talk-in on 146.730(-). Directions: Exit Interstate 77 at Exit #87 (Strasburg). Turn right at the exit stop sign, heading south on County Road 74 to the first traffic light. Continue through the traffic light intersection. The armory is on the right. Admission \$3 donation at the door. Dealers admitted free of charge. Tables \$10 each. Food available on site and the restaurant next door opens at 7 a.m. ARRL/VEC Exams by appointment. For additional info and to reserve tables, contact *Gary Green KB8WFN, 32210 Norris Rd., Tippecanoe OH 44699*. Phone: 740-922-4454. Table reservations

payable by check or money order to *Tusco Amateur Radio Club*. Payment must accompany reservation and be received by January 20, 2002. Tusco ARC reserves the right to re-sell your space if you are not present by 9 a.m. Please bring your own extension cords. 120 volts is available.

STICKNEY, IL The Wheaton Community Radio Amateurs Midwinter Hamfest, featuring a ham radio, computer and electronics flea market, will be held at Hawthorne Race Track, 3501 S. Laramie, Stickney IL, January 27th, 8 a.m.–1 p.m. Flea market tables, commercial booths, VE exams, free parking. Talk-in at 145.390. Tickets \$6 in advance, \$8 at the door. Contact *WCRA, P.O. Box QSL, Wheaton IL 60189*. Get more info at the Web site [*http://www.wheatonhamfest.org*]. E-mail [*info@wheatonhamfest.org*], phone: 630-545-9950.

FEB 3

LORAIN, OH The Northern Ohio ARS will sponsor Winterfest 2002 at Gargus Hall, 1965 N. Ridge Rd., Lorain OH, 8 a.m.–1 p.m. Directions from the East — Take I-90 or the Ohio Turnpike West to the Rt. 57 exit. Go north on Rt. 57 to the first light and turn left. Get in the right lane. The hall is on the right side about a half mile down. It is after the first light and right before Marco's Pizza. Directions from the West — Take I-90 or the Ohio Turnpike East to the Rt. 57 exit. Go north on Rt. 57 to the first light and turn left. Get in the right lane. The hall is on the right hand side about a half mile down. It is after the first light and right before Marco's Pizza. From the South — Many routes cross Rt. 57. Take 57 North through Elyria. Turn right when 57 goes north to Lorain. Pass the turnpike and I-90 to the first light past I-90 and turn left. Get in the right lane. The hall is on the right hand side about a half mile down. It is after the first light and right before Marco's Pizza. Free pancake breakfast. Talk-in on NOARS rpters. 146.700(-) and 444.800(+). Ample all indoor commercial space, reservations required. Tickets \$5 each at the door; includes 1 admission and 1 breakfast. Breakfast will be served from 8 a.m. until 11 a.m. only. 6 ft. tables are \$10 each. All workers require an admission ticket. Set up for vendors begins at 6 a.m., doors open to the general public at 8 a.m. For info contact *John Schaaf K8JWS* at 216-696-5709, or write *NOARS* via E-mail at [*noars@qsl.net*], or write to *NOARS Winterfest, P.O. Box 432, Elyria OH 44036-0432*. 73

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Build This Simple Electronic Keyer

One of the nicest little projects we've seen.

One way for the CW radio operator to send almost perfect Morse code is to use an electronic keyer. Most commercially available keyers are relatively expensive, but it is easy to build a low-cost keyer using TTL devices and a single 556 dual-timer IC.

The keyer features a variable clock speed rate and a sidetone oscillator. It can be used to key a CW transmitter or as a CPO (code-practice oscillator). The circuit operates from any conventional 5-volt DC source. Since it draws only 40 mA of current, it can even be battery-powered, providing many hours of operation from ordinary penlight (AA) cells. For a longer span of time, C or D cells can be used. A power supply is included if you want to run it off house current. See Fig. 2.

How it works

Quad 2-input NAND gate IC1, as shown in the schematic, eliminates most of the diodes commonly used in other keyer circuits and provides a TTL-level signal for the remainder of the circuit. Dual flip-flop IC2 generates the dits and dahs in a 3:1 ratio, with the spaces being one dit wide. Timer IC3A serves as the system clock generator, with potentiometer R7 acting as the speed control. The second timer IC3B generates an audio tone signal when gated, producing a sidetone so that you can hear what you are sending out.

Output transistor Q1 is required if you intend to use the circuit to key a transmitter. If negative grid keying is desired, add reed relay K1 to the circuit as shown. This relay isolates the

keyer circuit from the voltages used in the transmitter. Another way you can go is to use an optical isolator instead

Continued on page 56

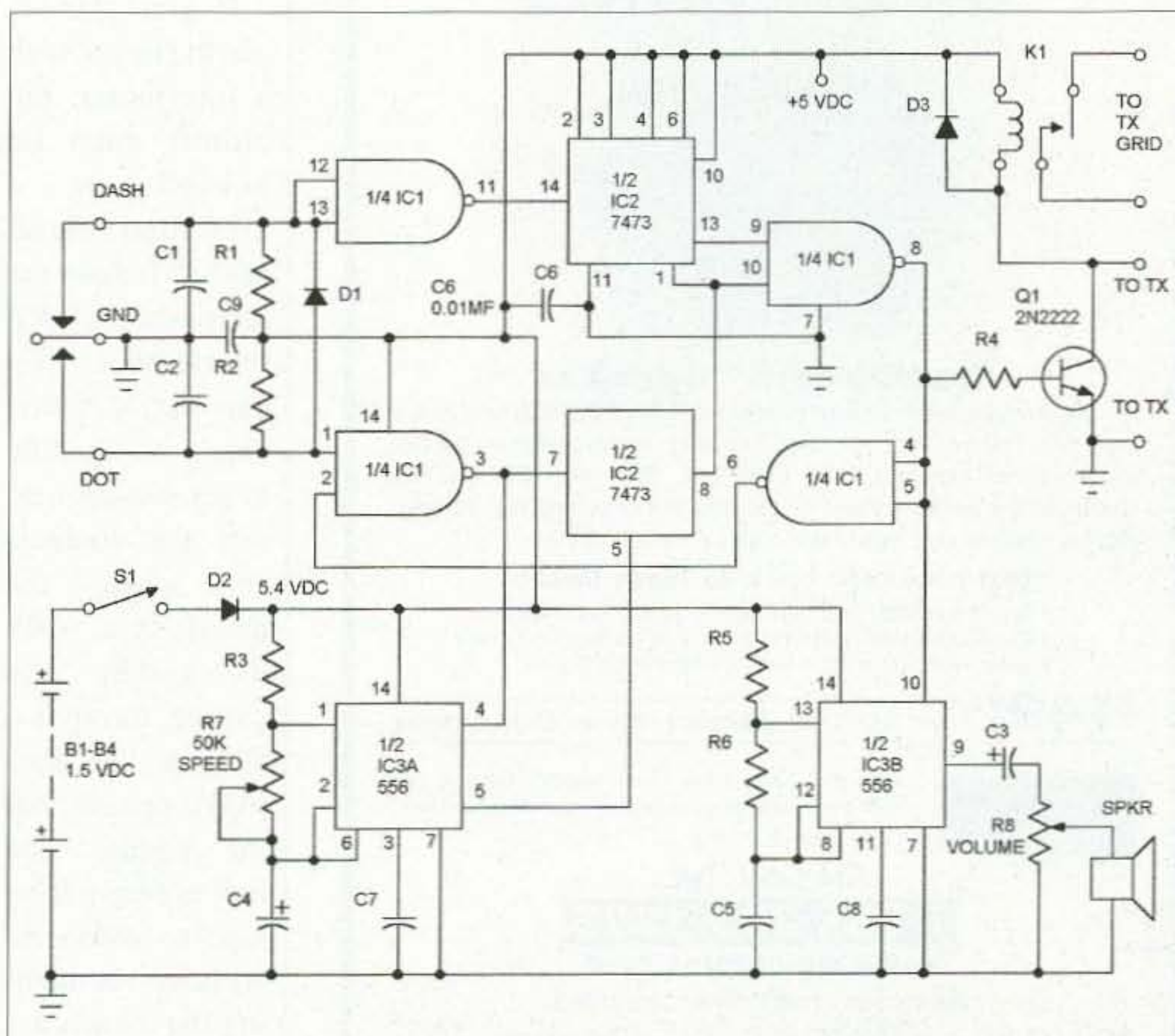


Fig. 1. Relay circuit is for negative-grid keying, and sidetone oscillator for code practice.

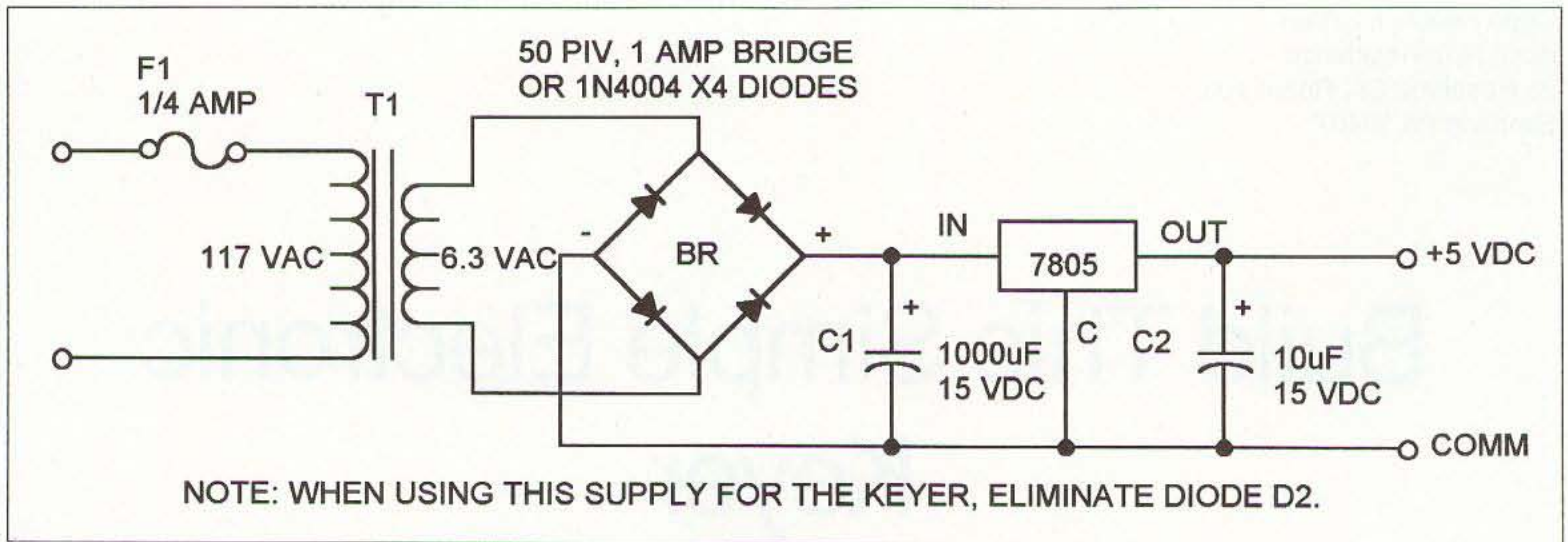


Fig. 2. Power supply.

Build This Simple Electronic Keyer

continued from page 55

of the relay, but it would be too much to explain here.

The circuit can be assembled on a piece of perforated board, using a point-to-point wiring technique. Or you can design a printed circuit board.

There is nothing critical about parts placement or lead routing.

If you prefer, you can substitute two separate 555s for the 556 IC3. Speed control potentiometer R7, which mounts on the front panel of the chassis box in which the keyer is to be housed, should have a reverse-log taper to improve the linearity of the

keyer. The side-tone oscillator can be adjusted to produce a desired tone in the speaker.

If you plan to use the keyer with a transmitter, the circuit must be housed in a grounded metal case to reduce the possibility of RF interference. You can easily fabricate a paddle keyer. Mount it so that the contacts are inside the metal box, with the paddle arm exiting through a slot in the box. Make certain that the paddle arm moves freely from side to side and without contacting the metal case box.

Part No.	Description
B1-B4	1.5 V cell
C1, C2, C6-C8	0.01 µF disc capacitor
C3	1 µF 16 WVDC electrolytic capacitor
C4	2 µF 16 WVDC electrolytic capacitor
C5	0.02 µF disc capacitor
C9	0.1 µF disc capacitor
D1	1N4148 or 1N914 diode
D2, D3	1N4001 diode
K1	Reed relay 5 V coil
Q1	2N2222A transistor
SPKR	8 Ω speaker
S1	SPST switch
R1-R3, R5	1k 1/4 W resistor
R4	2.2k 1/4 W resistor
R6	47k 1/4 W resistor
R7	50k reverse log taper pot, front panel
R8	1k pot, front panel
IC1	7400 quad 2-input NAND gate IC
IC2	7473 dual flip-flop IC
IC3	556 dual timer IC
Miscellaneous: Perforated or printed circuit board; suitable metal case or box; battery holder; 2 control knobs; paddle assembly; hookup wire; solder; machine hardware, etc.; IC sockets; 4 rubber feet or rubber pad or metal plate; heat sink for Q1.	

Table 1. Parts list.

After assembling the keyer, check out its operation in both the transmit and CPO modes.

73

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Say you saw it in 73!

The ABCs of IRCs

continued from page 30

exchange for postage stamps in the foreign country. Consequently, many people use U.S. dollars (often euphemistically referred to as "green stamps") instead. A very broad rule of thumb says that buying a new IRC costs almost exactly the same as US\$1. Although U.S. dollars are not so readily available as IRCs outside the U.S., they can be purchased from most High Street banks or bureaux de change, although they do attract a small surcharge as commission. Some U.K.-based QSL managers currently offer surplus US\$1 bills for sale at around £0.70 each.

Generally, all QSL managers prefer to receive U.S. dollar bills than IRCs, as they can be turned into cash rather than postage stamps. Quite apart from anything else, no one is likely to argue that a \$1 bill is not valid! However, the new \$1 coins and low-value hard currency notes other than U.S. dollars are especially unwelcome, simply because such notes as 1000 Italian lire, 25 Austrian shillings, and the like are of so little value that they are not accepted for exchange by the banks and are thus worthless to the manager. Applications containing such currency are sometimes returned via the bureau, with the money and an explanatory note included. 73

The Peet Brothers Ultimeter 2000

continued from page 39

includes date, time, the barometric pressure, etc. The next step was to step through each of the displays. The unit usually displays the wind direction and one other measurement including wind speed, the temperature, chill factor, dew point, barometric pressure, rainfall, and humidity. You can even set it up so that it alternates through the various readings that interest you on a rotating basis. It can also show any significant change in any of fifteen readings. The two that I find most useful are a rapid rate of change in barometric pressure (a key indicator of

an impending storm.) and high wind. Depending upon your area, temperature extremes or flash flood warnings might be even more useful.

I was impressed, but now it was time to move to the next step. There are weather stations and there are ham radio weather stations. Now it was time to connect the weather station to the ham station (we older folks remember station-to-station calls, but that has nothing to do with this). This called for the last piece left in the box — the Ultimeter 2000 serial port. The serial cable comes with software that logs the information from the U-2000, but it is also easy to interface the weather data to the popular WinAPRS program. Depending upon the program you are using, you can set the U-2000 to output a steady stream of data, a weather record every five minutes (ideal for APRS), a detailed stream of data, or connected to a modem. The packet mode provides updated information frequently, about every five minutes. Normally, I transmit weather data every ten minutes unless bad weather is forming (when I will drop to every five minutes), so this is ideal.

WinAPRS is the program I use, and the weather station works flawlessly with the system. I had a little trouble at first, but not due to the weather system or the APRS. It took me a while to realize that COM1 can be serial port 2 and vice versa. Oops. Once I figured that out, everything else went great. With WinAPRS you can click on a particular station's icon and access its current weather data, or even the weather history. You can also set WinAPRS to display only other weather stations and chosen measurements.

Having a weather station is great. When I get up in the morning I check the E-mail and the weather data. I'll look at the other stations in the area and compare what is happening. We've all seen it rain a short distance away while enjoying sunshine where we stood, so we know that weather is not actually constant throughout a city or area (regardless of what the TV weatherman says). I find it interesting to see how different things can be throughout the area. This is also helpful in trying out

your predictive powers. Let's see, wind is from the southwest at 10 miles per hour. They're reporting rain 5 miles in that direction. Sounds like we may get wet in about half an hour.

When I'm at work or on the road, it's kind of fun to tap into the Internet gate (IGate) connections to see how weather is in the backyard. You can connect to [<http://wx.findu.com/ke8yn>] to get a reading. IGates collect information off the air and pass them along to the Internet, so your weather data is available to the National Weather Service, other hams, or just plain weather junkies.

The bottom line? If you're looking for something new to add to your station, you've got to check out the Peet Brothers line of weather systems. Try their Web page at [<http://www.peetbros.com>] for general information and an interactive demo of the Ultimeter 2000. They are located at 31 E. 17th Street, St. Cloud FL 34769; 1 (800) 872-7338 or (407) 957-9786. 73

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THE DIGITAL PORT

continued from page 43

fine programs, he came back to me directly and announced the fact that what I needed was a "real computer." Funny thing, now that I have this new whiz-bang setup, those are two of the programs that don't like the "real computer."

While I think of it, most available ham software works great on Windows 98. To me, for our purposes, the better combination is a fast processor, buckets of RAM, and Windows 98. And you can't buy that combo at the store. It has to be a do-it-yourself project.

That is not a condemnation of any product or anyone — it is simply a fact. Whatever works best for you in your computer with your radio is what is best for you. I have yet to try one or two of the old standby programs that would not run on the old computer to see how they react to this environment. And I know at least one of those programs is being used by a whole bunch of hams, because I converse with them frequently.

That's about it for this month. Have a Happy New Year. And if Wayne is feeling generous, perhaps he will allow me to spill over into your shack during the next twelve months. If you would like to ask questions about these subjects, feel free to E-mail me at [KB7NO@worldnet.att.net]. 73 until next time, Jack KB7NO. 73

HOMING IN

continued from page 52

electronic and postal mail addresses at the beginning of this article.

Footnotes

1. Moell, Joe, "Homing In: Up, Up and Away," *73 Magazine*, January 1992.

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

3. Moell, Joe, "Homing In: A New Millennium for Foxhunting," *73 Magazine*, January 2001.

4. Moell, Joe, "Homing In: Foxhunt Fun at the Friendship Games," *73 Magazine*, October 1993.

5. Moell, Joe, "Homing In: City of Roses — and Foxes," *73 Magazine*, October 1999. 73

ON THE GO

continued from page 53

Sound impossible? Don't worry, there is a product that will handle these needs with no hassle whatsoever.

The A & A Engineering "Smart Battery Charger" may be one of the best headache-savers for hams requiring emergency backup power. Designed to work with either lead acid or gel-cell batteries, the Smart Battery Charger provides the type of charging current the battery needs for its current state, as well as providing current to the load. Most important of all, the charger will not overcharge your battery.

The secret is the UC3906, an IC specifically designed for this purpose. This chip permits the charger to switch among three modes of operation, bulk, absorption, and maintenance. When hooked to a battery, and with AC applied, the charger checks the battery's voltage. If it is less than 6 volts, the charger will not attempt to charge the battery, since this low voltage may indicate dead cells in the battery. If the voltage is between 6 and 12 volts, the charger enters bulk mode, which provides the highest current to the battery. As the charge level rises to about 95%, the charger enters into absorption mode. At this stage the charger attempts to raise the voltage from 2.3 volts per cell to 2.4 volts. Finally, when the battery approaches its full charge, the charger switches to maintenance mode. In maintenance mode the current is reduced further — all the way to zero if and when necessary. Unlike a trickle charger, the ability to drop the charging current provides better protection and longer life for the battery. This is why the charger can be left hooked to the battery and turned on indefinitely.

The A & A Smart Battery Charger is available either assembled or as a kit. Construction is straightforward on a printed circuit board and should present no problems for most hams. The unit is mounted in a metal case with a switch and indicator LEDs. The LEDs show which mode the charger is in at any given time. I have to admit I don't often worry about the LEDs because the unit has worked so flawlessly that I do not worry about its performance. Many chargers used with gel-cells are notorious for their RFI. Since the A & A charger is specifically designed for use in amateur radio, it is well filtered and does not create any harmonic interference.

After the World Trade Center and Pentagon attacks in September, I brought a mobile 2-meter rig into my office at the hospital. Even though we have multiple redundant power supplies including a

generator, not every outlet or device is connected to the emergency power. I brought in a 17 Ah gel-cell and the Smart Battery Charger. My ability to operate two meters and 440 MHz in the event of an incident is now firmly placed on my "Things Not To Worry About" list.

Be sure to put this on your shopping list if you have any interest in emergency or disaster communications. 73

QRX

continued from page 7

will take to develop, or whether they will ever be deployed.

Thanks to Telecom Daily, via Newline, Bill Pasternak WA6ITF, editor.

Words of Wisdom

• I care not for a man's religion whose dog or cat are not the better for it. — Abraham Lincoln (1809–1865)

• The man who claims to be the boss in his own home will lie about other things as well. — Amish saying

• Fall seven times, stand up eight. — Japanese proverb

• You may have a fresh start any moment you choose, for this thing we call "failure" is not the falling down, but the staying down. — Mary Pickford

• Always do right. This will gratify some people and astonish the rest. — Mark Twain

• Today is a gift. That is why it is called the present. — Unknown

• Happiness is not a station you arrive at, but a manner of traveling. — Margaret Lee Runbeck

• The only real voyage of discovery consists not in seeking new landscapes but in having new eyes. — Marcel Proust

• A lion chased me up a tree, and I greatly enjoyed the view from the top. — Confucius

• Life is what happens to you while you're making other plans. — John Lennon

• You can take all the sincerity in Hollywood, place it in a fruit fly's navel, and still have room for three caraway seeds and a producer's heart. — Fred Allen

• You must learn from the mistakes of others. You can't possibly live long enough to make them all yourself. — Sam Levinson

• There are two possible outcomes: If the result confirms the hypothesis, then you've made a measurement. If the result is contrary to the hypothesis, then you've made a discovery. — Enrico Fermi

• When you have eliminated the impossible, whatever remains, however improbable, must be the truth. — Arthur Conan Doyle (1859–1930)

Continued on page 59

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QRX

continued from page 58

- Nostalgia is like a grammar lesson: You find the present tense and the past perfect. — Unknown
 - Most people reach the top of the ladder of success only to find it is leaning against the wrong wall. — Unknown
 - There's a fine line between genius and insanity. I have erased this line. — Oscar Levant
 - The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn. — Alvin Toffler
 - No one is much pleased with a companion who does not increase, in some respect, their fondness for themselves. — Samuel Johnson
 - Journalism is merely history's first draft. — Geoffrey C. Ward
 - Good communication is as stimulating as black coffee, and just as hard to sleep after. — Anne Morrow Lindbergh
 - Cleanliness is next to clean-limbed, in the dictionary. — Unknown
 - The two secrets to success: Don't get lost in the woods, and don't go in your old lady's pocketbook. — Archie Burnett, Vermont farmer
 - Always hold your head up, but be careful to keep your nose at a friendly level. — Max L. Forman
 - I have every sympathy with the American who was so horrified by what he had read about the effects of smoking that he gave up reading. — Henry G. Strauss
 - Worry is like a rocking chair: It gives you something to do, but it doesn't get you anywhere. — Dorothy Galyean
 - The second day of a diet is always easier than the first. By the second day, you're off it. — Jackie Gleason
 - Never raise your hands to your kids. It leaves your groin unprotected. — Red Buttons
 - A conference is a gathering of important people who singly can do nothing, but together can decide that nothing can be done. — Fred Allen
 - They think they can make fuel from horse manure. ... Now I don't know if your car will be able to get thirty miles to the gallon, but it's sure gonna put a stop to siphoning. — Billie Holliday
 - Why should people laugh at the idea of making fuel from garbage? After all, they make TV from it. — quoted in *TV Guide*
- From the ARNS Bulletin; the Internet, with special thanks to Gardner Johnson; other sources as noted. 73

NEVER SAY DIE

continued from page 4

Maybe you've wondered where the American Radio Relay League got its name.

I'd like to see some articles for 73 on more ways hams can use digital communications. How narrow a bandwidth can today's compacting algorithms achieve?

Slow-scan TV was fine for 30 years ago. Isn't it time we developed a way to compact real-time video for use on 20m?

Emergencies?

How many clubs have an emergency communications van? Let's see some pictures and descriptions. This will goad other clubs into trying to do even better. With the changes in the weather, we're likely to see more and more natural emergencies where ham communications will help. Has your club's van an emergency repeater that can be set up to handle local communications in the event of a hurricane or earthquake?

When a hurricane hit St. Lucia I sent an editor down there with a couple suitcases of ham gear to help out. Ever since, I've been treated like royalty when I've visited St. Lucia. I was even thanked by the governor. Maybe you've read my \$5 *Caribbean Travels* book?

Some prophets with distressingly good records have been predicting a catastrophic event in the next few years. If an asteroid hits, or the earth's crust shifts, our emergency systems are going to be needed. Will we be ready?

Being ready for emergencies is important, but of equal importance is making sure that the public knows about it. Get photos and stories into the papers and on TV, and talk it up on talk radio. Oh, yes: Please send me copies so I can build a file.

Quid Pro Quo 2002

In return for our billions of dollars of radio spectrum, we have to pay the piper in some way. In the past we were able to supply trained radio operators. Well, that was important 60 years ago. We amateurs helped significantly in WWII, but today the military has no need for us.

International goodwill was another benefit we were supposed to provide. Is that what you call those pileups demanding a 30-second contact and a QSL card? Sure. With the world able to watch American TV, the few foreign amateurs we bother to actually talk with is insignificant.

Technical education? Hmm, when was the last tech session held at a radio club meeting? Anyone remember? A few years ago, I ran a wonderful 26-part tech series by Peter Stark K2OAW. I'm not sure anyone bothered to read it. I admit I've lost track of what's out there to help newcomers learn about technology. I know that none of the publishers have sent me review copies in years. If you've found any outstanding books, please write and let me know so I can pass along the word.

Sea Power

One source of energy that's available and so far not used is the movement of the ocean waves. The estimates are that electricity generated this way would cost about 12¢ per kilowatt hour. That's competitive just about anywhere. But for islands, where coal or oil have to be imported to run power generating stations, this could lower power costs substantially.

All it takes is a series of floats which operate pumps on the bottom. The pumped water would then turn generators, just as hydroelectric plants in our dams do. Presto, wave action can be turned into electricity.

Health Insurance

D'ja notice that the average hike of health insurance last year was 15%? Insurance companies, which get a percentage of the cash flow, have little interest in keeping medical costs down. They just pass along the high and higher cost of drugs and hospital care, building bigger and more beautiful buildings.

Companies could help cut the sickness costs for their employees by encouraging the concept of prevention. Very few people seem to understand that their health problems are caused by their lack of care for their bodies. The coffee, Danish, and candy machines that most companies have for their employees are helping to increase sickness care costs.

Super Pork

As long as the public has their eyes glued to the TV being entertained, Congress can spend our tax money any way they want. Every now and then, something gets so outrageous that even Congress can't stand the stink of pork. Alas, not often.

They're still pouring billions into hot fusion. Scientist welfare. They stopped

Continued on page 61

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Special Forecast

During January, the average Maximum Usable Frequencies (MUFs) are at their lowest annual values in the northern hemisphere. This seasonal phenomenon means that the higher bands (i.e., lower frequencies) will perform the best, so the bulk of activity will be found on 20 through 40 meters.

Be sure to explore elsewhere, however, since a bit of patience on apparently "dead" bands can sometimes net a rare contact or two. Getting away from the crowd in this way positions you to take advantage of sudden favorable swings in DX propagation.

At this writing (late September), we are seeing sunspot numbers and flux values above 300 — the highest recorded since 1991. This has been quite a surprise and not particularly good for the HF bands, due to numerous geomagnetic disturbances from solar flares and CMEs. I expect to see a return of this intense activity in the new year, which is why I've indicated mostly Fair-to-Poor (F-P) conditions on the calendar. Don't be dissuaded from getting on the air, however: Just expect a little extra challenge.

Given the current interest in Afghanistan and Pakistan, you might try working 20 meters for openings to those countries. Although amateur stations aren't numerous over there, it will be a good test of your technical skills to see if you can make a few contacts anywhere in that area. Expect the aurora to be your main bugaboo, because the "pipeline" to that region runs very close to the poles. Although the shorter path is to the north, you might find that propagation is better on the long path across the Antarctic summer.

To check the accuracy of my Time-Band-Country chart, I regularly listen to commercial broadcast bands worldwide. By doing so I am able to follow current propagation conditions, but am also reminded that many people still rely heavily on their shortwave radios for news and entertainment. There is certainly some interesting stuff to be heard that you aren't likely to get from domestic sources. If you haven't done so in a while, turn off the TV and computer, tune up your old SW set, and see if you don't have a

Continued on page 61

January 2002						
SUN	MON	TUE	WED	THU	FRI	SAT
		1 P	2 P	3 F-P	4 F	5 F
6 F-G	7 F-P	8 P	9 VP	10 F-P	11 F	12 F-P
13 F-P	14 F	15 F-G	16 F-P	17 F-P	18 F	19 F-P
20 F-G	21 F-G	22 F-P	23 F-P	24 P	25 F-P	26 F-P
27 F-P	28 P	29 VP	30 F-P	31 F-P		

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

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

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

Propagation

continued from page 60

little old-fashioned fun with it — I'll bet you do! 73, and Happy New Year.

Band-by-Band Summary

10-12 Meters

Only reliable a few hours a day at this time of year. As always, these bands open in the east at dawn, follow the sun westward, and close in the southwest in the afternoon. No nighttime openings are expected. Short skip can range from 1,000 to 2,500 miles.

15-17 Meters

Expect some reliable overseas openings, especially to the southern hemisphere. Try Southeast Asia in the late afternoon for some exotic contacts. As always, signals will peak before noon toward the east, around midday to the south, and toward the southwest in the afternoon. Short skip will extend beyond 1,000 miles.

20 Meters

This will be your mainstay as usual, but may suffer occasionally during the stronger solar outbursts. It is still your most versatile HF band and you can usually find openings from dawn to late evening. On good days 20 might even remain open all night if fluxes reach the 300-plus level. Short skip can fluctuate from as little as 500 miles during the day to as much as 2,500 miles at night.

30-40 Meters

These bands will provide some good worldwide openings, but only after dark. Southern Europe, the Middle East, and Africa can remain open in the evening when propagation is good, but Central and South America will usually dominate the nighttime hours. Asia and the Pacific won't open up until after midnight, but if you can stay awake some exotic contacts can be made there. Short skip should extend beyond 700 miles.

80-160 Meters

Often very good at this time of year because atmospheric noise is at a seasonal ebb, but unusually low MUFs could close these bands down on many days. DX openings can sometimes appear in the east right after sundown, but both bands are primarily for "night owls" when open. Short skip on 80 is typically beyond 2,000 miles while skip on 160 averages closer to 1,500 miles. 73

NEVER SAY DIE

continued from page 59

pouring billions into the super collider project. Too much was going to just one state. The space station is out there — doing what? Well, after the Moon landings and the shuttle, Congress had to spread around a few more billions to contractors and the thousands of highly paid employees at NASA.

The latest scam is the reviving of the Star Wars project to build a system to protect us from missiles. The December 2001 issue of *Discover* has a ten-page article explaining in detail why this project is total pork. As soon as we manage to design a system which can sort out a real warhead from a bunch of fakes, they'll start lobbing multiple warhead missiles at us. Or, thousands of small packages of anthrax the size of Wheaties boxes.

How much of this waste of your money is it going to take before you lift your eyes from the tube as say "baa"?

These guys you have been unable to stop yourself from electing and then re-electing are fleecing you. You know the job pays when a senator will spend several million dollars to get re-elected. Pays very, very well. In other words, these bozos are putting on a great show for you, and getting a big piece of the action.

The reality is that we are sitting ducks for any intercontinental ballistic missiles any country lobs at us. We cannot shoot them down. We are not going to invest in a way to shoot them down.

Those Patriot missiles during the Gulf War? Shooting at slow, easy targets, they were at most 6% effective.

The people who are pushing for us to spend billions on missile defense are mostly nontechnical. Politicians. The top people at the Defense Department are political and managerial, not technical.

Negative People

A recent study reported in *Time* (May 14, 2001, p. 62) confirmed that people who express negative emotions do not live nearly as long as positive people. That's good news. It's a real drag when you know someone who invariably thinks in terms of the negative side of everything and who sees or suspects the negative side of everyone they meet. No matter how excited you may be about a new idea, this person will find a potential downside if you try to share it.

The study also points out that Alzheimer's can be postponed by a diet change to leafy green vegetables. Also, the more active you are in using your

brain, the less likely you are to get Alzheimer's. Playing chess and Scrabble and doing crossword puzzles are great preventatives. As a crossword and cryptogram addict, that's comforting to know.

Thanks, Rocky (a fan in Santa Clara CA) for sending those bundles of *NY Times* puzzles. I usually knock off the "Solution time: 24 minutes" puzzles in about eight to ten minutes. Yep, I'm bragging.

MMR-Autism Link

Doctors in the U.K. found the measles virus in the intestines of children who developed autism after a healthy infancy. All of them developed autism after receiving the MMR vaccine. That's the combination of mumps, measles, and rubella vaccination.

Again, we've been conned by the medical industry. If you prefer to believe your kindly family doctor about vaccinations, at least do me the courtesy of reading a book or two exposing this scam. Like Coulter's *Vaccination — Social Violence and Criminality — The Medical Assault on the American Brain*. This exhaustively referenced book shows the connection between vaccinations and autism, mental retardation, criminality, and a few other downsides — like death. About a thousand babies a year die. The medical industry calls that an acceptable loss.

Or read Walene James' *Immunization — the Reality Behind the Myth*.

Could a childhood MMR shot make the difference between a CBer and an Extra Class ham? Over to you, good buddy.

The Ham Industry

With the lack of newcomers, plus the lack of significant new ham technologies, the ham industry is hurting. And since the normal corporate reaction when there is a downturn in business is to cut advertising, thus guaranteeing a further drop in sales, this has slimmed down the ham rags. And this, in turn, has limited the space available for my editorials. This has not stopped me from writing, so I've been posting my newer essays on my Web site every few days, and then taking them off after a week or so.

The Wayne's Weird World section is right up front when you go to [www.waynegr.com].

The Cell Game

Yes, our HTs and repeaters have spawned the multi-billion-dollar cell

Continued on page 62

NEVER SAY DIE

continued from page 61

phone market. Good for us, bad for consumers.

You see, those little antennas people are holding up to their heads are slowly burning out brain circuits. Yes, I know all about the "controversy" over the danger. There's only a controversy because the cell phone industry doesn't want to find itself in the mess big tobacco's in.

The leading researcher in the field, Dr. Ross Adey K6UI, has confirmed beyond any doubt how dangerous these little gadgets can be. If you absolutely have to be connected 24/7, then get a phone with an antenna that's not close to your head.

Naturally, the scam artists got right to work and are making a bundle selling wave shields to the ignorant. These gadgets do virtually nothing to protect one's brain. Though this should be totally obvious to anyone with even a vague understanding of radio, *Good Housekeeping* went ahead and ran tests. The result? None of the five leading brands had any significant lowering of a cell phone's radiation exposure to the brain.

Fortunately, like the damage sugar and milk products do to your body, the burnout is slow, so the user's IQs and memories are just gradually blown away. The downside is that if you stop poisoning your body it can recover, but those fricasseed brain cells are pfffft for life.

Drug Testing

Bet you didn't know that most of the drug testing for FDA approval is done by the drug companies seeking the approval. Would it surprise you to know that many of these tests are rigged? That problems are swept under the carpet? All of which explains the parade of FDA-approved drugs which later have to be taken off the market when the adverse reactions and side effects can no longer be hidden.

A recent study by the U.S. Agency for Health Care and Quality of 192 drug trials, each with a minimum of 100 patients, brought this: "We found no instances where the safety reporting can be deemed satisfactory." They found that the severity of the side effects were not reported in over 60% of the trials, and the drug toxicity in over 70%.

Happy pharmacy, sucker.

Cancer Answer

According to the April 26th issue of *Nature*, scientists have proven again that a strong immune system prevents cancers from forming. They did it with mice. Never mind that Dr. Lorraine Day

has proven with her own body that a strengthened immune system can reverse and cure even near fatal cancers. In her case she was so near death when she decided to cure herself that she'd been given last rites. Well, it was a last wrong in her case.

If you know anyone with cancer, for heaven's sake have them get her *Cancer Doesn't Scare Me Anymore!* video. Call her at 800-574-2437 — and say hello from Wayne. I sent her a copy of my *Secret Guide to Health* and she called to say that my book is right on the money.

Since I'm not an MD, you may believe her more than you do me. Dr. Day was a leading San Francisco trauma doctor. Now she's busy trying to get the word out on how anyone can cure cancer and almost any other disease just by changing one's lifestyle. As she says, "There are no incurable diseases."

Let's try to stop the medical industry's \$50,000 lumpectomies and mastectomies just by changing our diets.

Home PCs

Fifty-one percent of households have at least one computer. It was 42% in 1998 and about 10% in 1984.

It wasn't all that long ago that DEC president Olson couldn't imagine why anyone would ever want a computer at home. So much for the tunnel vision that killed the minicomputer industry ... Data General, Wang, Prime, Centronics, and many others.

Don't laugh ... just think of the thousands of people who worked for those companies for years, only to find their jobs gone as a result of their tunnel vision. They didn't understand what was going on, so they blindly stuck with what they should have recognized as a slowly sinking ship. Then one day their ship sank.

My advice is to aim toward starting your own small business, and do it before you see the torpedo coming toward your employer's ship. After the pink slip panic has set in is no time to start planning.

Most people (like 99%) live in the present. They've got a job, they commute to work, they go home at night and watch TV — probably a ball game. They may even read a newspaper, though they don't bother with more than the sports pages. Then the fan gets hit.

Unlike DEC's Olson, Data General's De Carlo and An Wang, and their employees, look for a need or a service in the field you know best that you might be able to satisfy. Maybe it's information and you could write a book? Or as a consultant, if you've taken the time and effort to become an expert in something. If

you haven't by now, what in the hell is wrong with you?

It pays to have a fallback in case that paycheck suddenly stops. It pays even better to get your small business started nights and weekends so you can grow it and stop being an employee.

Lied To

Gotta nice E-mail from Chris KAØBLT about my review of *You Are Being Lied To*. "It's one of those books that once I pick it up, I can't put it down. Thanks for the recommendation!"

Another nice E-mail came from Steve Weber KD9BO. "Keep pounding your message into the thick skulls of the sheep. Maybe some of it will make its way into their consciousness. I wish you had a wider audience, since hams are infamous for being set in their ways. You would be a great Art Bell program host!"

Yep, it would be fun (for a while) to be a guest host on the *Coast-to-Coast* show. I'm friends with the authors of books the public needs to hear from. They'd make great guests. But that would take an awful lot of time and I'm pathetically behind as it is — what with starting *NH ToDo* magazine with the goal of keeping the recession from doing New Hampshire people any damage. And then, if I can find an angel with \$750,000, I'd like to get a magazine started that will do for education what *Byte* and my other computer magazines did for PCs. Imagine kids of all ages, anywhere in the world, being able to learn anything they want and have a ball doing it! And at a cost of about 10% of our government-run public school system.

On the other hand, I've found that most people prefer being sick and dying to changing their lifestyle. The wife of a good friend of mine in her 50s is dying of multiple sclerosis and cancer, yet there's no way to get her to stop drinking Diet Coke and eating a diet of chips and chocolate. Raw food? No way! Oh, she's also taking an array of prescription drugs.

That reminds me of when the ARRL pulled their Incentive Licensing disaster in 1963. That forced about 95% of the ham industry out of business, continuing to advertise in *QST* until *QRT*.

Hydrogen

One of the events I'll never forget was around 1930 when our school turned out to watch the dirigibles fly over. There were the *Hindenburg*, the *Graf Zeppelin*, the *Akron*, the *Macon*, and the *Los Angeles*, all flying over at the same time. Wow, what a sight! And what a sound, too.

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 Bioelectrifier 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! The circuit can be built for under \$20 from the instructions in the book. \$10 (#01)

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)

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)

Cold Fusion Journal: They laughed when I predicted the PC industry growth in 1975. PCs are now the third largest industry in the world. The cold fusion ground floor is still wide open, but then that might mean giving up watching ball games. Sample: \$10 (#22)

Julian Schwinger: A Nobel laureate's talk about cold fusion—confirming its validity. \$2 (#24)

Dowsing. Yes, dowsing really does work. I explain how and why it works, opening a huge new area for scientific research with profound effects for humanity. \$2 (#84)

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 its 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. I explain 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 - like Hapgood, Einstein, Snow, Noone, Felix, Strieber. \$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 readers who worked for

NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. \$5 (#32)

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 Gotschalk'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. 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 Editorials: 120 pages, 100 choice editorials. \$10 (#72)

1997 Editorials: 148 fun-packed pages. 216 editorials. \$10 (#74)

1998 Editorials: 168 pages that'll give you lots of controversial things to talk about on the air. \$10 (#75)

1999 Editorials: 132 pages of ideas, book reviews, health, education, and

anything else I think you ought to know about. \$10 (#76)

2000 Editorials: 76 pages (thinner magazine as a result of our slowly dying hobby) \$5 (#77)

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)

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

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

Wayne's Bell Saver Kit. The cable and instructions enabling you to inexpensively tape Art Bell W6OBB's nightly 5-hr radio talk show. \$5 (#83)

73 Writer's Guide: It's easy, fun, can pad your résumé, and impress the hell out of your friends. \$0 (#78)

Cold Fusion Six-Pack: Six Cold Fusion Journal back issues to bring you up to speed. \$20 (#19)

NASA Mooned America: René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. \$30 (#90)

Last Skeptic of Science: This is René's book where he debunks a bunch of accepted scientific beliefs - such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. \$30 (#91)

Dark Moon: 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. \$35 (#92)

Dark Moon Video: 222-minute exposé nailing NASA with their own photos. If you've watched the NASA films of the astronauts walking on the Moon you wondered at their weird gait. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of giveaways that the photos and films had to have been faked. \$46 (#93)

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Barter 'n' Buy

Turn your old ham and computer gear into cash now. Sure, you can wait for a hamfest to try and dump it, but you know you'll get a far more realistic price if you have it out where 100,000 active ham potential buyers can see it, rather than the few hundred local hams who come by a flea market table. Check your attic, garage, cellar and closet shelves and get cash for your ham and computer gear before it's too old to sell. You know you're not going to use it again, so why leave it for your widow to throw out? That stuff isn't getting any younger!

The 73 Flea Market, Barter 'n' Buy, costs you peanuts (almost) — comes to 35 cents a word for individual (noncommercial!) ads and \$1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

Send your ads and payment to: 73 Magazine, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls. The deadline for the March 2002 classified ad section is January 10, 2002.

220 MHz Award; see W9CYT on WWW.QRZ.COM for information. BNB645

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NEVER SAY DIE

continued from page 62

Then, with the crash of the *Hindenburg*, the lighter-than-air era instantly ended. Never mind that the American dirigibles were using helium. We'd refused to sell it to Germany, so they had to use hydrogen — and the burning of the *Hindenburg* at Lakehurst proven how dangerous that was.

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*Digital communications require at least two similarly equipped transceivers.

Digital mode is compatible with Alinco DR-135/235/435T mobile transceivers equipped with EJ-43U digital communications board.

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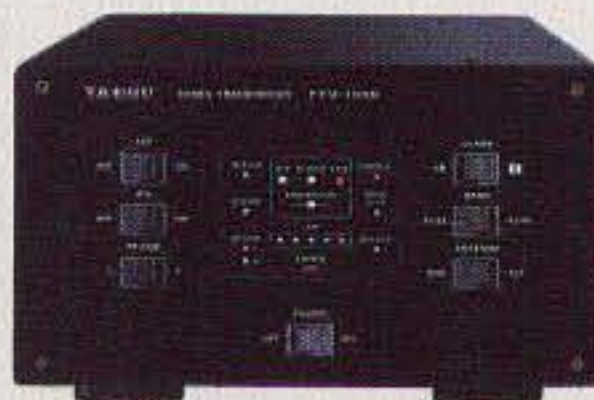


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200 W 50 MHz Transverter

FTV-1000

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