SEPTEMBER 2002
ISSUE #502
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73® Amateur Radio Today

FAIRS in Dominica

Testing Broadband Amps

General-Purpose Interface Board for Your PC

More:
- 2m/70cm Quad
- VLF to HF Loop

"CQ Lidsville"

Alinco Delivers HF Adventure!

Alinco's HF Transceivers Deliver Incredible Performance at a Tiny Price

You're only a few hundred dollars away from a brand new Alinco HF Transceiver. That's right! Just a few hundred dollars gets you on the air with a big 100-watt signal, great audio and an easy-to-operate package that's perfect for base, portable or mobile operations. The Alinco DX-70 and DX-77 make it easy for everyone to enjoy HF with a dependable transceiver that's backed by Alinco's 1 year warranty.

The world of HF is calling. What are you waiting for?

Alinco DX-70TH Base/Mobile/Portable HF + 6 Meter Transceiver

- 100 watts SSB, FM & CW, 40 watts AM
- Continuous coverage HF receiver + full 6 meter coverage
- 100 memory channels
- Speech compressor
- Great CW rig, full QSK, semi or automatic break-in
- Standard narrow filter fights QRM on SSB, CW or AM
- Two VFO's and easy "split" operation
- Removable face for remote mounting.
- RIT / TXIT, IF shift
- Multi function control for easy operation

Alinco DX-77T Desktop HF Transceiver

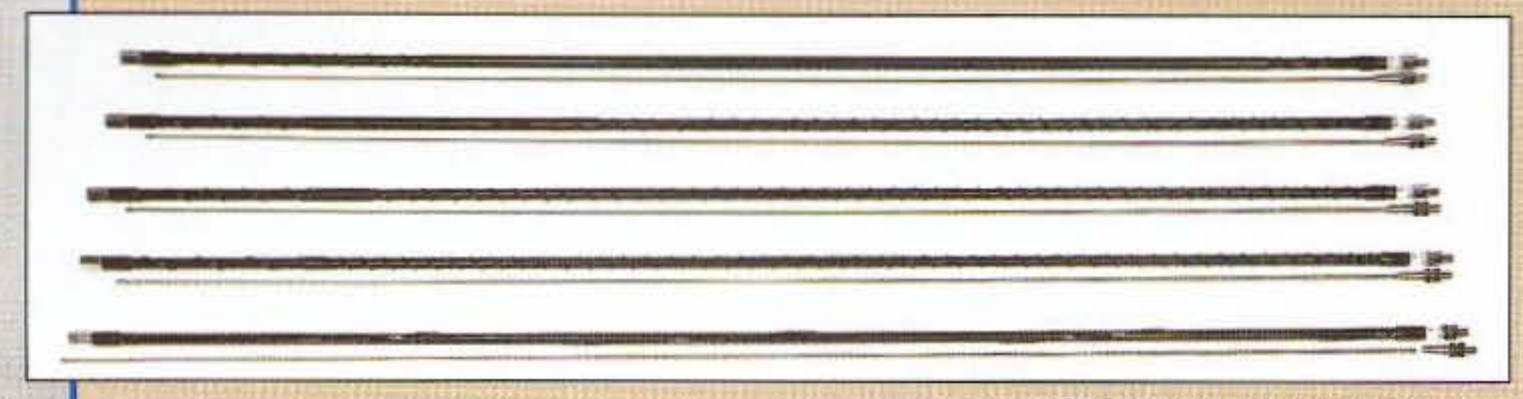
- 100 watts SSB, FM & CW, 40 watts AM
- General coverage receiver 150 KHz ~ 30 MHz
- Two VFO's; easy "split" operation
- Standard speech processor
- Front panel speaker provides loud, clear audio
- Built-in electronic keyer 6 ~ 60 wpm
- Full QSK, 7-step semi break-in or auto break-in
- Enhanced Direct Digital Synthesis (DDS) eliminates need for SSB Narrow Filter
- Front panel connections for mic, key, speaker & phones

Options

- EDX-2 automatic wire antenna tuner
- EMS-14 desktop microphone
- DM-330 MVT switching power supply
- DM-340 MVT regulated power supply

Iron Horse Mobile HF antennas for Alinco and other HF transceivers

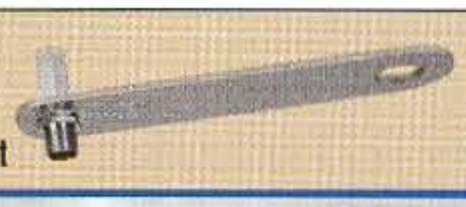
Order the Iron Horse IHF5S package from your dealer and go mobile fast!



IHF5S Mobile HF Antennas

You get a package of 5 rugged, easily tuned antennas for 10, 15, 20, 40 & 75 meters from Iron Horse, a name recognized for its strength and dependability. Each has 3/8 x 24 threads and is rated for 500 watts. Order the IHKD3S 5 antenna quick disconnect mounting kit to make changing bands a quick and easy operation, just push, turn & go!

IHKD3S Quick Disconnect Kit



IHTH-1 Optional Trailer Hitch Mount

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ISSUE #502

73 Amateur Radio Today

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FEATURES

DEPARTMENTS

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Web Page
www.waynegreen.com

COVER: In Dominica, FAIRS raises an HF station. KK4WW/J79WW is on ladder, which KE4UGF/J79UGF holds as JA7KAC/J79KAC looks on.

QRX . . .

Giggle Hertz: WARNING! Children!

For those who already have children past this age, this is hilarious. For those of you who have grandkids, this is considered parents' revenge. For those who have children this age, this is not funny. For those who have children nearing this age, this is a warning. For those who have not yet had children, this is birth control.

The following came from an anonymous mother in Austin, Texas.

Things I've Learned From My Children (Honest and No Kidding):

1. A king-size waterbed holds enough water to fill a 2,000 sq. foot house 4 inches deep.

2. If you spray hair spray on dust bunnies and run over them with roller blades, they can ignite.

3. A 3-year-old's voice is louder than 200 adults in a crowded restaurant.

4. If you hook a dog leash over a ceiling fan, the motor is not strong enough to rotate a 42-pound boy wearing Batman underwear and a Superman cape. It is strong enough, however, if tied to a paint can, to spread paint on all four walls of a 20 by 20 foot room.

5. You should not throw baseballs up when the ceiling fan is on. When using the ceiling fan as a bat, you

Continued on page 6

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INPUT VOLTAGE: 115 VAC 50/60HZ OR 220 VAC 50/60HZ SWITCH SELECTABLE

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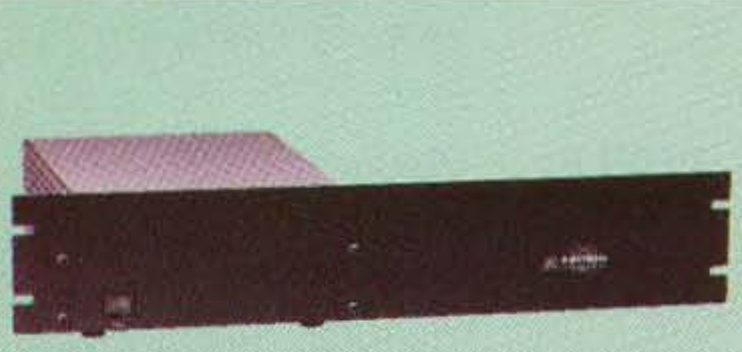
MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-10	7	10	1⅛ x 6 x 9	3.2
SS-12	10	12	1⅜ x 6 x 9	3.4
SS-18	15	18	1⅞ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅜	4.2
SS-30	25	30	3¾ x 7 x 9⅜	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅜	4.2
SS-30M*	25	30	3¾ x 7 x 9⅜	5.0



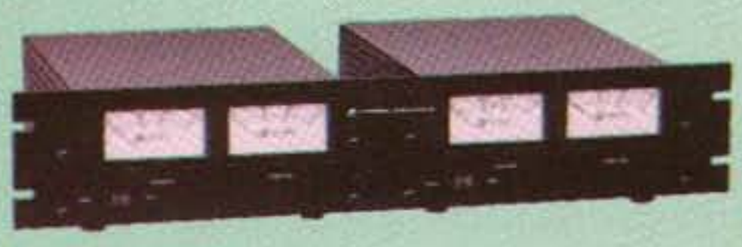
MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅜	6.5
SRM-30	25	30	3½ x 19 x 9⅜	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅜	6.5
SRM-30M	25	30	3½ x 19 x 9⅜	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	3½ x 19 x 9⅜	10.5
SRM-30-2	25	30	3½ x 19 x 9⅜	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅜	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅜	11.0

MODEL SS-12SM/GTX

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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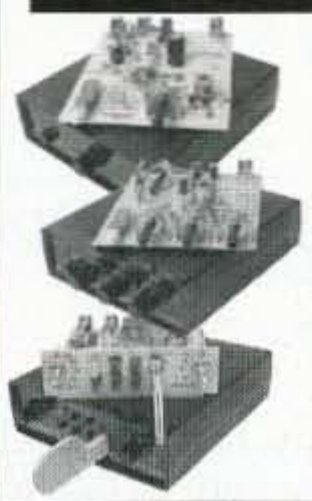

QRP TRANSMITTER
Available in 20, 30, or 40 Meters, these neat little transmitters put out 1 Watt!

HR RECEIVER
Available in 20, 30, or 40 Meters, 1.0 uV sensitivity rivals the big rigs...at a fraction of the price!

CW700 KEYER
With adjustable pitch & speed from 3-60 wpm, features true iambic keying and EPROM memory!

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Visit www.ramseykits.com/qrp to order this special deal!

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35 WATT LPFM STEREO TRANSMITTER

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

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

PX1 35W Professional FM Stereo Transmitter $1,795.95

TOUCH-TONE TONE GRABBER NEW!

✓ 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

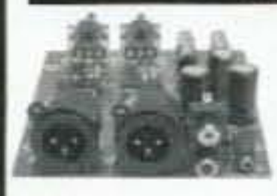
✓ Visible and audible display of your heart rhythm
✓ Re-usable sensors included; just like visiting the hospital!
✓ Bright LED "beat" indicator
✓ Monitor output for oscilloscope display

NEW!

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

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

XLR TO RCA AUDIO CONVERTER NEW!



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

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

R2XL1	**Unbalanced to Balanced Audio Converter Kit**	**$49.95**
CR2XL	**Matching Case & Knob Set**	**$14.95**
PWR25	**12VAC Power Adapter**	**$9.95**

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PROFESSIONAL FM STEREO RADIO STATION

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

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

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

SYNTHESIZED FM STEREO TRANSMITTER

✓ All new design & features for 2002!
✓ Fully adjustable RF output

NEW!

Our #1 kit for years has just gotten better for 2002! Totally redesigned, the FM25B has all the features you've asked for. From variable RF output, F connector RF output jack, line input, loop output, and more. Includes case, power supply, whip antenna, audio cables.

FM25B Synthesized FM Stereo Transmitter Kit $129.95

AUTOMATIC COLOR/BW IR CAMERA

✓ Color during the day, IR B&W at night!
✓ Automatically turns on IR Illumination!
✓ Waterproof to IP57 standards!
✓ Black anodized housing with universal mount

NEW!

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

CCD309	**Color/B&W IR Waterproof Bullet Camera**	**$169.95**
CCD308	**B&W IR Waterproof Bullet Camera**	**$109.95**
AC125	**110 VAC Power Adapter**	**$9.95**

MINI B&W CAMERA WITH IR ILLUMINATION

✓ Built in IR illumination!
✓ Sees in total darkness!

NEW!

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**

Check out all our other new cameras at www.ramseykits.com

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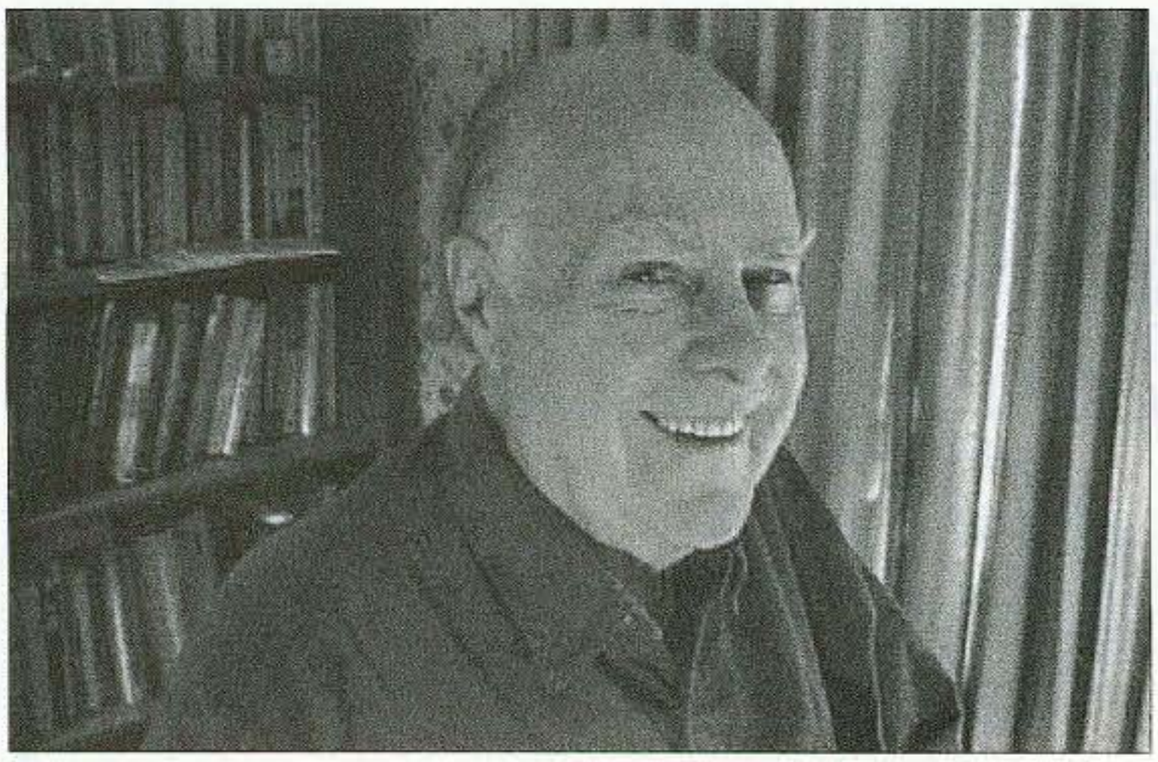

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Never say die

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Birthday Present

Please don't tell me that you've forgotten the 80th birthday present I asked for. It's a present you can give me. plus give someone else twelve monthly reminders of your generosity. It's a gift subscription to *73* for a friend of yours. The regular subscription is $25, but until the end of September you can give a gift subscription for $20. This will make both me and your friend happy. A two for the price of one deal. Send cash, check, money order, MC, or Visa info to 73 Magazine, 70 Hancock Road, Peterborough NH 03458. Oh, and include the name, call, and address of the giftee.

Perspective

My early memories are of my dad's Model T, which had to be cranked to start. I think of that as I get into my Honda van, heading for Durham to address a Rotary Club about my new magazine. I touch type my destination on the screen and in seconds my van knows where it is and the best route to get me to Durham, complete with a map display. The system talks me through every turn.

The one-lane twisting dirt road through Franconia Notch of my childhood has been replaced by Interstate 93, where I'm able to drive at 90 and 100 mph (to keep up with the traffic), protected by my radar detector. If I want to talk with anyone anywhere in the world I've a cell phone at hand. No more ring three on party line 32 with a hand crank phone on the kitchen wall and Mrs. Wallace down the road listening in.

Nostalgia, not being what it used to be, my point is that the changes I've seen in the world during my lifetime are more than a hint of how different the world is going to be for the people in 2080. It will be a life we can't even imagine today.

Eighty years ago New Hampshire was well known for making shoes and clothing. You can still see the huge old mill buildings along the Merrimack River in Manchester. My shoes today were made in China, my socks in Bangladesh, my pants in United Arab Emirates, and my shirt in Mongolia. They're making Segways in one of the old mill buildings. Eighty years from now?

When I was seven my grandparents toured Europe. That was a big deal then. My mother was good friends with Osa Johnson, who married Martin Johnson when she was 17. They did some wonderful films of Africa in the 1930s. It never occurred to me that someday I'd be touring the upper reaches of Uganda, Kenya, and Tanzania. I don't think it'll be long before our kids will be routinely touring all of Africa, China, the Andes, and even Borneo in school groups. They will be in daily touch with their family members, swapping videos.

A wrist watch was a big deal when I was a kid. Now my watch automatically sets itself every night via a radio signal from Boulder, Colorado. It also has a memory bank built-in, a calculator, and no stem to pull out and wind.

When I was a kid around 90% of Americans lived on farms. Now it's more like 4%. The farm workers moved to factories and cities. Now factory work is moving to Bangladesh and Mongolia, helping third world countries build their economies, and we're doing the marketing (which is where most of the money is).

Those who bet on the future are going to get the best return on their investments, in both money and business careers. Those who remain stuck in the past (or even the present) will fall behind. Every business needs a visionary to help it chart a path to the future. Hmm, yes, I'm for rent.

Sharing

In my talks to the Chambers of Commerce, Rotary, Kiwanis, and other groups around the state while promoting *NH ToDo,* my theme has been sharing.

For some reason, probably either a genetic defect or an influence from a previous life, whenever I've found something I've really enjoyed, I've always had this tremendous urge to share my pleasure with as many other people as I could. Heck, this was what got me started in publishing 50 years ago.

I'd been having more fun with ham teletype than would be allowed by the government if Congress or the FCC had had any hint of it. The major-major guru in the field was John Williams W2BFD, but I couldn't get him off dead center in starting a RTTY newsletter.

So, when I started to work in 1951 at WXEL-TV in Cleveland as a program producer-director and I saw a mimeo machine sitting there, I started a monthly newsletter, *Amateur Radio Frontiers.* It soon outgrew the mimeo machine, so I went to having it offset printed, with me drafting all of the schematics and taking the photographs. This led to an RTTY column in *CQ* magazine, which led to me becoming the *CQ* editor.

With *CQ* I was able to share the almost 20 years of fun I'd had at the workbench building electronic stuff by publishing lots of construction articles. I loved VHF so I got my pal Sam Harris W8UKS to do a VHF column. Indeed, my first contact when I got my ticket was on 2-1/2 meters with a walkie-talkie I'd built.

My theme with the members of the New Hampshire groups was for them to get busy with their word processors and write articles and letters to the editor sharing the fun and excitement they've had in our state.

Now, how about you? What is the most fun you've ever had in the ham radio? How can I get you to take off a few minutes and share your experience with the *73* readers? I've been writing for over 50 years about the fun I've had, so now it's your turn.

Continued on page 35

Big Savings on Radio Scanners

Uniden® SCANNERS

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 ligher cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for $29.95; The BC780XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. For fastest delivery, order on-line at www.usascan.com.

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.

Bearcat® 245XLT Trunk Tracker II

Mfg. suggested list price $429.95/**CEI price $189.95**

300 Channels • 10 banks • Trunk Scan and Scan Lists
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:
29.000-54,000 MHz., 108-174 MHz., 406-512 MHz., 806-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

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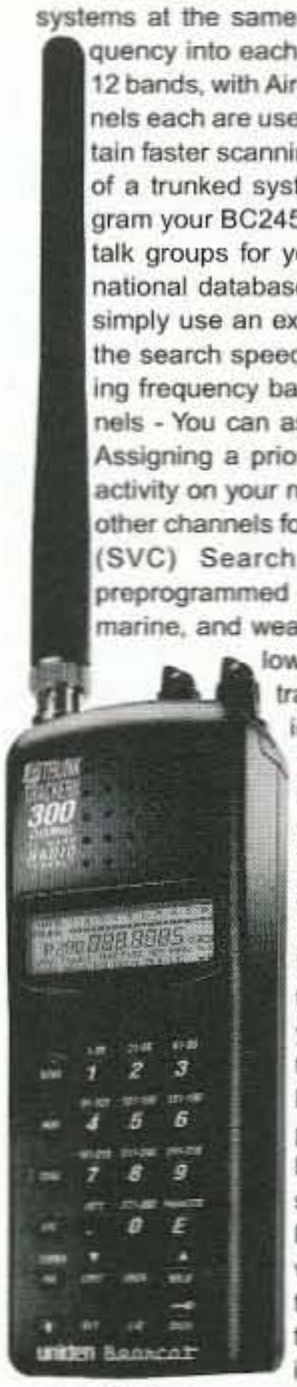

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have to throw the ball up a few times before you get a hit. A ceiling fan can hit a baseball a long way.

6. The glass in windows (even double pane) doesn't stop a baseball hit by a ceiling fan.

7. When you hear the toilet flush and the words "Uh-oh," it's already too late.

8. Brake fluid mixed with Clorox makes smoke, and lots of it.

9. A six-year-old can start a fire with a flint rock even though a 36-year-old man says they can only do it in the movies. A magnifying glass can start a fire even on an overcast day.

10. Certain LEGOs will pass through the digestive tract of a four-year-old.

11. Play Dough and microwave should never be used in the same sentence.

12. Super glue is forever.

13. No matter how much Jell-O you put in a swimming pool, you still can't walk on water.

14. Pool filters do not like Jell-O.

15. VCRs do not eject PB&J sandwiches even though TV commercials show they do.

16. Garbage bags do not make good parachutes.

17. Marbles in gas tanks make lots of noise when driving.

18. You probably do not want to know what that odor is.

19. Always look in the oven before you turn it on. Plastic toys do not like ovens.

20. The fire department in Austin, TX, has a 5-minute response time.

21. The spin cycle on the washing machine does not make earthworms dizzy.

22. The spin cycle on the washing machine will, however, make cats dizzy.

23. Cats throw up twice their body weight when dizzy.

Thanks to the June 2002 Radio Flyer, *the UBET ARC newsletter.*

Tabletop Emergency Exercise

On Tuesday, June 6, 2002, the Xerox El Segundo (California) Disaster Response Recovery Team participated in an emergency drill with about 25 participants. XAR (Xerox Amateur Radio) was represented by the following persons: Terry Wells KC6VCL, Don Bornemann KC6OKU, Doug Gilbert WA6LXB, Art Zeller KD6JEG, Lew Siegler N6AES, and Hugh Wells W6WTU.

This particular drill was based upon a huge earthquake that disrupted Xerox site power, causing several buildings to sustain damage, and water main disruption and flooding in both Xerox buildings and in public streets. Also, fires broke out in numerous places, employees were injured, car wrecks occurred in the surrounding streets, and the worst was a toxic gas release from the local oil refinery. The toxic fumes were drifting toward two of the local Xerox facilities. Individuals injured in car wrecks sought assistance by entering the lobbies of various Xerox buildings. The news media entered Xerox lobbies seeking stories on damage and action taken to recover from the disaster.

Terry and Don sat in the Command Center along with the bulk of the Disaster Response team. Terry's function, supported by Don, was to be the receiver of incoming messages handled by hams. For this exercise, several hams were located outside of the Command Center (as field reporters) and fed canned messages into the Center via the XAR repeater. Terry also provided feedback responses to the field that resulted from action taken on the received messages.

One of the intentions of the exercise was to create a stressful situation within the Command Center in order to demonstrate the need for organization within the affected operations. Our task, as hams, was to feed the "status" messages into the Center at a reasonably fast rate such that the Response team would be hard pressed to handle efficiently the needed action.

Even though our Xerox facility has a very complete communications network with multiple frequencies, we, as hams, provide the backbone for site communications during an emergency. This was my first participation in a "tabletop drill" so I wasn't well prepared, but I did learn from the experience even though I was on-board at Xerox for the Y2K exercise. But that exercise was nothing like the one that we experienced on that Tuesday — this exercise seemed to be real.

This earthquake exercise was designed to involve all of the various maintenance groups within the facility in addition to medical assistance teams, fire response, public press release persons, etc. Action required routing medical assistance to the areas where needed, removing people trapped in elevators and offices, and planning and executing safe evacuation routes out of the multistory buildings and away from the toxic fumes.

Following the drill, which lasted about 2 hours, we gathered in the Command Center, did a critique of the event, and put some plans into place for the next drill — which will be performed at a slower pace using a "stop action" technique. Now that everyone has had the opportunity of experiencing the chaos and pressure that occurs during an emergency, the next drill will involve honing the procedures and techniques for streamlining the actions occurring within the Command Center. The consensus was that the pressure exerted by the exercise made the experience more real because individual attention was focused more on "action" rather than on "this is a drill."

A written critique of the exercise was also done so that a more in-depth analysis can be performed in preparation for the next event. One of the shortcomings experienced by participating ham operators was the difficulty in writing down, accurately, messages transferred via radio. XAR will need to examine "lessons learned" and develop plans on how to perform more efficiently with communications while interfacing with the Command Center and field teams.

Thanks to Hugh Wells W6WTU.

Pleasing Everyone

There once was an old man, a boy, and a donkey.

They were going to town, and it was decided that the boy should ride. As they went along, they passed some people who thought that it was a shame for the boy to ride and the old man to walk. The man and boy decided that maybe the critics were right, so they changed positions.

Soon they passed some more people who thought that it was a real shame for that man to make such a small boy walk. The two decided that maybe they both should walk.

Soon they passed some more people who thought it was stupid to walk when they had a donkey to ride. The man and the boy decided that maybe the critics were right, so they decided that they both should ride.

They soon passed other people who thought that it was a shame to put such a load on a poor little animal. The old man and the boy decided that maybe the critics were right, so they decided to carry the donkey.

As they crossed a bridge, they lost their grip on the animal and he fell into the river and drowned.

The moral of this story is this:

If you try to please everyone, you will eventually lose your ass.

Thanks to Greg WB9SNZ, via the November 1999 Squelch Tale, *newsletter of the Chicago FM Club.*

Now That I'm Older ...

Here's what I've discovered:

- I started out with nothing, and I still have most of it.
- My wild oats have turned to prunes and All Bran.
- I finally got my head together, and now my body is falling apart.
- Funny, I don't remember being absent-minded.
- All reports are in. Life is now officially unfair.
- If all is not lost, where is it?
- It is easier to get older than it is to get wiser.
- Some days you're the dog, some days you're the hydrant.
- I wish the buck stopped here. I sure could use a few ...
- Kids in the back seat cause accidents; accidents in the back seat cause kids.
- It's hard to make a comeback when you haven't been anywhere.

• The ONLY time the world beats a path to your door is if you're in the bathroom.

• If God wanted me to touch my toes, he would have put them in my knees.

• When I'm finally holding all the cards, why does everyone decide to play chess?

• It's not hard to meet expenses ... they're everywhere.

• The only difference between a rut and a grave is the depth.

Thanks to the January 2000 issue of X-MITTER, *published by the Penn Wireless Association.*

Giggle Hertz: Hussy

An old man and his wife lived deep in the hills and seldom saw many people. One day, a peddler came by to sell his goods and asked the man if he or his wife wanted to buy anything.

"Well, my wife ain't home, she's gone down to the crick to wash clothes, but lemme see what you got," said the man.

The peddler showed him pots and pans, tools and gadgets, but the old man wasn't interested.

Then the man spotted a mirror and said, "What's that?"

Before the peddler could tell him it was a mirror, the old man picked it up and said, "My gosh, how'd you get a picture of my pappy?"

The old man was so happy, he traded his wife's best pitcher for it. The peddler left before the wife came back and spoiled his sale.

The old man was worried that the wife would be mad at him for trading her best pitcher, so he hid it in the barn behind some boxes of junk.

He would go out to the barn two or three times a day to look at the "picture," and eventually the wife got suspicious.

One day she got fed up, and after he retired for the night, she went out to the barn. She saw the mirror behind the boxes, picked it up, and said, "So this is the hussy he's been foolin' around with!"

Thanks to the June 2002 Radio Flyer, *the UBET ARC newsletter.*

Are You Electrosensitive?

That is, are you one of those people who is unusually sensitive to radio frequency fields? Well, a group called the Cellular Phone Taskforce

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LETTERS

From the Ham Shack

Art Housholder K9TRG. OK, Wayne, I read your April issue editorial and I can't agree more … I'll start the ball rolling with a couple of ham radio–related stories for you.

As you know, we have both traveled extensively. Sometimes together on the same flight. How many times have we been together on flights to the Far East for the electronics shows in Japan, Korea, Taiwan, Hong Kong, etc.?

Operating "air mobile" with an HT, with the captain's permission of course, always made the trips more exciting, and the time most certainly passed quicker — especially on those 12- to 16-hour flights. I admit HT contacts going east to Europe don't last long after you leave the U.S. coastline. However, going west from Chicago to the Far East is another story. Most of my flights have been nonstop from Chicago — that means the "polar route." This gives me a lot more time over land all the way from Chicago to Alaska, and creates a lot more opportunities for contacts. A few of the more memorable contacts were from Glasgow, Scotland, at 40,000 feet, to the "Feldtbach" repeater outside of Frankfurt. The reason that the contact was always from Scotland was that it was illegal to operate any transmitter not certified as an aircraft radio from any airplane, even if you owned the aircraft. Many pleasurable contacts were made into France, Germany, Holland, etc.

Another one was from northeast of Hudson Bay to my friend Al Amster in Cleveland, Ohio. In both of these cases we were always flying "to" the stations worked, and a 40,000-foot antenna in the cockpit looking right at the stations sure helped.

Wayne, I'm sure that you remember that I do have written permission from a major airline to operate on their airplanes. Most of the airlines honor the letter as it is from one of the major airlines. As far as I know, it is the only one ever issued. Now, with the 9/11 incident behind us, I haven't even asked. If permission were granted it might be upsetting to a few passengers, and none of us needs this on current flights.

Before I get umpty thousand letters asking how to get a letter such as this, part of the agreement was that I would not tell how it can be done. They did not want umpty thousand other hams knocking on their door for the same thing. And now with the "9/11" issue, I'm not sure it could be done at all. Sorry …

A few years ago I made an RTW, "'Round the World in 80 Days" flight. On this trip, I also had cockpit privileges and use of the VHF and HF frequency radios. I was more interested in making my video documentary at the time, and ham operating time was minimal. I did manage to get all of the takeoffs and landings on videotape, all the way around the world.

One unique "side ham story" that goes with this is kind of interesting.

I show the video program at many ham radio club meetings, CAP groups, nursing homes, "careers" days for schools, and also for other groups. At one ham club meeting of about 100 guests, I was giving my five to ten minute talk about what they were going to see before starting the tape. I was telling about the cockpit privileges, etc., when this gray-haired gentleman stood up and said, "Art, I don't know what kind of #$%^%$ you are trying to feed these people, but I have been a captain for 25 years and you can't tell me that you got permission to ride in the cockpit."

I always come prepared for this kind of people, as it has happened before. I reached in my jacket pocket and said, "Captain, would you mind stepping up here for a moment?" As he approached I unfolded "THE LETTER," and said "Captain, I hope that you will help me keep my word with the airline and that you will not read out loud the signature on this letter nor divulge it in the future."

He took one look at the letterhead and the signature, turned on his heel, and stormed out. I love this kind of people.

Robert Harder WB8ILI. In response to Steve Nowak KE8YN's "On the Go" in April 2002. First of all, I did not read or hear about any proposals to establish an emergency communications service (ECS) somewhat along the lines of the National Guard. But in these times a lot of ideas are being floated around, some good and some bad.

My first thought about this idea is that it may be a good idea. We should be positive about it. It is a chance for amateur radio to become "officially" part of national and local disaster plans.

You are correct that most people do not know that we exist. Those that have heard the term "amateur radio" don't know anything substantive about it. At best, you get the question "Do you mean CB?" At worst, you are correct in that we are the guys who mess up TVs.

One of the reasons we are not known to the general public is we are a very inefficient "publicity machine." We (at least so far) are not in a business like charities or labor unions whose very existence relies on ever increasing numbers of members.

I also believe we are not known to the public service agencies for the most part because these agencies are tax-supported bureaucracies. First, their goal is to get as many tax-supported employees under their jurisdiction as possible. Volunteerism is discouraged. Ham radio operators are prohibited from accepting any remuneration for their services.

Second, any amateur radio volunteers are considered only as interference with normal operations. I call this the arrogance by these agencies. In these days of all communication being digitally encoded, the fewer the people who know what is going on, the better.

From what I have read over the years, where amateur radio has been successfully integrated into police departments, fire departments, and other public safety organizations, it has taken a tremendous amount of work by local hams or there has been some key person who has been instrumental, such as a high-ranking officer or politician being a ham.

Currently, being a member of RACES or ARES does not mean a whole lot. For the most part, in times of disaster, a RACES identification card is no more valuable than a K-Mart coupon in gaining access to disaster areas to provide assistance. Most official personnel (police, fire, etc.) have no idea what RACES is.

We, the amateur radio community, should support this proposed ECS. Amateur radio operators would serve as the core of this group. For the most part, we already have the communication skills. We would most likely need some standardized federal training in handling disasters. Maybe a "disaster certification" could be added to our current FCC licenses and be a requirement to be an ECS member.

Most important, local governments need to be required to include the ECS in their disaster plans. This would give the ECS "official" standing. Every policeman and

Continued on page 62

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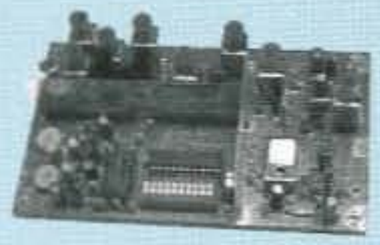

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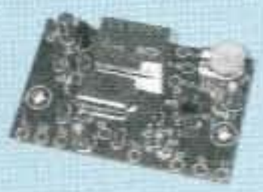

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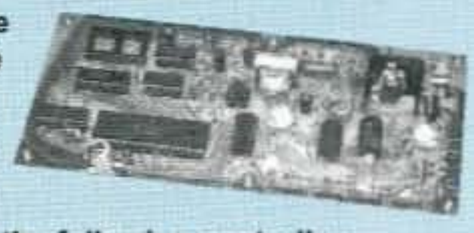

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Amplifier Testbench Report

Here's a look at broadband amps that's packed with useful insight.

Like many home-brewers, I've squirreled away interesting schematics for years. When I recently needed a broadband receiver amplifier covering 3–30 MHz, I found a dozen or so ideas in my files. This article presents the best nine amplifiers that I built and evaluated. While my purpose was a receiving amplifier, these designs could be used as low-level transmitter stages as well.

Using some scrap aluminum, I made a simple test fixture to hold a 1-3/8" x 2-1/4" piece of PC board stock. I built each amplifier on a separate piece of PC stock and mounted it in the test fixture for performance measurements. I find that Manhattan-style construction is rapid and low-cost, so that's what I used for these amplifiers. Manhattan-style construction is well described at K7QO's Web site [http://www.qsl.net/k7qo/manhat.htm].

These are very simple projects. The most complicated one shouldn't take more than an hour to build, and most took me less than 30 minutes.

Performance measurements and summary

The key performance characteristics of each amplifier are presented in **Table 1**. I'll briefly describe each of the data categories that I measured. An excellent introduction to these parameters is found in Watkins Johnson Communication's Tech-note "High Dynamic Range Receiver Parameters." It's available on WJ's Web site at [http://www.wj.com/pdf/technotes/HighDynRangeRec.pdf].

• Midband gain — the power gain of the amplifier, measured at 5.0 MHz

• –3 dB Frequency — the high frequency at which the gain of the amplifier drops 3 dB below the midband gain. Since I was not interested in low frequency performance, I didn't measure the low-frequency 3 dB point; all were flat down to 3 MHz, the lowest frequency I was interested in. However,

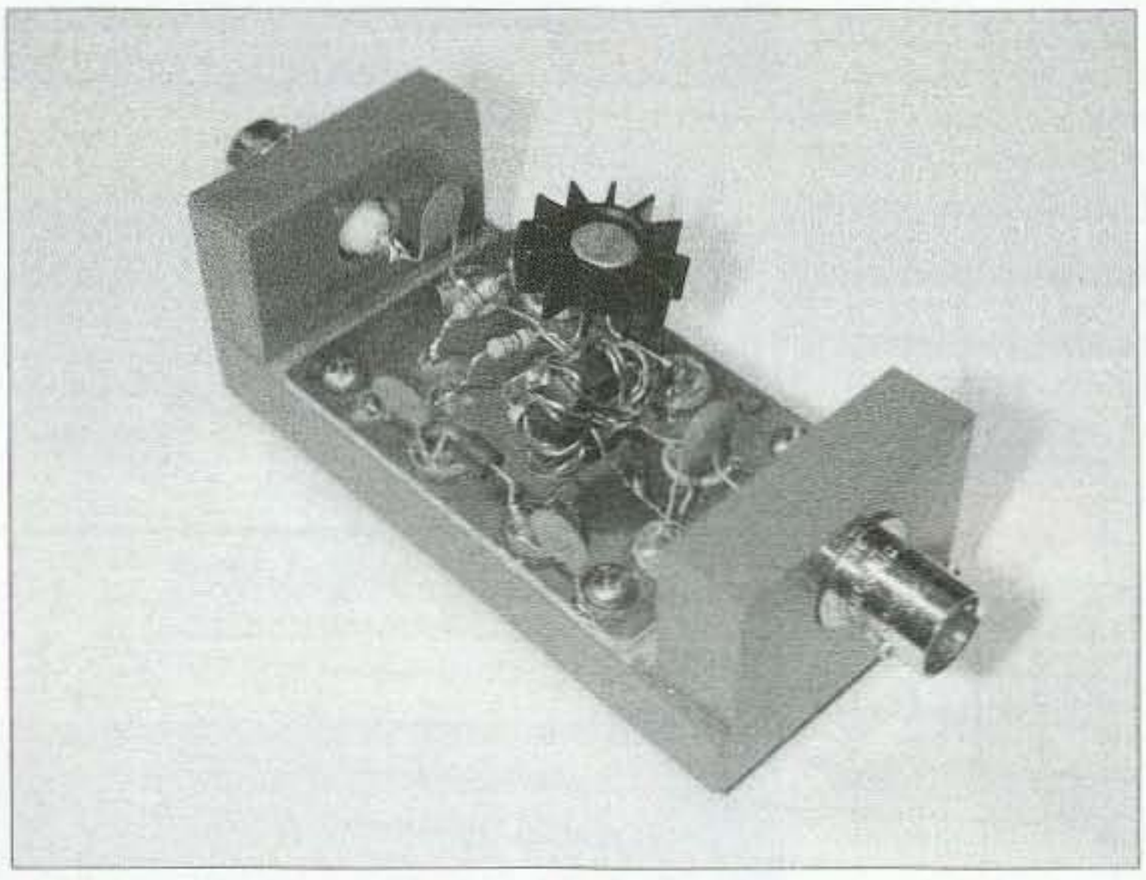

Photo A. *Test fixture and sample Manhattan-style amplifier.*

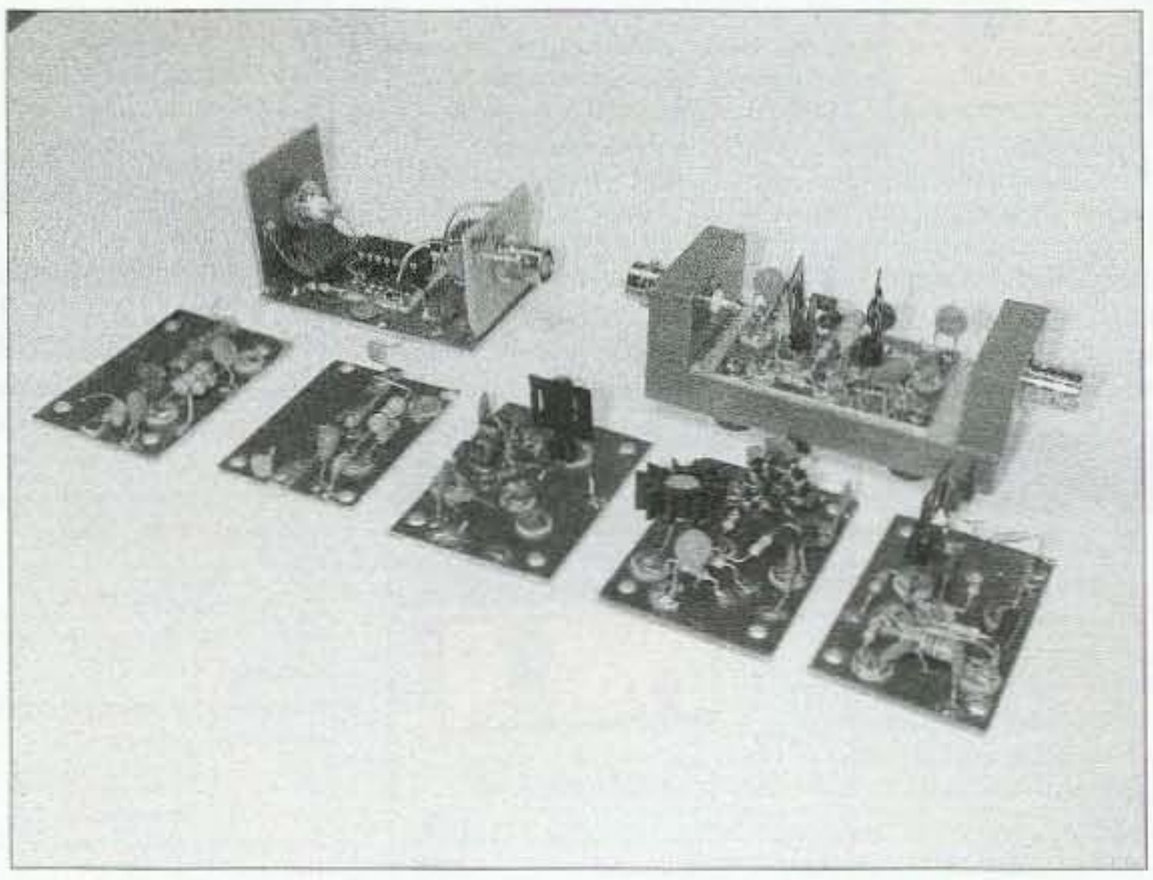

Photo B. *Some of the evaluation amplifiers built by the author.*

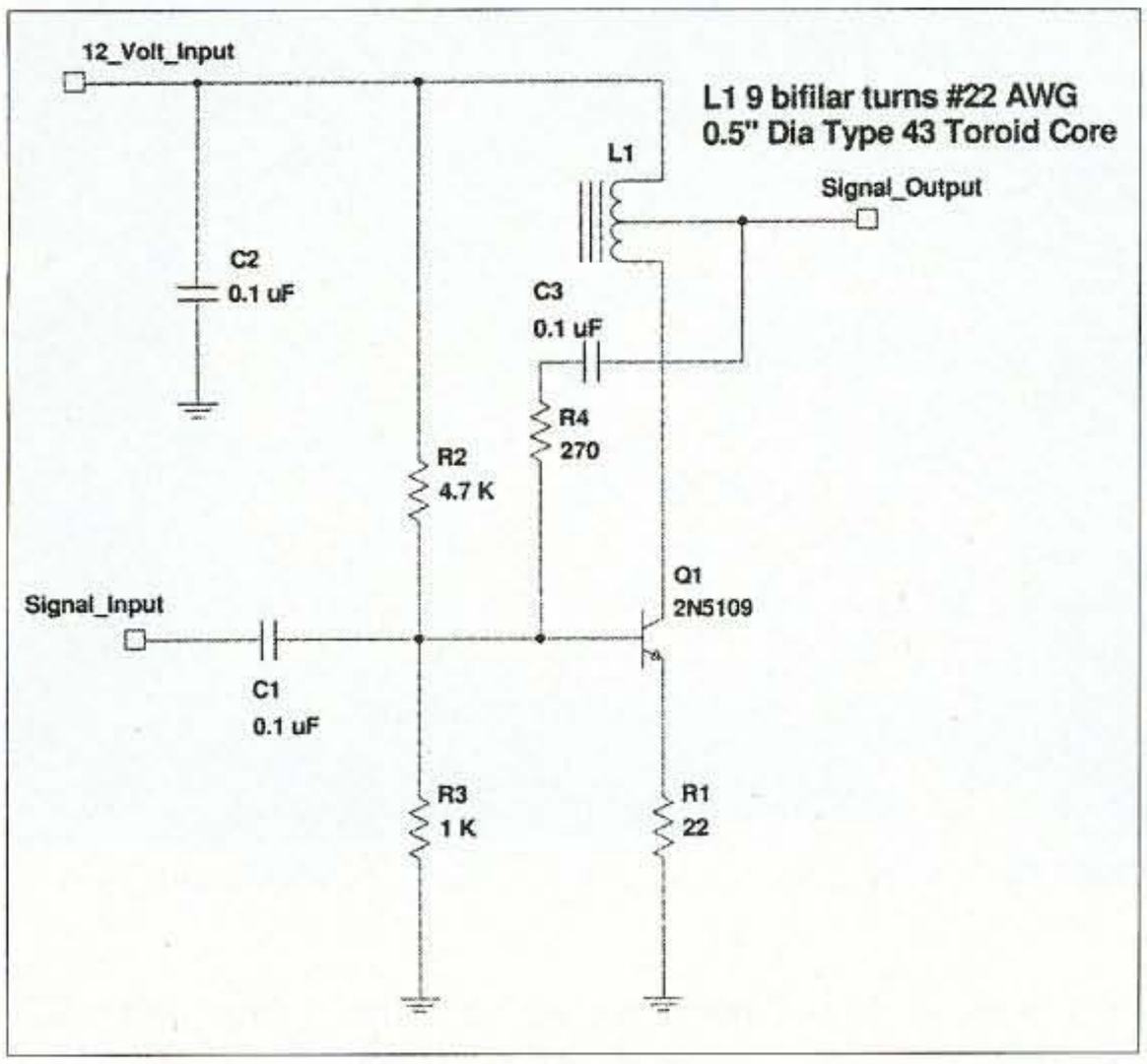

Fig. 1. Classic 2N5109.

casual checks show that most of these designs perform well down to 100 kHz or lower.

• Input IP2 and Output IP2 — second-order intermodulation intercept point, measured with respect to the second harmonic of a 5 MHz signal. Input IP2 is referenced to the input signal, while Output IP2 is referenced to the output signal level. Output IP2 = Input IP2 + midband gain.

• Input IP3 and Output IP3 — third-order intermodulation intercept point, measured with two equal-level input signals of 5.0 and 6.0 MHz. Input IP3 is referenced to the input signal, while Output IP3 is referenced to the output signal level. Output IP3 = Input IP3 + midband gain.

• Output power (1 dB compression) — a perfect amplifier shows the same gain, regardless of input signal level; real amplifiers can't increase power past some certain level. The 1 dB compression point is the amplifier output power at which the gain drops 1 dB from the low-level gain.

• Noise figure — the noise figure represents the excess noise added by the amplifier. For the 3–30 MHz range, and normal antennas, atmospheric noise is the dominant factor, and achieving a low noise figure is often not critical.

• Input VSWR — the worst-case VSWR of the amplifier input over the 3–30 MHz range.

• Spurious-Free Dynamic Range — this is a single measure attempting to capture the total amplifier performance. Watkins Johnson describes it as "that portion of the total dynamic range where there are no 3rd order spurious responses exceeding the noise floor by 3 dB when two equal-power input signals are applied." I've calculated the SFDR based on a typical voice SSB bandwidth, using

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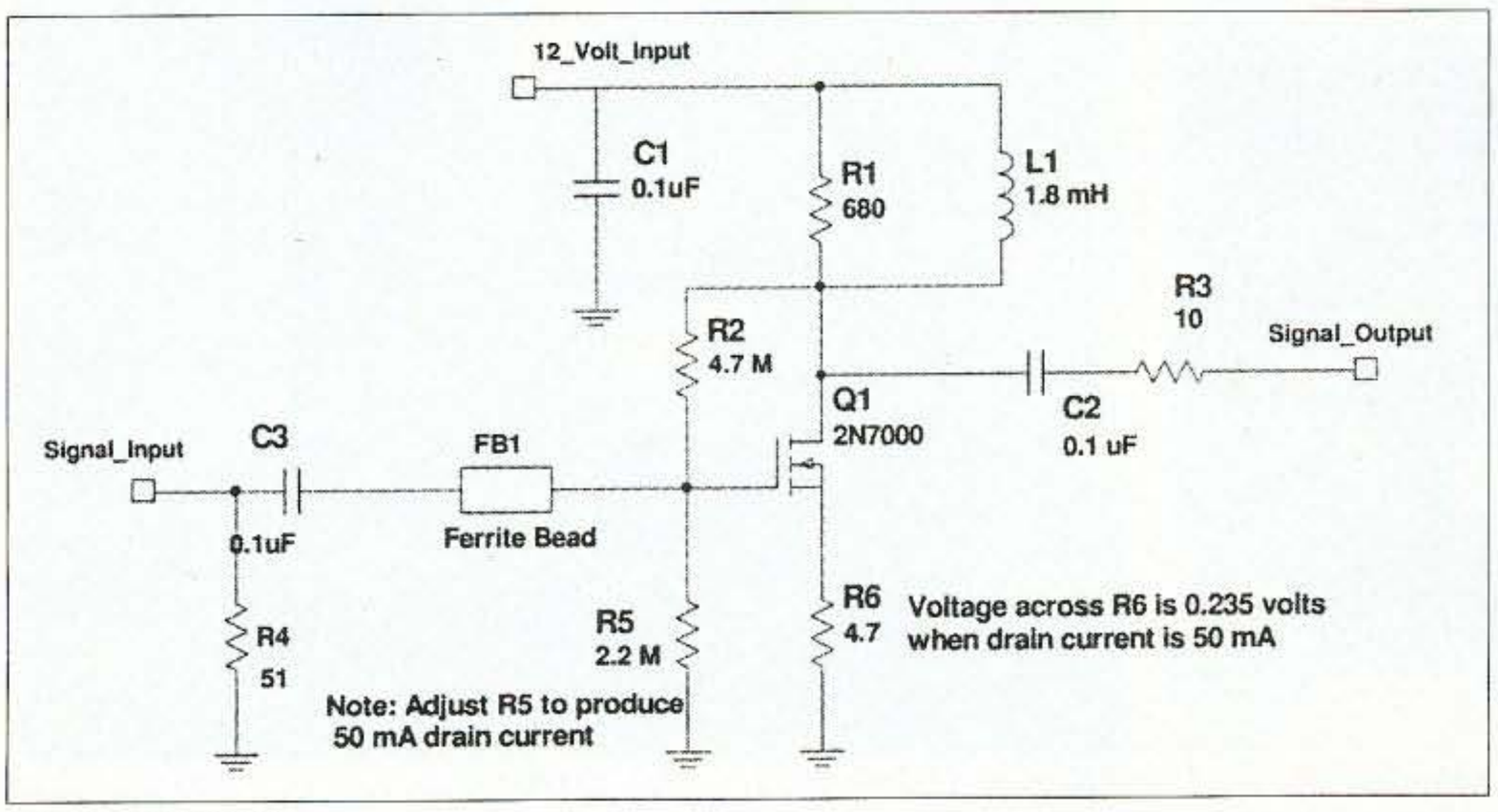

Fig. 2. 2N70000.

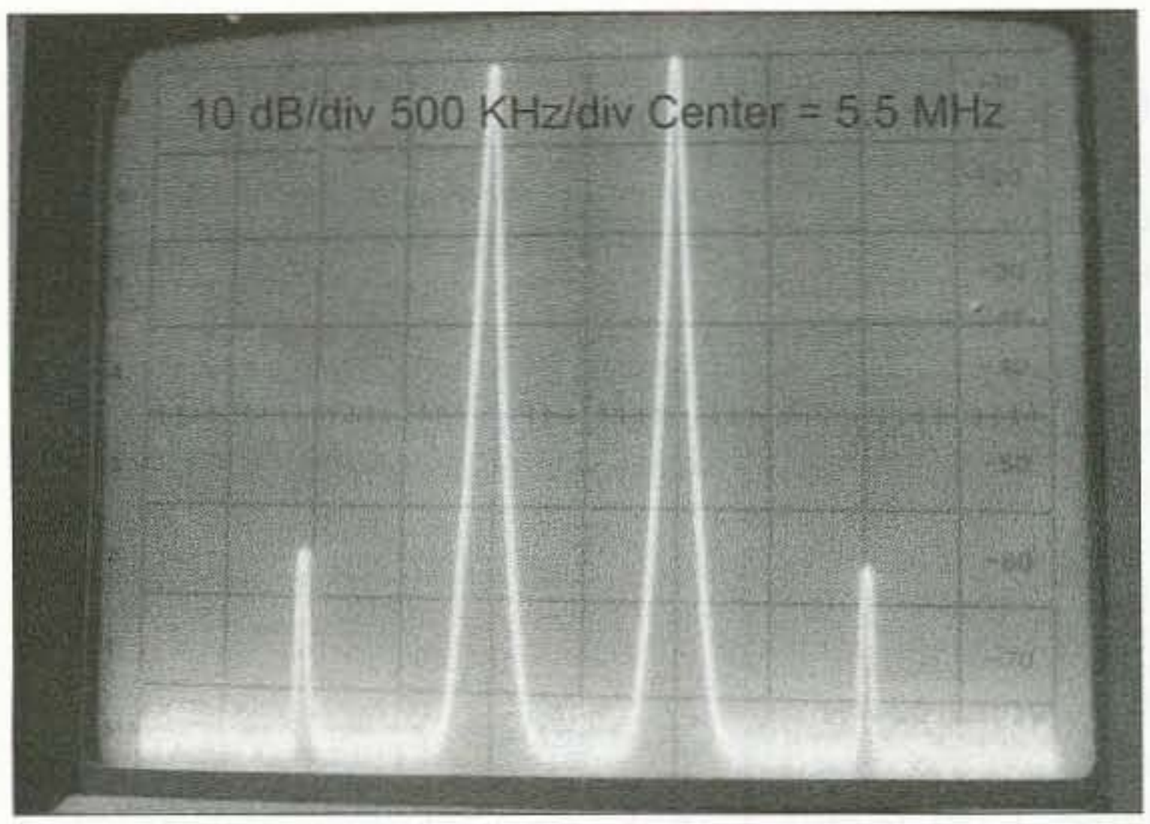

Photo C. *Intermodulation test of 2N5109 amplifier showing intermodulation products down 56 dB from –4 dBm input.*

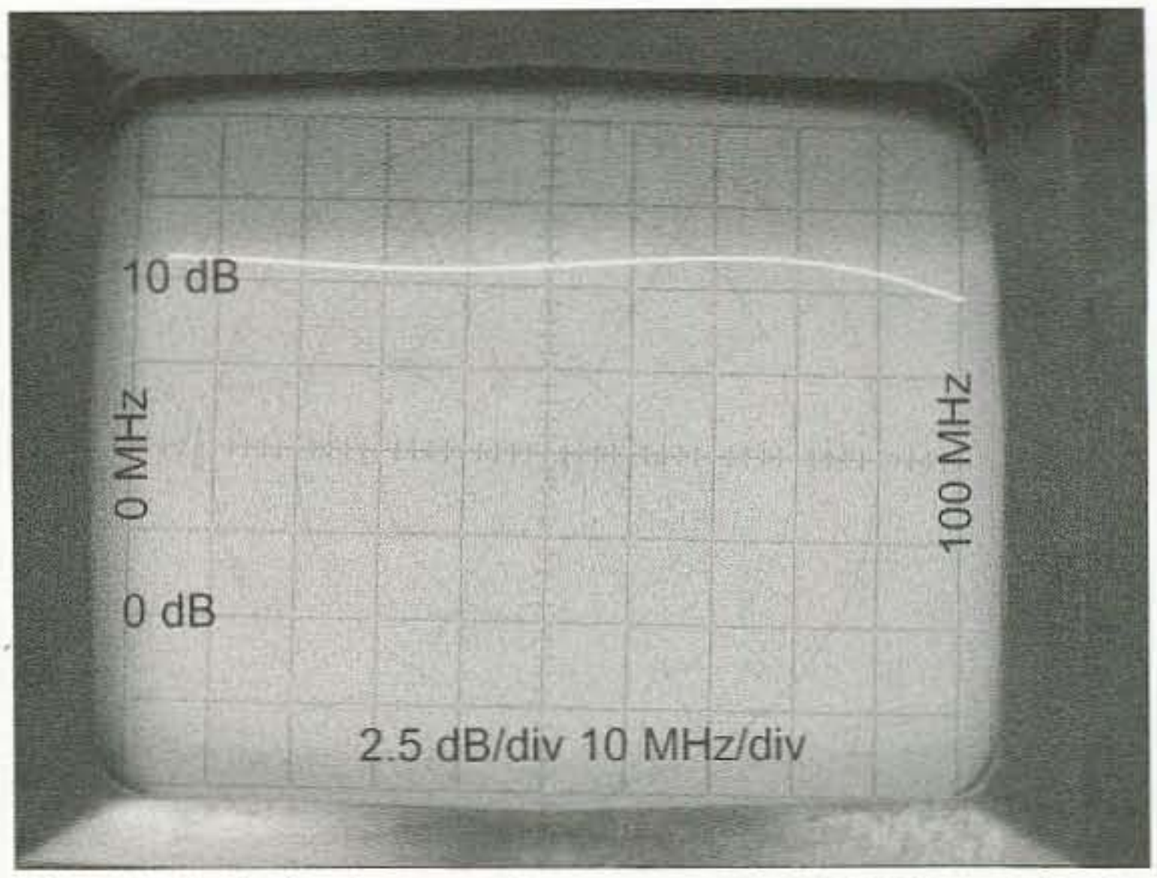

Photo D. *Typical gain versus frequency sweep (2N5109 amplifier).*

Amplifier Testbench Report

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the measured performance data for each amplifier.

I've shown signal levels in dBm, or decibels below one milliwatt power, referenced to 50 ohms. I've taken reasonable care in making these measurements, and used professional quality test equipment. Still, many of these parameters are level-sensitive, so use the data with some degree of caution when comparing with other sources of information.

Which one to use?

Each of these amplifiers has a purpose. For a receiver preamplifier, my favorites are the classic 2N5109 or the newer NE461M02 amplifiers. If you are looking for pure simplicity, the MAR MMIC amplifiers are hard to beat, particularly if you have a controlled signal environment, such a low-level stage in a transmitter. For minimum noise figure, a J310 in grounded gate is the clear choice, and it's an excellent performer by all other standards as well.

I've not been concerned with performance beyond 30 MHz in these amplifiers. Some of these designs will work into the GHz range, if you use proper construction practices and appropriate components. Even with normal leaded components and sloppy breadboarding practices, performance well beyond 500 MHz is possible with some of these amplifiers.

Classic 2N5109

Drake used this design as the RF preamplifier stage in its late-1970s R7 receiver. Slight variants of it appear in several books by Doug DeMaw, including his 1990 *W1FB's Design Notebook*. Regardless of the originator, it's still an impressive performer, clocking in the best spurious free dynamic range, IP3, and IP2 values of the amplifiers I built, and offering a decent noise figure as well.

The design is a simple common emitter amplifier, with an unbypassed emitter resistor to add degeneration. Transistor selection is important, and the 2N5109 was developed for CATV applications where gain linearity and intermodulation control are critical.

R4 provides significant negative feedback, which both reduces the input impedance to 50 ohms and flattens the gain versus frequency response. Indeed,

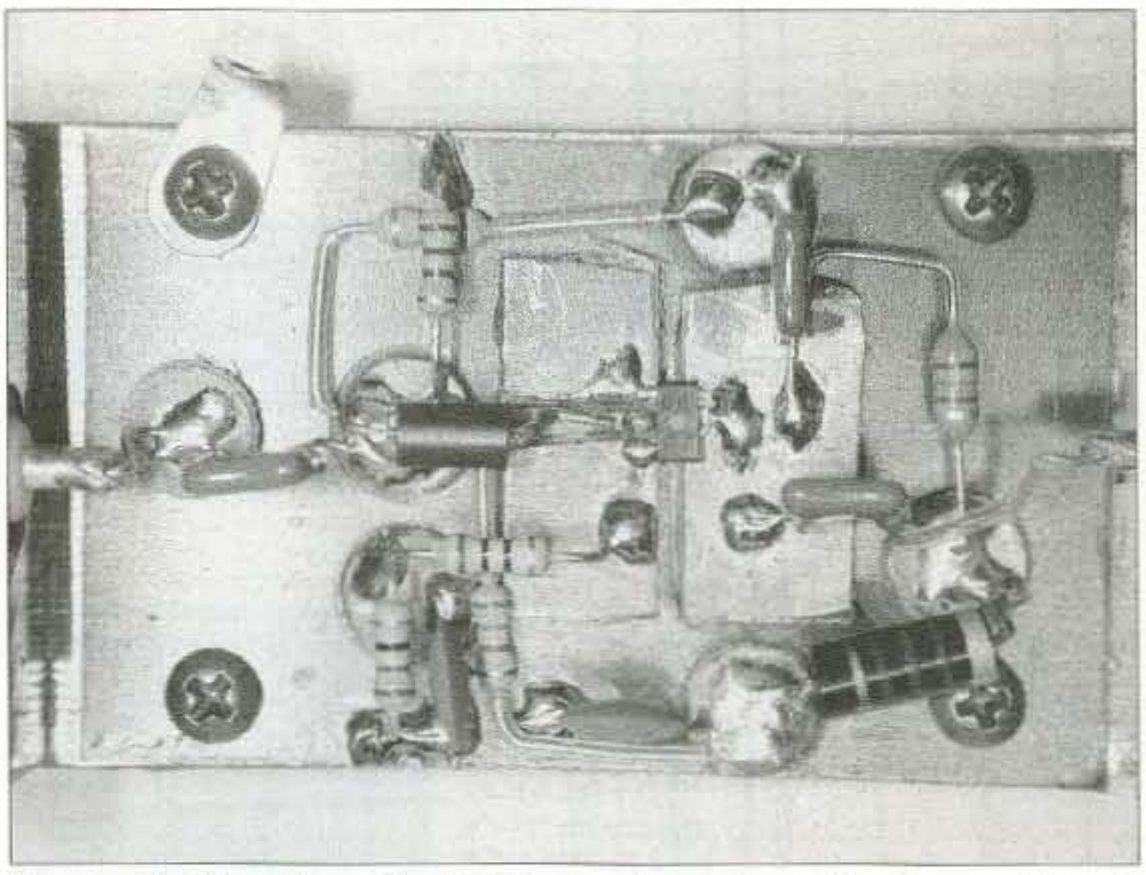

Photo E. *Mounting the SMD transistor in a Manhattan breadboard.*

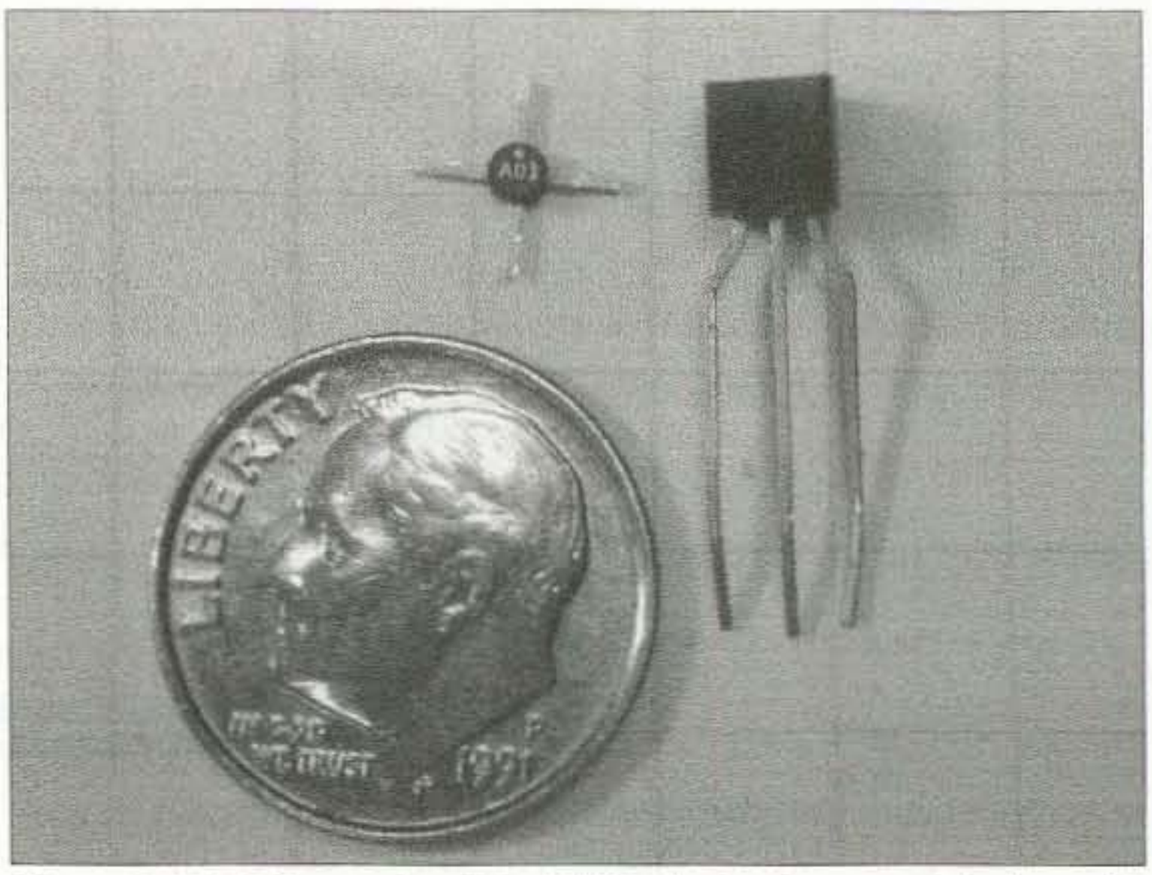

Photo F. *MMICs are tiny. The MMIC is the tiny round device with four leads.*

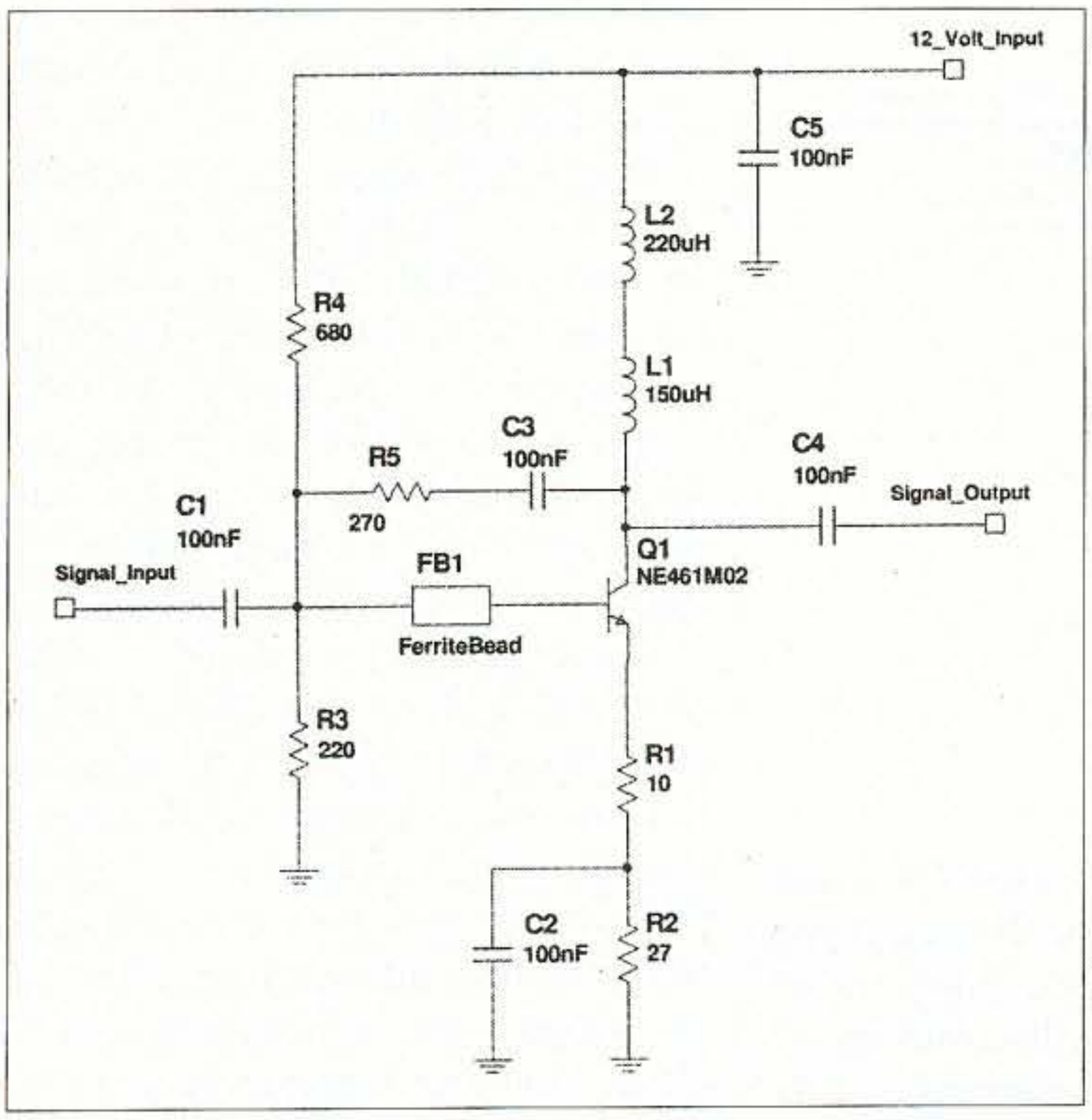

Fig. 3. HF1000 preamp.

the input VSWR is remarkably good throughout the 3–30 MHz range. I used a 0.1 µF input coupling capacitor to extend the low frequency response below 100 kHz. Drake used a 0.005 µF coupling capacitor to roll off strong broadcast signals. If you are not interested in gain below 3 MHz, use 0.005 µF.

The output is connected to the collector through an autotransformer, shown as L1 in the schematic. Drake doesn't specify L1 other than by a part number, but it appears to be around 9 bifilar turns wound on a 0.5-inch-diameter toroid using a high μ_r material. I used 9 bifilar turns of #22 AWG wire wound over a Fair-Rite 5943000301 (FT50-43) core.

The 2N5109 draws around 50 to 60 mA current, and should be equipped with a clip-on heat sink. Slightly better intermodulation performance will be seen with a 13.8 volt supply instead of 12 volts.

2N7000

MOSFETs are also candidates for linear amplification of strong signals. WA1ION's Internet site describes an interesting low-frequency MOSFET preamp using a VN10KM device [http://www.qsl.net/wa1ion/bbva/bbva_af1.gif]. I've modified WA1ION's design to use the common 2N7000 enhancement MOSFET.

R4 provides a 50-ohm termination to the signal source. Ferrite bead FB1 is a "stopper" to prevent self-oscillation. R2 and R3 provide bias to the 2N7000. Note that R2 is connected to the drain, not the 12-volt supply, thus providing some negative feedback. The output is connected directly to the drain, with

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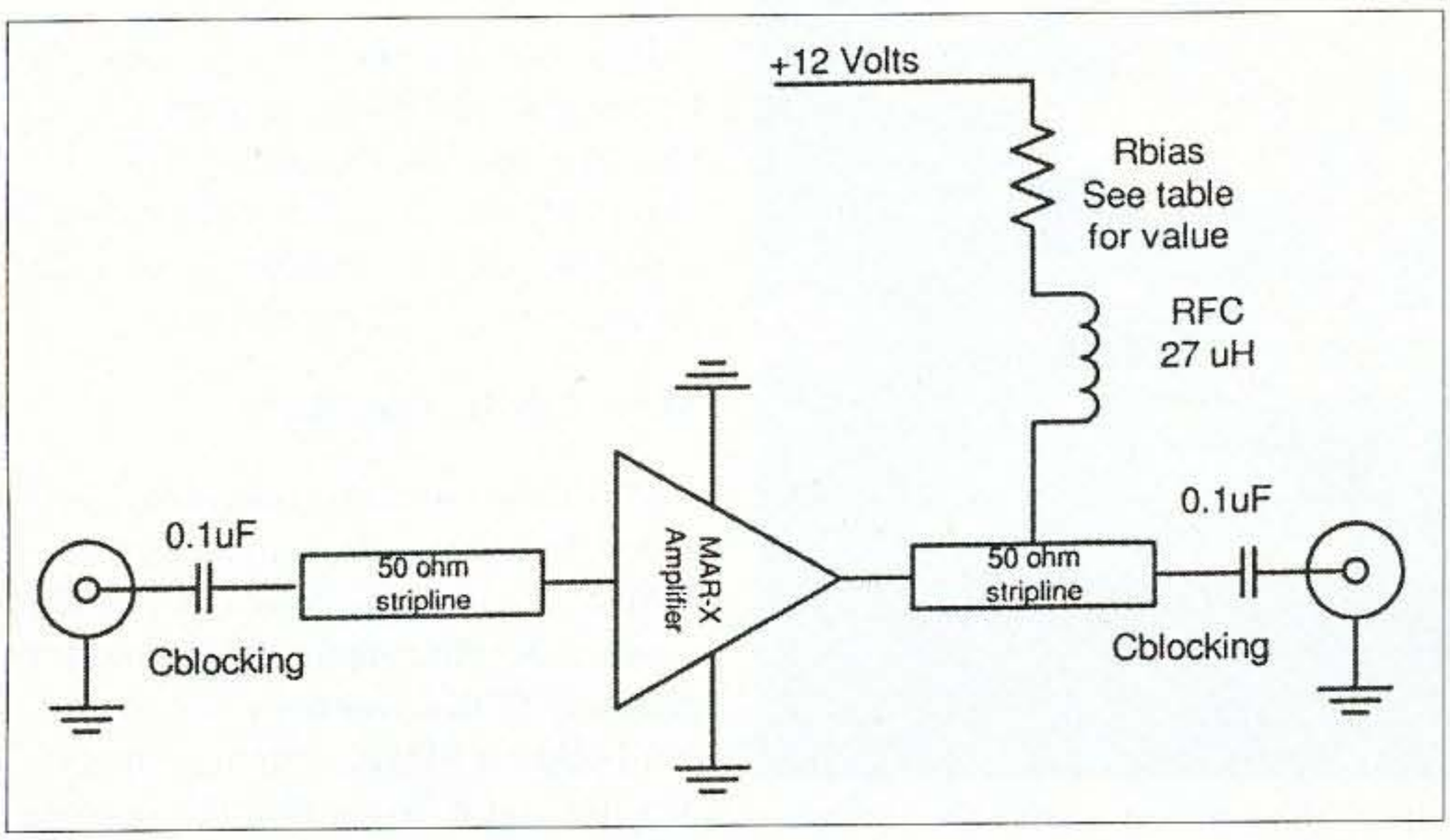

Fig. 4. Generic MMIC amplifier.

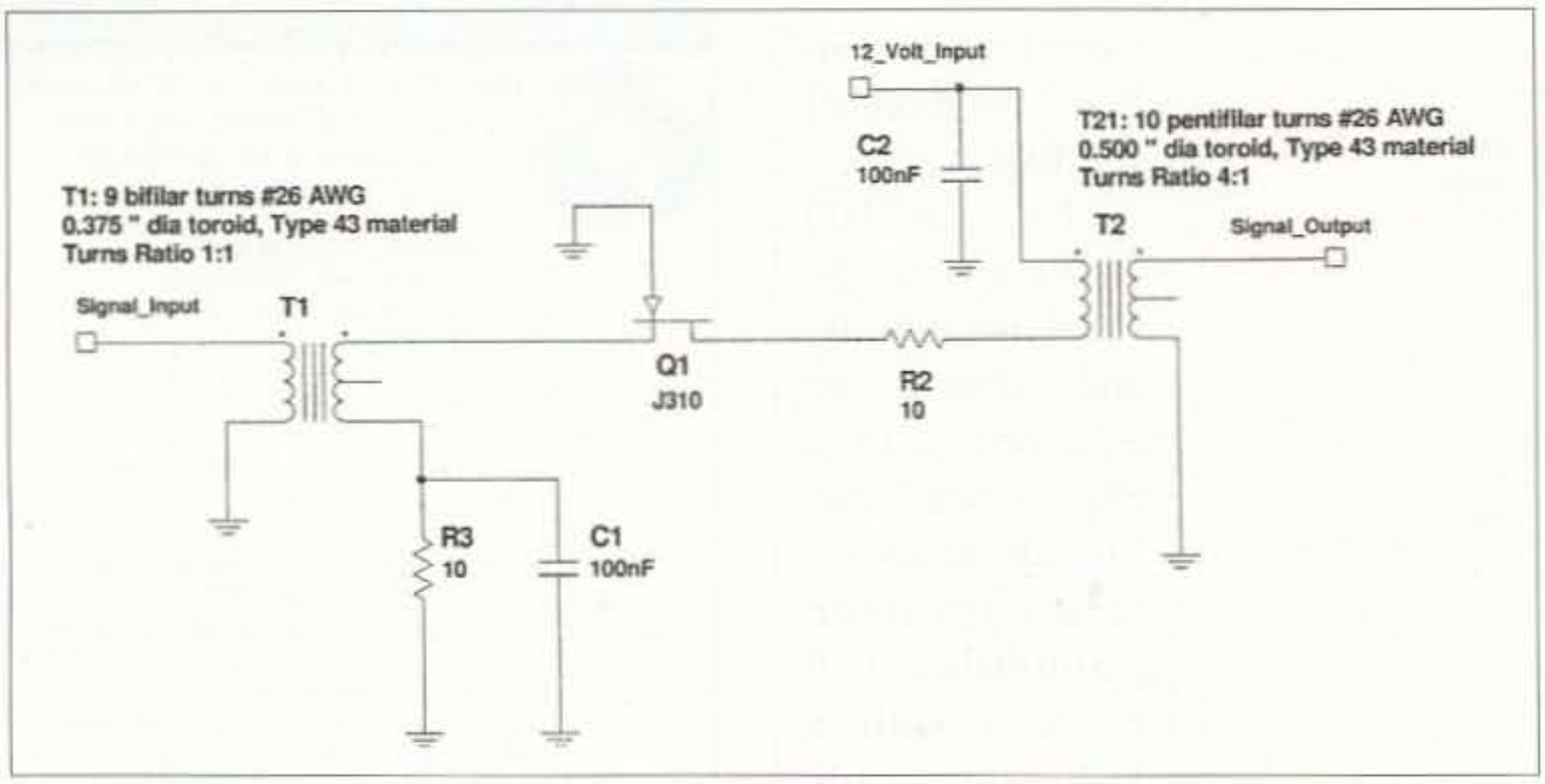

Fig. 5. J310 grounded gate.

Amplifier Testbench Report

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R3 protecting Q1 should the output be short-circuited.

MOSFET devices are not well controlled for gate threshold voltage, so it will likely be necessary for you to select R5 to obtain the target 50 mA drain current. Start with 2.2 megs and measure the current draw. If it is below 50 mA, increase R5; if it exceeds 50 mA, decrease R5. Once established, the drain current will be stable, so this is a set-once-and-forget task, assuming Q1 isn't replaced.

At the recommended 50 mA drain current, Q1 will dissipate around 600 milliwatts, which exceeds the device rating. I use a slip-on heat sink and have not had a problem with 2N7000 failures. If you wish to run Q1 within its ratings, adjust R5 to 20 mA. A heat sink is still a good idea, however. Operating Q1 at 20 mA will slightly reduce the intermodulation performance of the amplifier.

Watkins-Johnson HF1000 preamp

The preamplifier stage in Watkins-Johnson's HF1000 receiver has a familial resemblance to Drake's R7 design. However, WJ opted for direct coupling from the transistor collector and used a more modern transistor. WJ used a hard-to-find Philips BFQ19 surface-mount microwave NPN transistor, with an f_t of 5 GHz. I substituted a similar device from NEC, a surface-mount NE461M02/2SC5337, available from Mouser Electronics for $1.71. I also made a few other changes in WJ's design to reflect its use as a stand-alone amplifier.

Using a GHz-range microwave transistor for a 3–30 MHz preamplifier is certainly overkill, but it turns out that the 2-watt NE461M02 is about half the price of the lower-frequency 2N5109.

Instead of transformer coupling, this design directly feeds the 50-ohm output. Otherwise, it's quite similar to Drake's R7 design.

Breadboarding the NE461 is possible with a bit of care. The collector tab is designed to be directly soldered to a pad. Since the transistor dissipates nearly 1 watt, it's important to have a large copper area for the collector to act as a heatsink. Staying with the Manhattan-style construction technique, I cut a rectangular piece of PC stock about 1/2" x 3/4", and then super-glued it to the base PC board, and soldered the transistor's collector tab to it. I used a similar-size piece of PC stock for the emitter tab. This technique introduces several picofarads of stray capacitance from the collector and emitter to ground. Computer simulation of the design showed that the stray capacitance in my breadboard technique reduces the 3 dB bandwidth from over 500 MHz to about 100 MHz. So, if you are interested in a very broadband amplifier using this circuit, you should use a construction technique that minimizes stray capacitance, such as mounting the collector PC board vertically, or removing the ground plane underneath the collector pad.

This was the only circuit that was unstable when first built, with a strong parasitic oscillation around 1.3 GHz. A ferrite bead in series with the base lead stopped the parasitic but further decreases the 3 dB bandwidth.

Three MMIC amplifiers

MMICs (monolithic microwave integrated circuits) are deceptively simple. A MMIC is a tiny integrated circuit that offers a 50-ohm input and output impedance. With fewer than 10 parts, you can build an MMIC amplifier that offers flat gain from DC through the GHz range. No wideband transformers

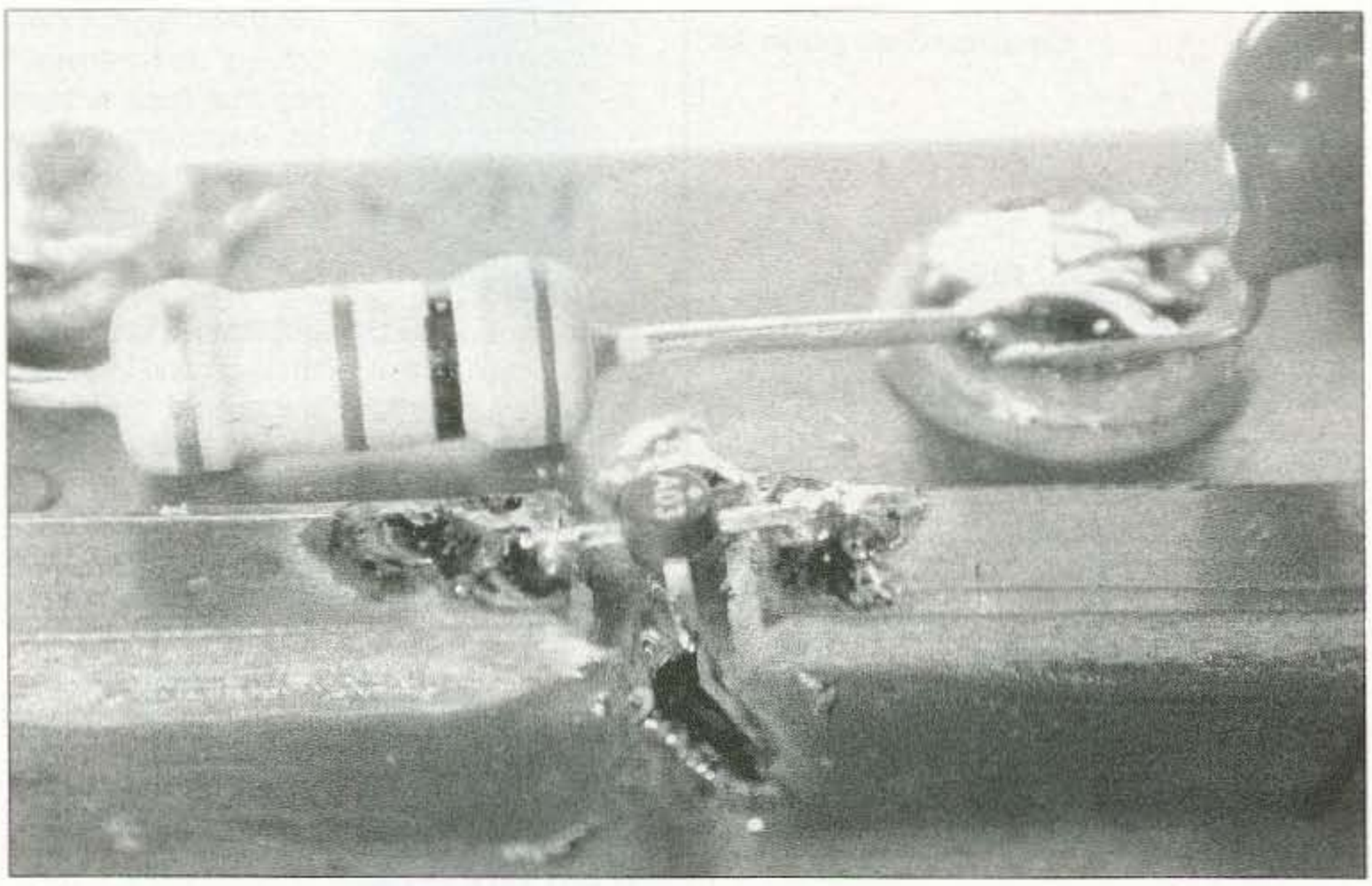


***Photo G.** MAR-3 amplifier in the test fixture, showing Manhattan construction, including strip lines.*

to wind; no complicated impedance matching.

A wide variety of MMICs is available from many manufacturers, and I tested three from among the nearly three dozen offered by Mini-Circuits Laboratories [http://www.minicircuits.com]. The MAR-1 through MAR-8 series is the original MMIC offering by Mini-Circuits; these are widely available at prices in the $1 to $2 range. Hence, I built test amplifiers with MAR-3, MAR-6, and MAR-8 MMICs, representing low, medium, and high gain chips. The MAR-series chips don't represent state-of-the-art in MMIC performance, but remain quite useful for HF through low UHF experimentation. (The leaded MAR-X series has recently been replaced by surface mount MAR-XSM packages. The device specifications important for HF use, however, have not materially changed, and the older leaded packages continue to be available on the surplus market.)

If you are to achieve decent performance in the GHz-plus range, you will need to pay careful attention to layout, component choice, and printed circuit board material. I was interested only in amplifiers up to 30 MHz or so, and I was able to get away with less-than-optimum construction techniques and components. Even so, the Manhattan-style construction I used worked reasonably well beyond 500 MHz. (The MAR-6 amplifier, I built from a kit.)

The MAR chips contain built-in bias elements, and both the input and output are at a positive DC voltage with respect to ground. Hence, both input and output require a blocking capacitor, $C_{blocking}$. I used 0.1 µF disc ceramics. (Good low-inductance surface-mount chip capacitors should be used if UHF performance is desired.) I used an 8.2 µH RF choke in addition to the bias resistor. The MAR chips require, depending on the particular model, between 3.5 and 7.8 volts, and must be run from a higher supply voltage through a series bias resistor, R_{bias}. If you don't use an RFC, R_{bias} shunts the output, so you will lose some gain — typically 1 to 2 dB. If you use a common leaded RFC, expect to see a dB or so of gain ripple over the 3–100 MHz range caused by choke resonances. Omitting the RFC will give almost ruler-straight (but lower) gain versus frequency over this range. If you use a choke, it should provide at least 500 ohms reactance at the lowest frequency of interest. For the 3–30 MHz range, the RFC should be at least 27 µH. (Special, resonance-free chokes are available where both maximum gain and maximum flatness are important.)

It's important to have a good ground plane for MMICs, and the Manhattan-style construction helps in this regard. I made the input and output connections with 50-ohm strip line. For standard 0.062-inch glass epoxy PC board material, the trace width for 50-ohm strip line is 0.158 inches. I just milled

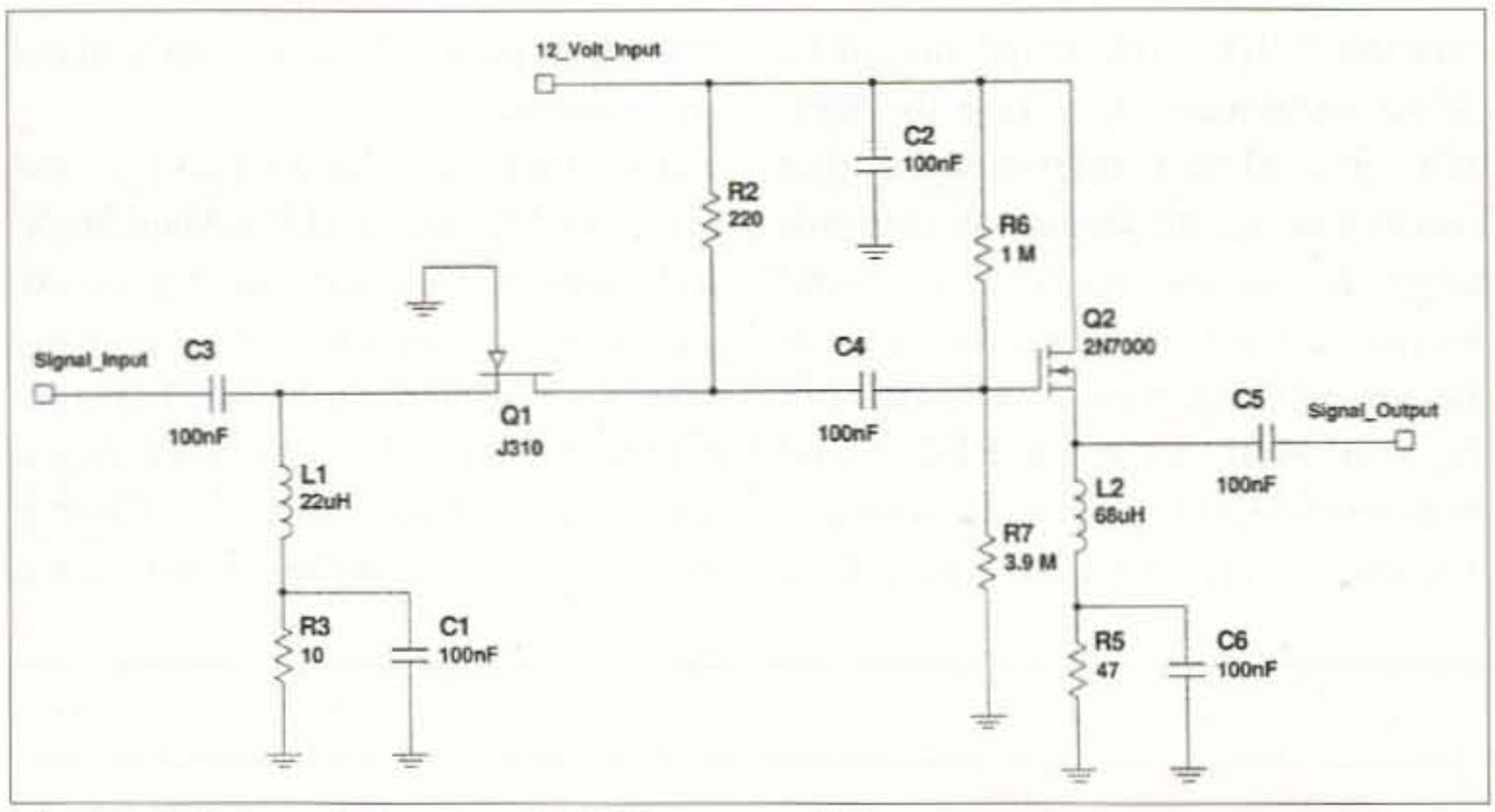


Fig. 6. J310 grounded gate and 2N7000 source follower.

a sliver of scrap PC stock to 0.158-inch width and Super-glued it just as if it were a Manhattan-style pad. This approach makes the MMIC stick up above the board surface, so the two ground leads are longer than desired. For HF use, strip line construction is not necessary. Remember, however, that MMICs have gain well into the GHz range, and sloppy layout could yield an oscillator, not an amplifier. Use a good ground plane and layout to keep the output clean. I did not see any indication of oscillation up through 1.5 GHz in my test circuits.

It's good practice to connect an amplifier in the following sequence: first, connect the output; second, connect the power ground; third, connect the power positive; and last, connect the amplifier input. I didn't follow this sequence as carefully as I should, and consequently destroyed two MMICs while running tests.

J310 grounded gate

Grounded-gate FET amplifiers have a good reputation for low noise performance, and the J310 circuit doesn't disappoint in this regard, turning in the best noise figure of the amplifiers I built.

The input impedance of a J310 in grounded-gate configuration is close to 50 ohms, so the input transformer should have a 1:1 turns ratio. Since the output transformer primary carries the same signal current as the secondary of the input transformer and we have designed for 50-ohm impedance at both the input and output, the voltage gain of this amplifier is simply the ratio of the transformer turns. In this case, T2's primary has a turns ratio of 4:1; hence the theoretical voltage gain is 4, or 12 dB. (The impedance of the output 50-ohm load seen by Q1's drain transformed by T2 is 800 ohms. This gives a voltage gain of 16:1. However, T2 has a 4:1 voltage step-down ratio. Hence the net voltage gain into the 50-ohm output is 4:1.) T1 and T2 carry the DC drain current as well; thus some care should be taken to avoid core saturation, particularly with T2. The size cores suggested on the schematic are satisfactory. (A no-transformer version of the grounded-gate J310 is shown later.)

This is a good-performing amplifier with a very good noise figure, but a disappointing high frequency response. Computer simulation suggests that the upper 3 dB frequency corner should be nearly 100 MHz. I was unable to coax the high frequency response past 21 MHz, despite extensive experiments with different output transformer designs.

J310 grounded gate and 2N7000 follower

With a little extra work, we can eliminate the transformers from the J310 grounded gate amplifier.

The input transformer can easily be replaced with an appropriate RFC and blocking capacitor. The RFC carries the DC current, but looks like high impedance to the RF input. C3 blocks the DC from the signal input.

We can replace the output transformer with a load resistance, R2. Since the same signal current flows through R2 and the input source, the voltage gain is the ratio of R2 to the 50-ohm input source, or, for the 220-ohm resistor in my design, 4.4:1, or 12.8 dB.

To connect the amplified signal to the 50-ohm output, we can use a source follower. A source follower has high input impedance and low output impedance and thus efficiently couples the signal amplified by Q1 to a 50-ohm output port. Our test circuit uses a 2N7000 MOSFET follower. A source follower has a voltage gain slightly

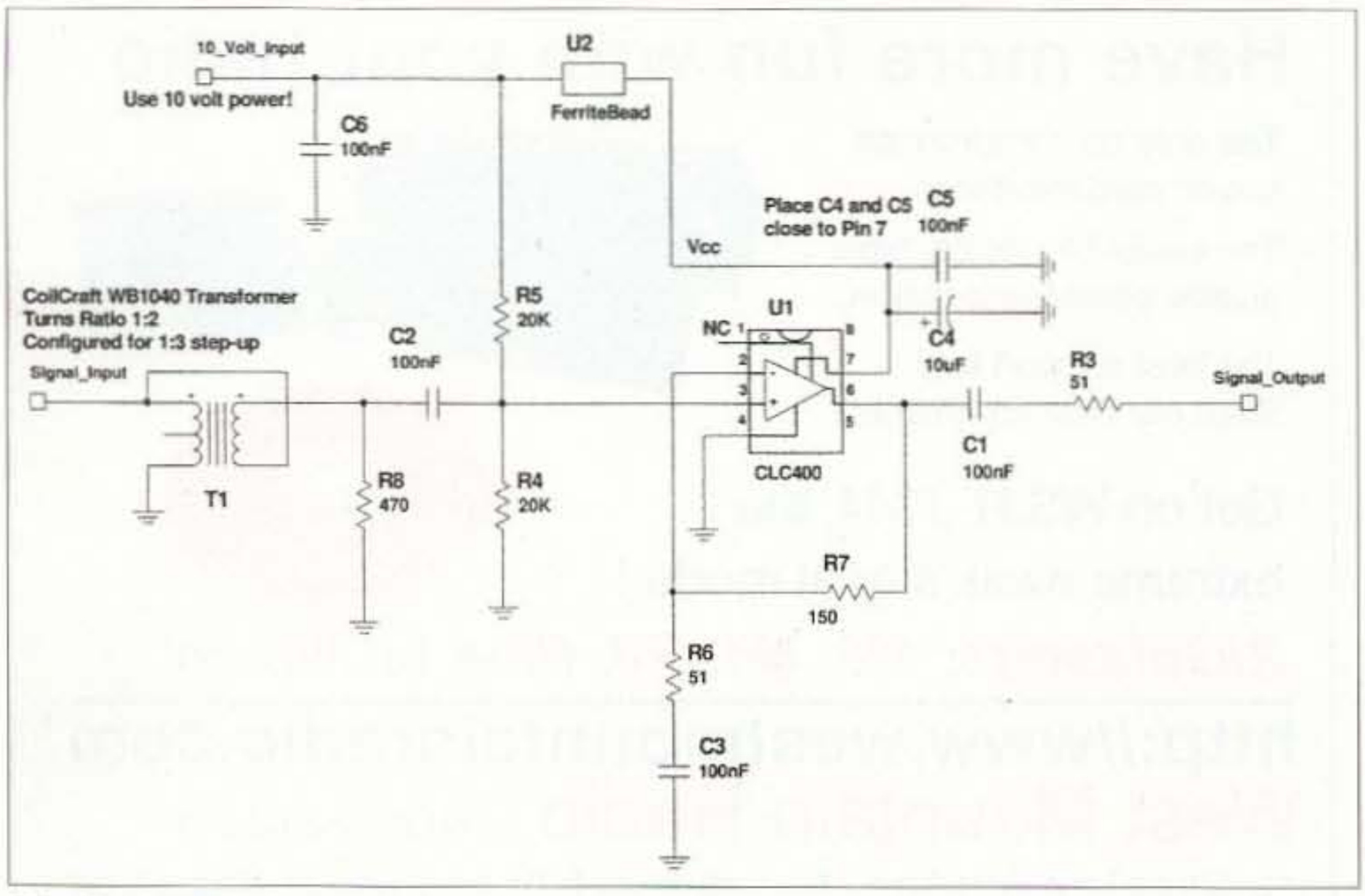


Fig. 7. CLC400 high-speed op amp.

Amplifier Configuration	5 MHz Gain (dB)	–3 dB Frequency (MHz)	Input IP2 (dBm)	Input IP3 (dBm)	Output Power dBm (1 dB Comp)	Noise Figure (dB)	3–30 MHz Input VSWR (max.)	Output IP2 (dBm)	Output IP3 (dBm)	Spurious Free Dynamic Range (dB)
2N5109	11	125	56	33	24	5.8	1.22:1	67	44	109
2N7000	13	34	36	23	26	8.4	1.50:1	49	36	101
J310 & 2N7000	11	62	44	23	24	7.1	1.29:1	55	34	101
J310 GG High Gain	10	21	55	28	20	4.2	1.29:1	65	38	107
MAR-3	12	500	25	12	12	7.3	1.29:1	37	24	94
MAR-6	15	340	–10	–7	–5	2.4	3.00:1	5	7	84
MAR-8	30	430	–4	–3	12	3.5	1.92:1	26	26	86
NE461M02	10	100	30	28	24	5.5	1.25:1	40	38	106
CLC400	15	88	51	16	17	8.7	1.62:1	66	31	96

Table 1. *Summary performance table.*

less than unity, so the net expected gain is close to 12 dB.

Because MOSFETs are poorly controlled for threshold voltage, you may find it necessary to adjust R7 to yield around 6 volts at Q2's source. R5 should be a 2-watt component, as it dissipates nearly three-quarters of a watt. This particular circuit runs Q2's dissipation somewhat exceeding its rated value. I use a small clip-on heat sink and have not found problems with device reliability.

Pairing the grounded gate input amplifier with a source follower markedly improves the high frequency response over the transformer-coupled grounded gate J310, but with a worse noise figure.

CLC400 current feedback op amp

National Semiconductor's high-speed current feedback op amp series has interesting applications for wideband RF amplifiers. Anyone interested in these chips should visit National Semiconductor's Web site [http://www.national.com] and download data sheets for members of the CLC family of chips and an excellent series of related Application Notes. In particular, Application Notes OA-7, OA-11, and OA-14 are instructive.

Using a high-speed op amp as an RF amplifier usually exposes an unimpressive noise figure. However, National provides an innovative solution to the noise problem, and I built a 15 dB gain amplifier using a CLC400 chip following the prototype in Application Note OA-14. Some members of the CLC4XX family have higher gain or lower noise figures than the CLC400, so pick the particular amplifier you need to match your requirements.

The circuit has several points of interest. I'll hit the highlights, but a detailed study of National's Application Notes is well worth the time invested.

The key to improving the noise figure is an input step-up transformer; by judicious selection of a step-up ratio, it's possible to balance noise voltage and noise current contributions in the amplifier. I used a CoilCraft WB1040 1:2 broadband transformer, configured as an autotransformer, to yield a 1:3 voltage step-up. R8 terminates T1 to match the input to 50 ohms. A 1:4 transformer would yield a better noise figure, and additional gain. With a 1:4 transformer, R8 should be changed to 820 ohms. You could, of course, wind your own transformer; 10 quadrafilar turns on a 0.375-inch diameter ferrite toroid using type 43 material should be suitable.

The voltage gain Av of the amplifier is determined by the ratio of R7 and R6 in the following formula: Av = (1+R7/R6). Keep the sum of R6 and R7 to be at least 200 ohms, however, as this feedback divider shunts the amplifier output.

Op amps don't like capacitive loads, and R3 is essential to preserve stability when feeding a 50-ohm coaxial cable. Unfortunately, R3 throws away 6 dB of the amplifier's gain, as it forms a voltage divider with the output load. If you were using a CLC400 to directly drive a 50-ohm mixer, for example, through an inch of wire, R3 could likely be omitted and the additional gain recovered. But, as a stand-alone preamplifier to be connected to a receiver through even a short length of coaxial cable, R3 is essential.

Op amps are most often used with

Model	Typical HF Gain (dB)	Max. Frequency (GHz)	Max. Output Power (dBm) @ 1 dB Compression	Noise Figure (dB)	Output IP3 (dBm)	Bias Resistor +12VDC (Ohms)
MAR-1	18.5	1	+1.5	5.5	+14.0	470
MAR-2	12.5	2	+4.5	6.5	+17.0	270
MAR-3	12.5	2	+10.0	6	+23.0	200
MAR-4	8.3	1	+12.5	6.5	+25.5	150
MAR-6	20	2	+2.0	3	+14.5	560
MAR-7	13.5	2	+5.5	5	+19.0	390
MAR-8	32.5	1	+12.5	3.3	+27.0	120

Table 2. *MAR amplifier specifications.*

Continued on page 58

Carl Markle K8IHQ
11570 Taylor Wells Rd.
Clairdon OH 44024-8910

2 m/70 cm Quad Revisited — Part 2

Try out this new, improved update to a CQ *article (July 1999).*

Now that you have an excellent antenna, we need to move on to the feedline, rotor, and whatever else is needed to make a complete VHF/UHF antenna system.

Well, it is obvious that we do not need any $500 rotor system to turn this little light antenna. We have all seen those used — sometimes well-used Alliance Mfg. TV antenna rotors from the '50s and '60s era. The price is usually two to five dollars for the rotor section and about one or two dollars for the control units.

That might seem like an ideal solution for rotating our quad system, but first let us look at the biggest problem faced by the VHF/UHF folks: transmission power line loss. Coax feedline has many times more losses at 100 feet than, say, a good 300-ohm ladder line. However, the matching is much simpler. Yep! It is one of those trade-offs again. Nowadays, coax manufacturers make 1,000 MHz RG-6 75-ohm satellite receiver coax, which is about as good as it gets, and no problem at about fifteen cents per foot. So we can use up to about 100 feet without worry in the VHF/UHF range.

I am a believer that the antenna system should be located as close as possible to the ham shack to minimize the transmission line loss problems. I always use an odd multiple of one-half electrical line lengths, 7 feet in our case, to minimize the SWR problems. So you can see where 50-ft. and 100-ft. lengths look good! My Kenwood TS-780S puts out 20 watts RF when loading a 50-ohm resistive load. I have found that hybrid modules used in most transceivers can handle 75-ohm coax with very little SWR problem, and you still get full RF output. It is that stray inductance that the modules do not like! I have never been a believer in using two 100-watt "blocks" and a huge DC power supply to run them just to get 20 watts up at the antenna. The home-brew of a 4CX300 high voltage linear amplifier does not

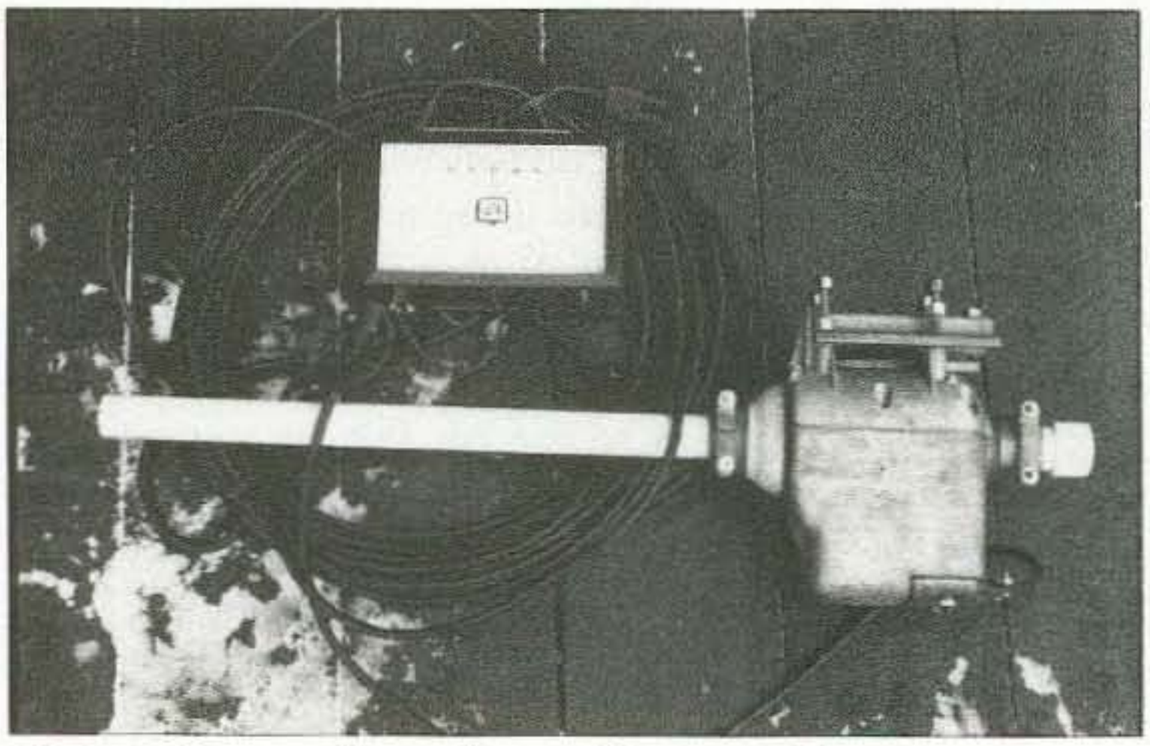


Photo A. *Rotor, cable, and control box assembly.*

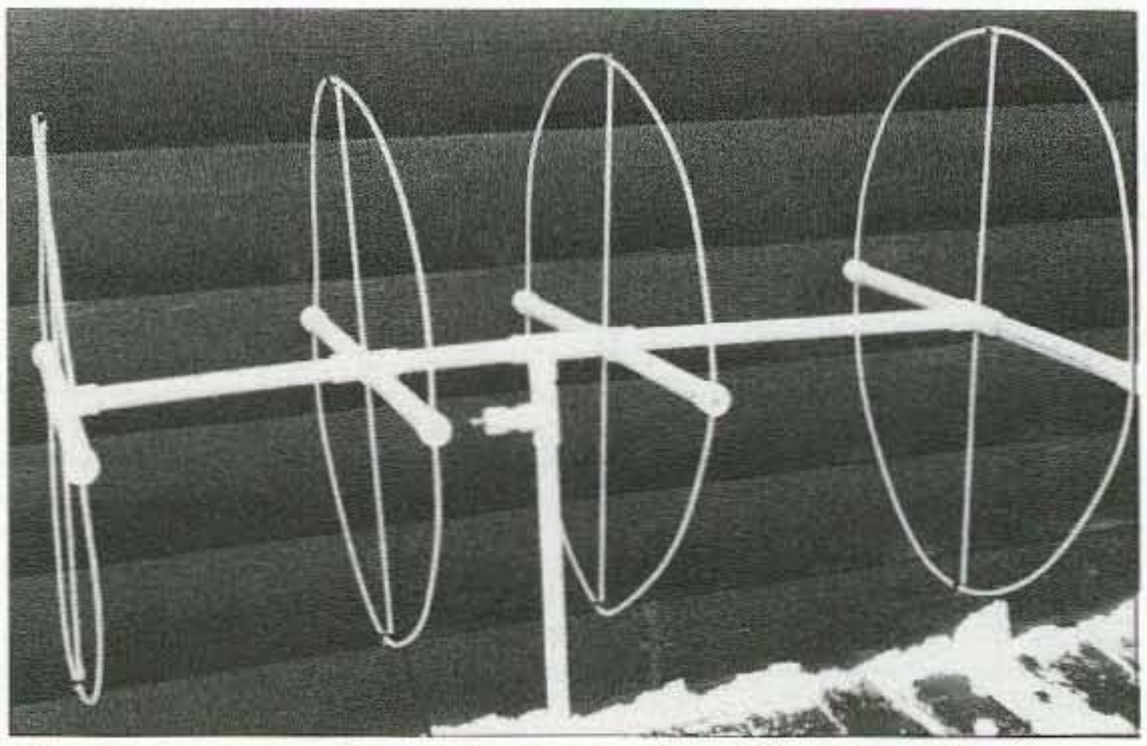


Photo B. *Another shot of the finished quad from Part 1.*

interest me much either! (I might try a project like that sometime in the future for those folks who think they really need one.)

I went to a couple of summertime ham flea market affairs and started looking for those crusty old TV rotors. They were there, and in big numbers. Seems like the new folks do not know what to do with them. Anyway, I started looking at rotors, since they are the hardest to find in good condition. I found a couple in the two- or three-dollar-each class, and purchased them. I then looked at the rotor case to check the stamped model number so that I could find the compatible control boxes. The control boxes are many, and usually run in the one- to two-dollar class. Purchase several just to make sure you have good parts if needed.

I found an old model T-45 rotor that was in like-new condition. I looked for the matching control box and found three of them for one dollar each. Such a deal! When I got them home and opened up the rotor, I was amazed. Almost like a mirror inside. I cleaned the insides of gear grease and checked everything out.

Take an old 24 VAC filament transformer and connect it to the motor wires to see if you hear a growl. Usually you will, since these motors are almost never bad. Then take one of the control boxes and check it out with a voltmeter. If everything looks good, plug it in to the 120 VAC power line. You should get 24 to 30 VAC when activated. Do the wire hookup to the rotor and see if you get action.

If the motor does not go with AC voltage on it, usually this means the start capacitor is bad. Among the two or three control units you purchased, you will have a good capacitor. It is the large white capacitor located in the control box, 100 µF, 30 VAC. Yes! I did say AC. If you had to, you could use a 100 VDC replacement capacitor. Once you have a working rotor system, you can swap parts off of the other controls to get the best-looking control. Sometimes the meters are bad, so make sure you have one that looks good and works. You do want to know what direction the antenna is in.

Open the rotor housing again. Purchase some electronic white grease or garage door opener white grease to lubricate the gears and slip bearings of the rotor. This is a light lubricant which has a low temperature rating and will not turn into cement on those cold nights. You might want to put a little zinc oxide primer paint, spray can of course, on the rotor housing, and finish with a coat of enamel paint. No rusting or oxidizing after that. I do recommend replacing the rotor screw terminal screws with #6-32 stainless steel machine screws. This will keep you out of trouble in the future. I have also used a male and female DIN-8 plug/socket system in-line so that I could have quick disconnect of the rotor line should I ever want to remove the antenna or rotor for repairs. PVC black tape weatherizes the connectors.

I recommend purchasing the eight-conductor light-duty black rotor cable. Anything beyond that is just a waste of money unless you have another suitable cable on hand. The cable has two AWG-18 conductors for the motor voltage and six AWG-22 conductors that provide the servo indicator job. This cable usually costs under twenty cents per foot when purchased new.

I have a roof mounting using two-inch PVC pipe and caps with stainless wood screws. I run the cable to the mounting using one-half-inch PVC (gray) pipe clamps and drywall screws. This system works for bringing the coax and rotor cables to the shack. Two couplings and a small piece of PVC pipe make a good wall entry for the cables. Use clear 100% silicone caulk to backfill and weatherize the entry.

Well, that is about it for this project. Remember, if using satellites you will need a second rotor system to elevate the antenna in the "Z" axis. You will need elevation to track those guys!

If there are any questions, I am available via USPS only, and only if I receive an SASE. Good luck! 73

Qty.	Item	Source	Cost
30 ft.	AWG-14 bare copper wire	Any	$1.20
1	Ferrite clamp-on RF choke	TDK via Hosfelt #80-287	$1.00
12 ft.	0.75 in. PVC water pipe	Any	$3.00
4	0.75 in. PVC "T" fitting	Any	$2.00
2	0.75 in. PVC cross fitting	Any	$2.00
8	0.75 in. PVC pipe caps	Any	$2.00
30 ft.	0.25 in. PVA agricultural clear tubing	Any	$3.00
2	Female type F coax connector	Hosfelt #60-342	$.50
1	Double female bulkhead type F	Hosfelt #FC-67	$.50
50 ft.	RG-6 Sat TV 75 ohm coax	Hosfelt #60-236	$7.50
Alt.	RG-59/U Alpha #1354 75 ohm coax	Hosfelt #60-506	—
Optional: 24	SS #4-025 sheet metal screws	—	—
Alt.	PVC glue and solvent/cleaner	—	—
Optional: 4	0.25 in. x 36 in. wood dowels	Local	$1.20
Optional: 8	#4 0.75 in SS panhead phillips sheet metal screws	—	—
Optional: 8	0.25 in. coax cable strips for stiffeners	—	—

Table 1. *Parts list.*

If you're a No-Code Tech, and you're having fun operating, tell us about it! Other No-Code Techs will enjoy reading about your adventures in ham radio—and we'll pay you for your articles. Yes, lots of nice clear photos, please. Call Joyce Sawtelle at 800-274-7373 to get a copy of "How to Write for *73* Magazine."

Tony Marchese AB2LX

General-Purpose Interface Board for the ISA Bus

A simple, inexpensive alternative for interfacing real-time, home-brewed applications to the PC.

Like many of you, I enjoy tinkering with electronic projects. Over the years, my projects have progressed from simple analog circuits to complex designs incorporating various forms of digital control. One of the most frustrating hurdles faced along the way was the lack of a simple method to test the digital interface.

A personal computer seemed to be the ideal candidate for the job. Unfortunately, interfacing to standard serial communication (COM) and parallel (LPT) ports was often frustrating considering the hardware and software constraints. The remainder of this article details the theory and construction of a general-purpose input/output (GPIO) card for IBM ISA/EISA bus-compatible systems. The GPIO provides a simple, inexpensive method for interfacing real time, home-brewed applications to the PC and is intended as an alternative to existing COM and LPT ports. Parts for the card, including the homemade printed circuit board, cost about $10. The GPIO provides all of the address decoding and bus buffering required to equip an ISA/EISA-compatible PC with 24, independently controllable external I/O lines.

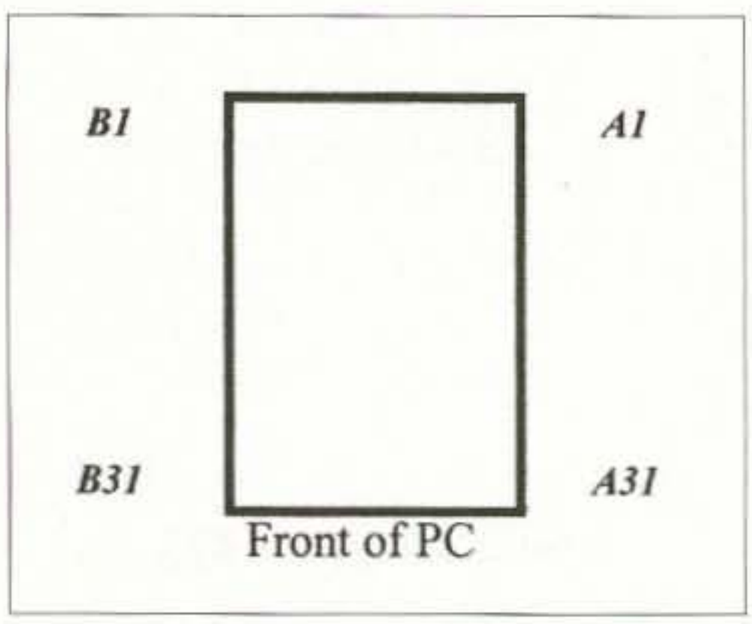


Fig. 1. ISA connector layout.

Technical background

The majority of IBM PC-, XT-, AT-compatible personal computers, with the exception of the IBM PS/2, utilize the "Industry Standard Architecture" (ISA) bus structure for the addition of feature cards. The ISA connector is detailed in **Fig. 1** and associated signals are defined in **Table 1**. The original PC and XT versions incorporated 8-bit processors. A single, dual-in-line, 62-pin connector is specified which provides access to 20 address lines, 8 data bits, power supplies, and control lines. The advent of the AT platform prompted an expansion of the original ISA bus, formally referred to as "Extended Industry Standard Architecture" (EISA), to accommodate the 16 data bits and 24 address lines of the 286 processor. Compatibility is maintained with existing ISA hardware by means of a secondary connector rather than changes to the original bus structure. Three minor changes were made, none of which significantly affect the structure.

Application boards connected to the IBM expansion bus should also comply with the following guidelines to prevent interference with other resident hardware:

1. No more than (2) TTL-LS loads attached to any given bus line.
2. NMOS, LSI components should be buffered from the connector as they can neither supply sufficient drive to the bus nor tolerate the negative spikes which may exist.
3. Boards must comply with predefined addressing.
4. Tri-state buffers should be utilized to prevent bus contention.

Theory of operation

The schematic for the GPIO card is provided in **Fig. 4**. The board incorporates U1 and U2, 74LS138, 3 to 8 decoders, to comply with standard IBM PC/XT/AT port allocations, while U3, an 74LS245 octal, tri-state transceiver, buffers the bidirectional data bus. The decoders utilize address lines A2–A9 to locate the general-purpose board at I/O port locations $300–$31F. IBM-

PIN	SIGNAL	DESCRIPTION
A2	D7	Bi-directional data bus - description relates to processor initiated bus cycle
A3	D6	
A4	D5	WRITE - processor places data on the bus prior to the rising edge of IOW or MEMW which
A5	D4	clocks the data into the port or latch
A6	D3	
A7	D2	READ - port or memory must place data on the bus prior to the rising edge of IOR or MEMR
A8	D1	which latches the data into the processor
A9	D0	
A12	A19	Address lines - 20 lines that provide 1Mbyte of memory addressing. Only lines A0-A15 are
....	....	used for port addressing
A31	A0	
		CONTROL SIGNALS
A1	I/O CH CK	I/O channel check - active low signal used to inform processor of parity error in I/O or memory
A10	I/O CH RDY	I/O channel ready - input to processor used to generate wait states by extending the length of bus cycles for slow memory or I/O
A11	AEN	Address Enable - signal asserted by the direct memory access (DMA) controller to indicate a DMA cycle is in progress. Typically used to disable I/O decoding such that DMA data is not inadvertently used as a port address.
B2	RESET DRV	Reset drive - used to initialize system logic during power up. This signal is synchronized with the falling edge of OSC
B11	MEMR	Memory read / write - active low signals used to control memory read & write operations
B12	MEMW	
B13	IOR	I/O read / write - active low signals used to control I/O port read & write operations
B14	IOW	
B30	OSC	System oscillator which provides a 70 ns (14.31818 Mhz) squarewave
B20	CLOCK	4.77 Mhz or 7.16 Mhz waveform depending upon system type
B28	ALE	Address Latch Enable - low to high transition indicates beginning of a processor initiated bus cycle. System bus does not contain valid address information when ALE is asserted. Valid address information is latch on the high to low transition of ALE.
		POWER SUPPLIES
B1,B10,B31	GND	system ground
B3, B29	+5V	
B5	-5V	
B7	-12V	
B9	+12V	
		INTERRUPTS
B4	IRQ2 (IRQ9)	Interrupt request - An interrupt is generated by asserting the IRQ line and holding it high until the processor acknowledges the request. The request is typically acknowledged in the interrupt service routine (ISR). The ISR may use the OUT command to set a I/O port bit which notifies the device to release the IRQ line. IRQ2 is the highest priority hardware interrupt available on the bus. IRQ2, pin B4, is replaced with IRQ9 in systems which utilized the EISA bus. The system's BIOS typically redirects the IRQ9 vector to that of IRQ2 to maintain compatibility.
B25	IRQ3	
B24	IRQ4	
B23	IRQ5	
B22	IRQ6	
B21	IRQ7	
		DMA CONTROL LINES
B18	DRQ1	DMA Request - synchronous channels used by peripheral to obtain DMA service. DMA request must remain high until the corresponding DACK line goes low. DRQ0 is not available on the bus as it is used to refresh the system's dynamic RAM.
B6	DRQ2	
B16	DRQ3	
B19	DACK0	DMA Acknowledge - active low signals used to acknowledge DMA request (DRQx). DACK0 is used to refresh dynamic RAM.
B17	DACK1	
B26	DACK2	
B15	DACK3	
B27	T/C	Terminal Count - provides a pulse when the terminal count for the DMA channel is reached

Table 1. *ISA bus pin definitions.*

compatible systems reserve these port addresses for prototype cards such as this. A bank of address-select jumpers is provided to allow the user to select from eight distinct 4-byte address blocks within the allocated space. The jumper configuration is shown in **Fig. 2.**

The decoder section also utilizes the Input/Output Read (IOR), Input/Output Write (IOW), Address Enable (AEN), and Address Latch Enable (ALE) lines from the system expansion bus. The IOR and IOW signals control the direction of read and

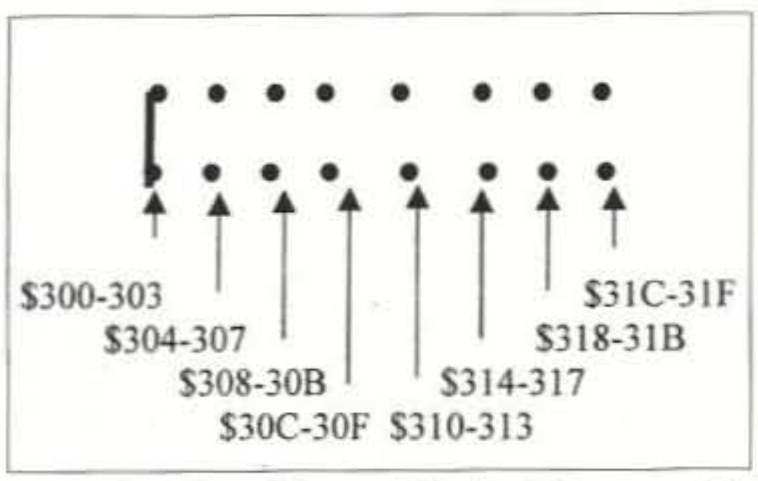


Fig. 2. *J3 address block (shown with jumper installed for $300-303).*

A1	A0	IOW	IOR	FUNCTION
0	0	1	0	read Port A data
0	0	0	1	write to Port A
0	1	1	0	read Port B data
0	1	0	1	write to Port B
1	0	1	0	read Port C data
1	0	0	1	write to Port C
1	1	1	0	undefined
1	1	0	1	write PPI control register

Table 2. *82C55 PPI internal registers.*

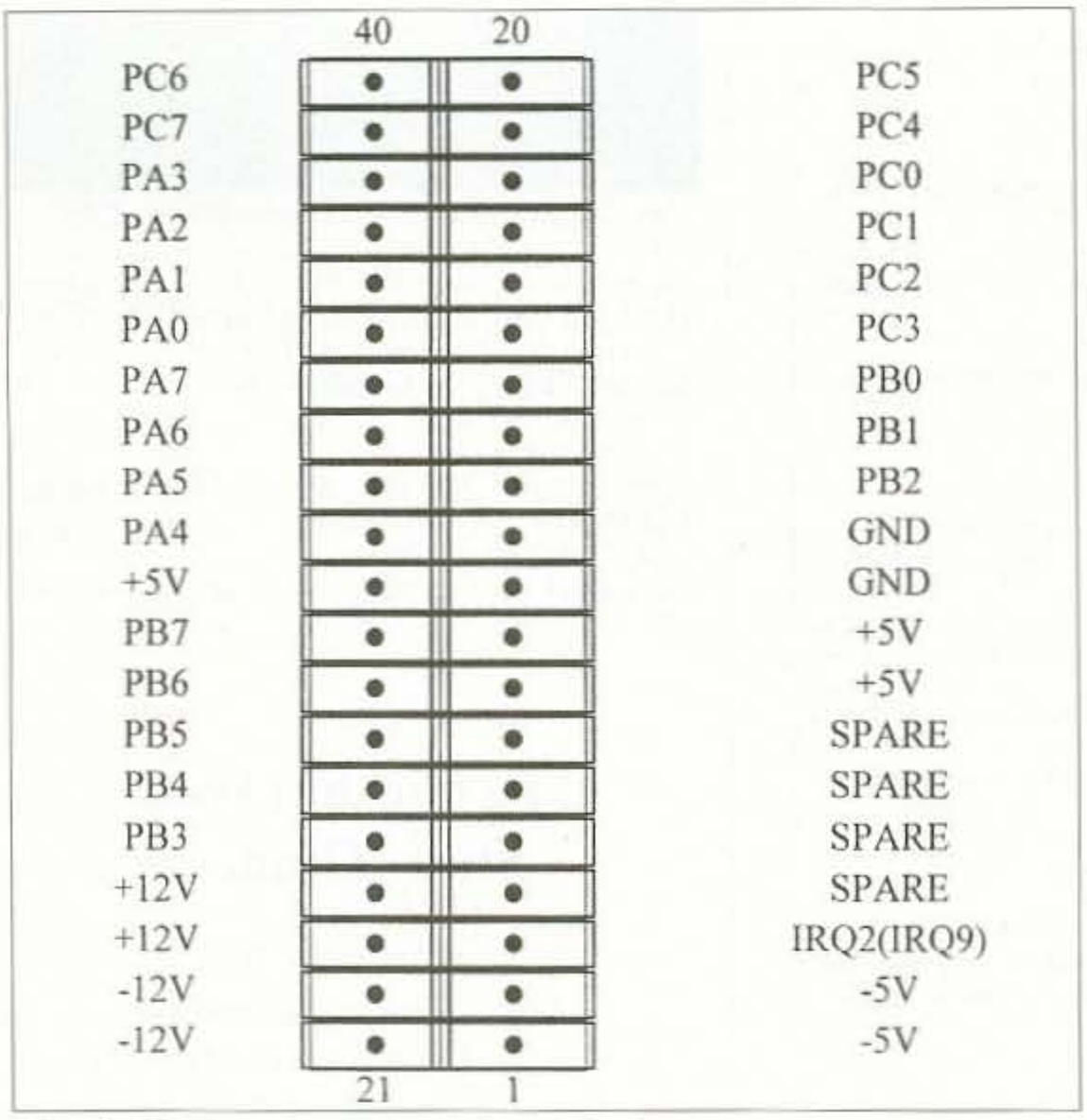
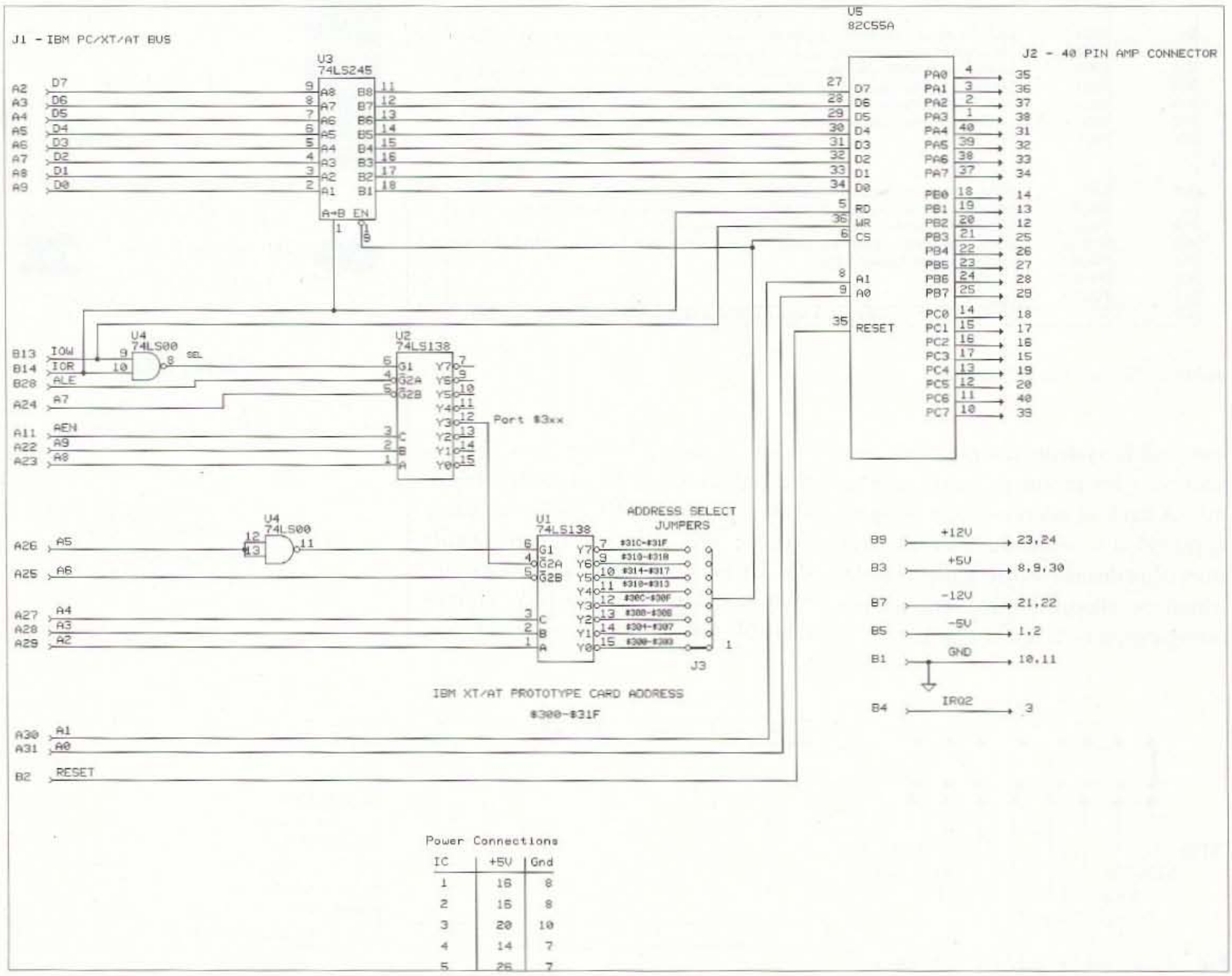


Fig. 3. *J2 output connector (rear view).*

write operations. These IOR and IOW lines are active low signals which may be asserted by either the processor during port operations or the controller during direct memory access (DMA). The high-level AEN signal seen during DMA cycles inhibits the decoder, thereby preventing accidental interpretation of the data transferred during the process as a valid port address. The processor initiates a bus cycle by asserting and holding ALE until the address bus stabilizes. The ALE signal inhibits the decoder during this period to prevent activation during undefined processor bus states.

A valid port address activates the decoder. The decoder enables the chip-select (CS) on the 82C55 and the U3 data buffer. The general-purpose card also uses address lines A0 and A1 to select one of the four individual registers within the 82C55 programmable peripheral interface (PPI). The IOR/IOW lines and A0 and A1 can now provide access to the 82C55's internal registers as detailed in **Table 2**. A complete data sheet, including a description of the 82C55 registers, is available at [www.intersil.com/data/fn/fn2/fn2969/fn2969.pdf].



Power Connections

IC	+5V	Gnd
1	16	8
2	15	8
3	20	10
4	14	7
5	26	7

Fig. 4. *GPIO schematic.*

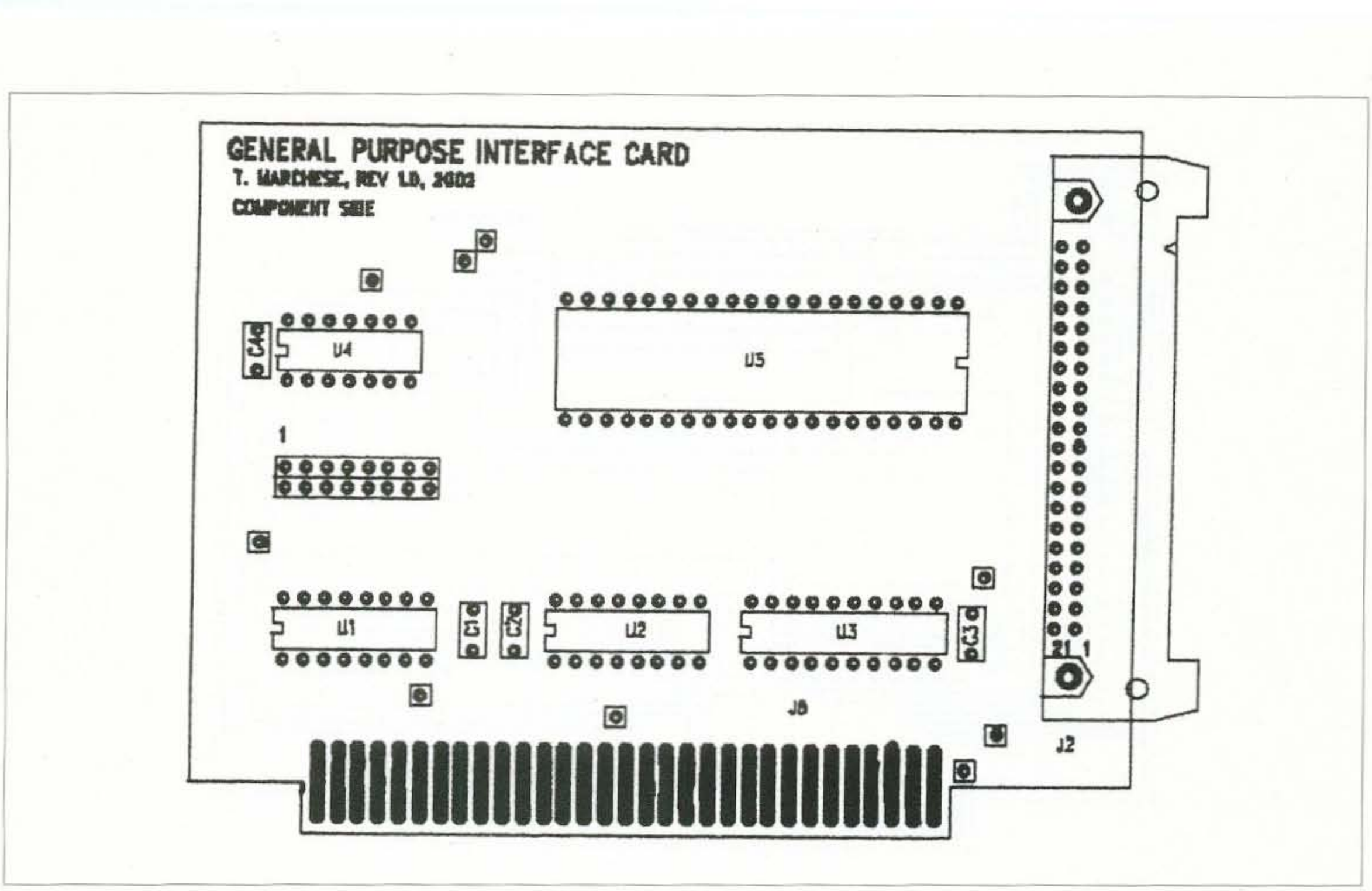


Fig. 5. GPIO PCB layout.

Construction

The circuit can be constructed on either a prototype card or with the printed circuit board (PCB) artwork provided in **Figs. 5, 6,** and **7**. The original interface card utilized a prototype board with a combination of wire-wrap and hard-wired construction. The card functioned well, but occupied the space of two ISA slots because of the long wire-wrap pins. The PCB is

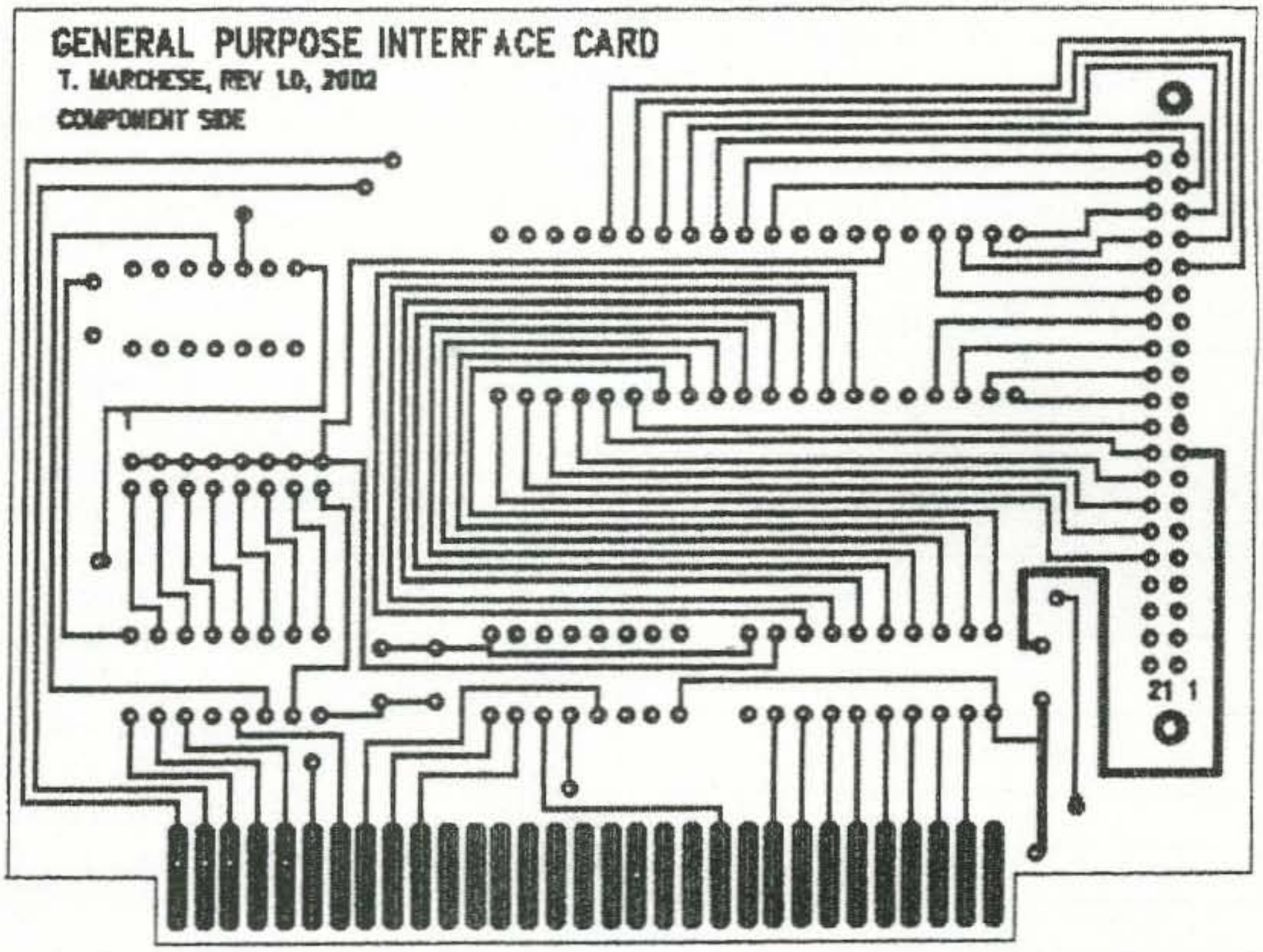


Fig. 6. GPIO PCB component side.

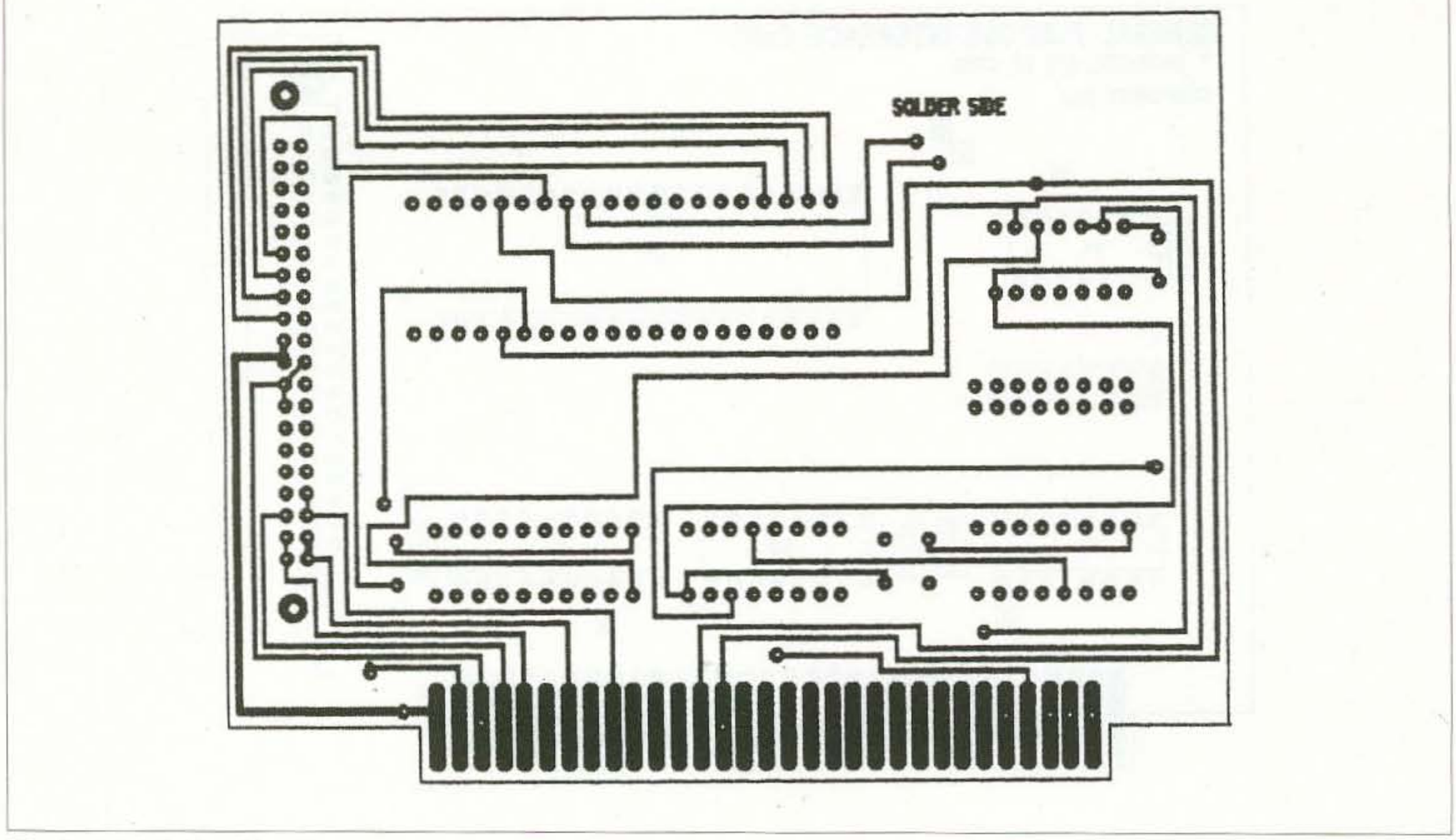


Fig. 7. GPIO PCB solder side.

provided to simplify construction and minimize the space requirements as the card fits in a single, short slot of the ISA bus.

The circuit board includes provisions for J2, a 40-pin connector which matches up nicely with ribbon cable. The J2 connector and cable allows easy access to all of the 82C55's 24 input/output lines. The ±5V, ±12V, and ground lines from the bus are also made available to the user on J2.

The printed traces are relatively thin. Current drawn from these lines should be limited to less than 20 mA. Extreme caution must be exercised when using these lines as they are tied directly to the computer system's power supply. Remember to protect the computer from damage by adding fuses to the power supply lines when they are used by an external application.

Fuses are purposely not included on the GPIO board for several reasons. First, the fuse should be appropriate for the application. Incorporating a large fuse to protect the system's power supply will undoubtedly result in damage to your application board if a fault occurs. Second, accessing an external fuse is typically easier than opening the computer and removing the GPIO card. This sounds good on paper, but I'll let you know if I damage my first GPIO card.

IRQ2 is also available on J2, as real-time applications often use a hardware interrupt. Please note that this interrupt is mapped to IRQ9 in EISA bus systems.

A test routine, written in QBasic, is provided here for assessing the card's functionality after construction is complete. The program simultaneously toggles each of the 24 I/O pins. Testing is straightforward: Run the program, then measure any of the PA(x), PB(x), or PC(x) pins with a voltmeter. The output should toggle between less than 0.5V to greater than +4.5V. Save this program, as it will also facilitate testing of the card if problems occur at a later time.

Name	Type	Description	Cost	Jameco P/N
U1	74LS138	3 to 8 decoder/demultiplexer	$0.29	46607
U2	74LS138	3 to 8 decoder/demultiplexer	$0.29	46607
U3	74LS245	Octal bus transceiver, tristate	$0.39	47212
U4	74LS00	Quad 2-input NAND gate	$0.19	46252
U5	82C55	Programmable peripheral interface	$4.95	52425
C1–C5	—	0.1 µF mylar cap	—	—
J2	—	40-pin header	$0.55	53604
—	—	Printed circuit board	—	—

Source: Jameco Electronics, 1355 Shoreway Rd., Belmont CA 94002-4100; 800-831-4141; [www.jameco.com]

Table 3. Parts list.

```
'*************************************************

' Test program for General Purpose Interface Card
' Program toggles all PPI bits between high & low
' state to facilitate testing.  The address jumper, J2
' is assumed to be in the $300-303 position.
'
' Description            Hex     Decimal

'                        Address Address
'
' Port A Read / Write     $300    768
' Port B Read / Write     $301    769
' Port C Read / Write     $302    770
' PPI Control Register    $303    771
'
'    Written by Tony Marchese, AB2LX, 2002

DECLARE SUB timep (x)

Rcontrol = 771

' numpulses may be increased  if a longer test time is required

numpulses = 10
high = 255
low = 0

'set PPI to Mode 0 which configures all interface lines as outputs

OUT Rcontrol, 128

' set up to output (qty) of pulses
FOR qty = 1 TO numpulses

' set all output bits to the high state

portstate = high
CLS
PRINT "Port Bits = 1 "
PRINT "Pulse Number: "; qty
timep (portstate)

'clr all output bits to the low state

portstate = low
CLS
PRINT "Port Bits = 0 "
PRINT "Pulse Number: "; qty
timep (portstate)

NEXT qty

END

SUB timep (portstate)

PortA = 768
PortB = 769
PortC = 770

' time delay routine holds output pulse in portstate for time = duration

FOR duration = 1 TO 20000

OUT PortA, portstate
OUT PortB, portstate
OUT PortC, portstate

NEXT duration

END SUB
'*************************************************
```

Test program.

Conclusions

The GPIO has come in handy for several projects, including as an interface to a stand-alone LCD matrix. The LCD required special timing and control signals which were not readily available from the parallel port. The GPIO provided an easy method to investigate the interface requirements, as the control signals and sequences to the display could be easily manipulated using relatively short QBasic routines. 73

Hugh Wells W6WTU
1411 18th St.
Manhattan Beach CA 90266-4025

Inside a Lampkin

More secrets of deviant behavior.

Test equipment is a ham's best friend! I suppose you'll ask me to justify or explain what I mean by that statement. I may not have a complete answer, but test equipment is like any tool — it has a designed use or an intended application.

In some cases, the application is very specific and when the equipment is needed, it is NEEDED NOW! The rest of the time it will sit idle on the shelf gathering dust. It's during this idle period that the owner becomes complacent and considers parting with the equipment to make room for something "new" and more in vogue with current interests.

During the years of manufacture, Lampkin offered both a deviation meter and a frequency meter as indicated in the 1957 ad shown in **Photo A**. These were both valued instruments that were required to set up FM communication radios for commercial and ham radio applications. **Photos B, C, D,** and **E** show various views of the FM modulation meter that is better known by hams as a "deev meter."

Being a deviation meter, its application is quite specific, because it was designed to measure only the carrier frequency deviation of an FM transmitter. Since most of us use commercially built ham equipment where the deviation of the carrier frequency is set by the factory, we tend to ignore the fact that we, as hams, are responsible for the signal generated by our transmitter, regardless of who made it. Unlike our cars that get serviced periodically, our ham transmitters never get serviced or checked unless there is a catastrophic failure.

My point is that we're responsible for the emissions from our transmitter, and that includes the amount of frequency deviation produced by the transmitter. When operating through a repeater, the repeater establishes a pseudo deviation requirement of 5 kHz in most cases, and distortion in the audio may occur should we exceed that amount. Listening to our signal at the output of the repeater gives us a fair idea of our transmitter's deviation — distortion vs. no distortion.

***Photo A.** This a 1957 ad for Lampkin.*

Photo B. *Front-panel view of the Lampkin frequency deviation meter.*

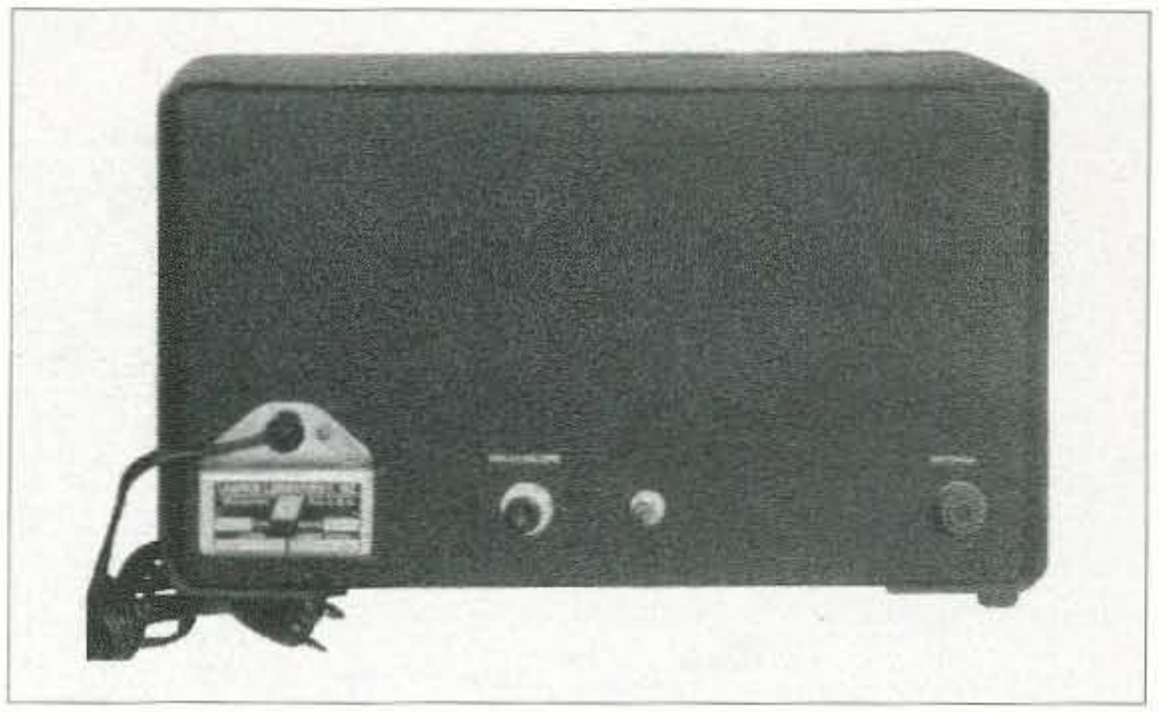


Photo C. *Rear view of the deviation meter. Provisions were made for connecting an oscilloscope.*

Those of us charged with the responsibility for setting up and maintaining a repeater system must have access to an instrument capable of measuring frequency deviation such as the Lampkin. In addition, most repeaters utilize a subaudible tone (CTCSS) to enable the repeater operation, and this tone has a specified frequency deviation. Although the FCC may not specify the CTCSS tone deviation, the tone must meet several criteria:

1. The waveform must be a sine wave.
2. Deviation must be high enough to reliably activate the repeater's decoder.
3. The deviation level must be low enough to not disrupt the normal voice channel communication.

So how do we, as hams, measure the frequency deviation emitted by our transmitter? The tool designed to perform the measurement is a deviation meter such as the Lampkin. It gives us the "eyes" to view the deviation of the emitted signal that is displayed on a meter as a deviation value. The Lampkin was designed specifically for measuring emitted signal deviation of an FM transmitter operating in the ham bands from approximately 6 meters to 70 cm. It is also capable of measuring the deviation of the CTCSS tone generator within the transmitter.

When using the Lampkin, the measurement is very simple and requires only a few moments of time. Because of the short test time it is easy to discount the importance of making the measurement that is needed to ensure that our transmitter meets the FCC requirement. Checking the deviation of our transmitter periodically is like changing the oil in our car, it's good insurance.

Deviation theory

Deviation of an FM signal is an instantaneous and a direct function of the modulating audio's amplitude measured from the carrier's resting frequency to the plus or minus peak excursion. In essence, that means the loudness of a voice introduced into the microphone controls the peak deviation of the emitted signal. However, to reduce the possibility of creating differing amounts of deviation from random operators, transmitter designs incorporate an audio peak limiter set up to prevent "overmodulation." During normal usage, voice amplitude peaks should not be quite high enough to force the limiter into action. Doing so could create audio distortion.

An important term in FM modulation theory, besides deviation, is the RATE OF DEVIATION. The rate is the speed that the carrier moves while deviating and is a function of the frequency of the audio producing the deviation. When the deviation value and the rate of deviation are combined, a

Photo D. *An inside top view of the chassis and tube layout.*

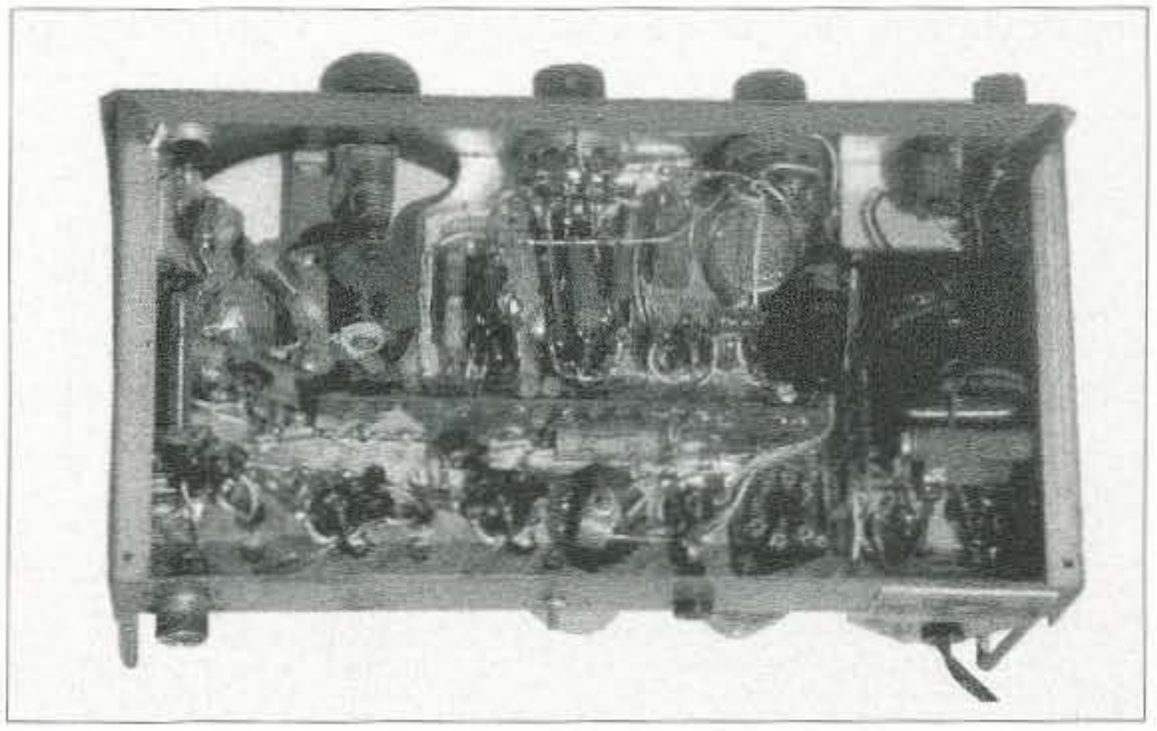


Photo E. *Inside bottom view of the Lampkin deviation meter. Note the mechanically stable design.*

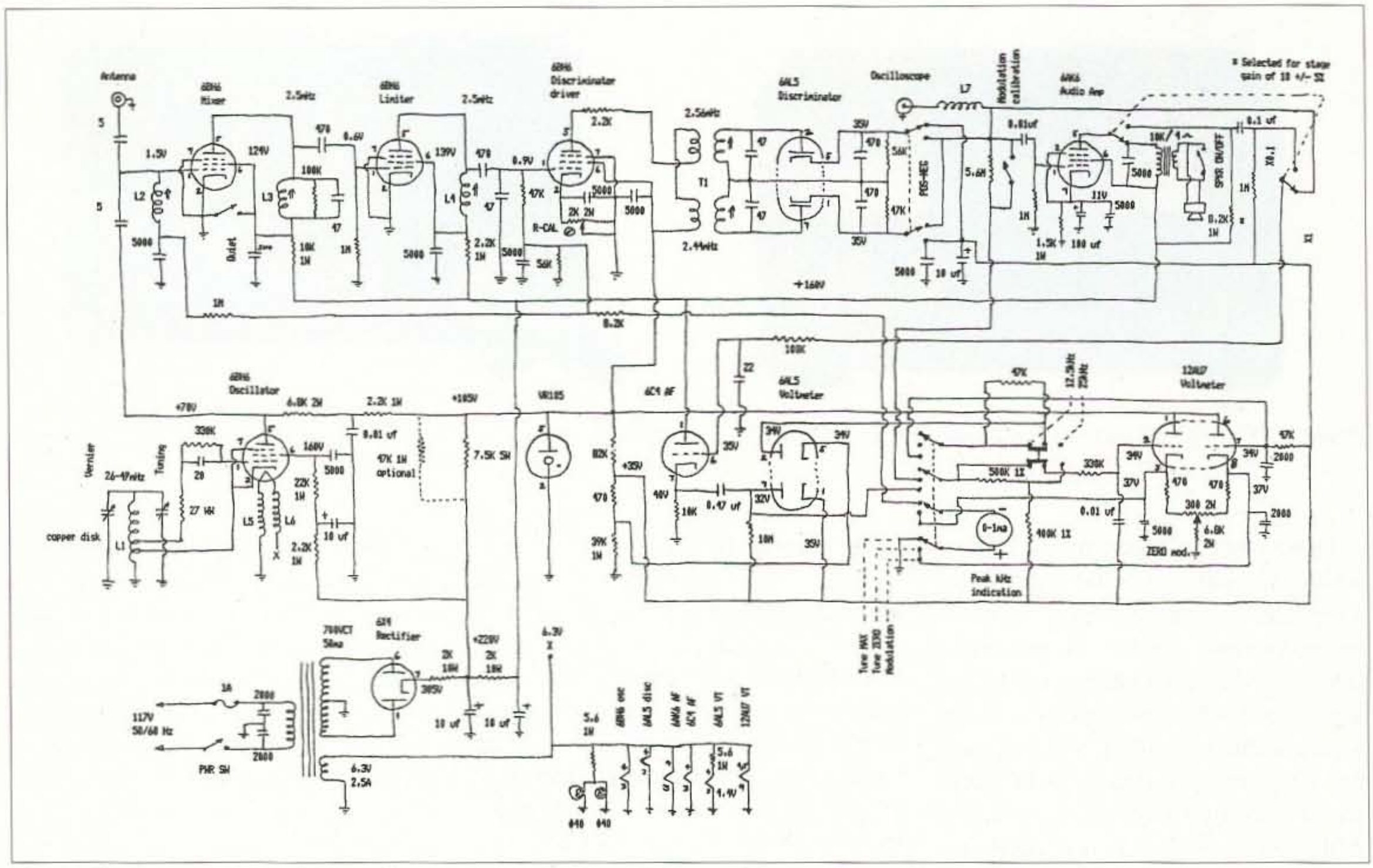


Fig. 1. This is a complete schematic for a Lampkin model 205A FM modulation meter.

modulation index value is established. Ham FM transmitters are limited to a modulation index of 1.67, where the index value establishes the maximum bandwidth to be occupied by the emitted signal. Modulation index for a signal is found by dividing the peak signal deviation by the highest audio frequency being transmitted.

Measuring deviation

There are several methods available to a ham that are suitable for measuring deviation, such as a Lampkin FM modulation meter, oscilloscopic spectral display, Bessel functions, etc.

Bessel functions are used as the basis for calibrating all deviation measurement equipment because it is accurate and repeatable. The technique utilizes a carrier null that involves the observation of when the FM carrier amplitude passes through a null or zero point. The carrier amplitude will predictably pass through a null at several modulation index points such as M = 2.405 and M = 5.52 as the first two of a series of nulls.

Calibration of deviation involves applying a single sine wave audio voltage of known frequency to the voice input of the transmitter and increasing the audio amplitude until the carrier reaches a null. The null is detected as a loss of beat note in a CW or SSB receiver or as a carrier loss as observed on a spectrum analyzer. If the modulating audio frequency were 1 kHz, then at the first null the deviation would be exactly 2.405 kHz, and would be exactly 5.52 kHz at the second null. It is usually easier to detect the first null than the second when listening to a beat note.

For calibration purposes, it is preferable to identify specific or whole number deviation values instead of using a number like 2.405 kHz. Therefore, specific audio frequencies can be calculated for a value of deviation by using the following equations:

$$F_{dev} = AF \times M(\text{at null})$$

or

$$AF = F_{dev}/M(\text{at null})$$

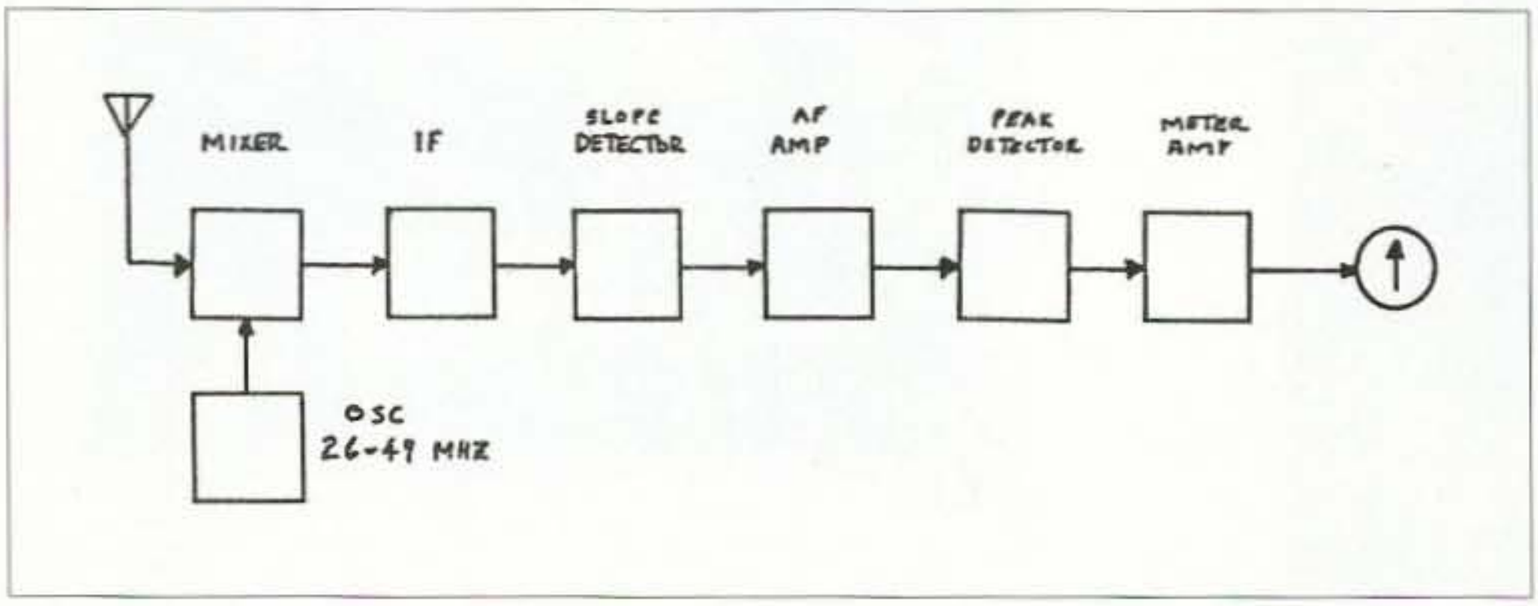


Fig. 2. Block diagram of the Lampkin 205A FM modulation meter. The design uses a single conversion superhet receiver utilizing a dual-slope FM detector.

Audio Frequency Values		
Deviation (in kHz)	1st Null (in Hz)	2nd Null (in Hz)
1	415.8	181.2
2	831.6	362.3
3	1247.4	543.5
4	1663.2	724.6
5	2079.0	905.8
6	2494.8	1086.9
7	2910.6	1268.1

Table 1. *Audio frequency values required to create a specific deviation using either the first or second null.*

Table 1 provides a listing of audio frequencies that will produce specific values of deviation that were derived from the equations. The table indicates values for both the first and second null. Setting up calibration at a single null is generally all that's required, but sometimes the second null provides confidence in the measurement at the first null.

Inside a deviation meter

To measure deviation with an instrument such as the Lampkin, the emitted signal must be detected and the peak carrier shift must be determined using a calibrated reference. The Lampkin uses a linear "S" curve produced by a dual-diode slope detector to convert carrier deviation to an instantaneous (peak) AC voltage that is displayed on a calibrated meter. When setting up the deviation meter, the "S" curve must be evaluated or calibrated against a Bessel function measurement.

Fig. 1 shows a complete schematic for the Lampkin FM modulation meter, with a block diagram shown in **Fig. 2**. It's generally easier to follow an overall device function with a block diagram. The Lampkin utilizes a conventional superhet receiver design that has an untuned input and mixer. Without tuning, the input will accommodate any signal creating a strong mix with the local oscillator, including any of the oscillator's harmonics. In essence, the input of the Lampkin will accept for deviation measurement any signal operating from about 24 MHz up to 500 MHz. The local oscillator is

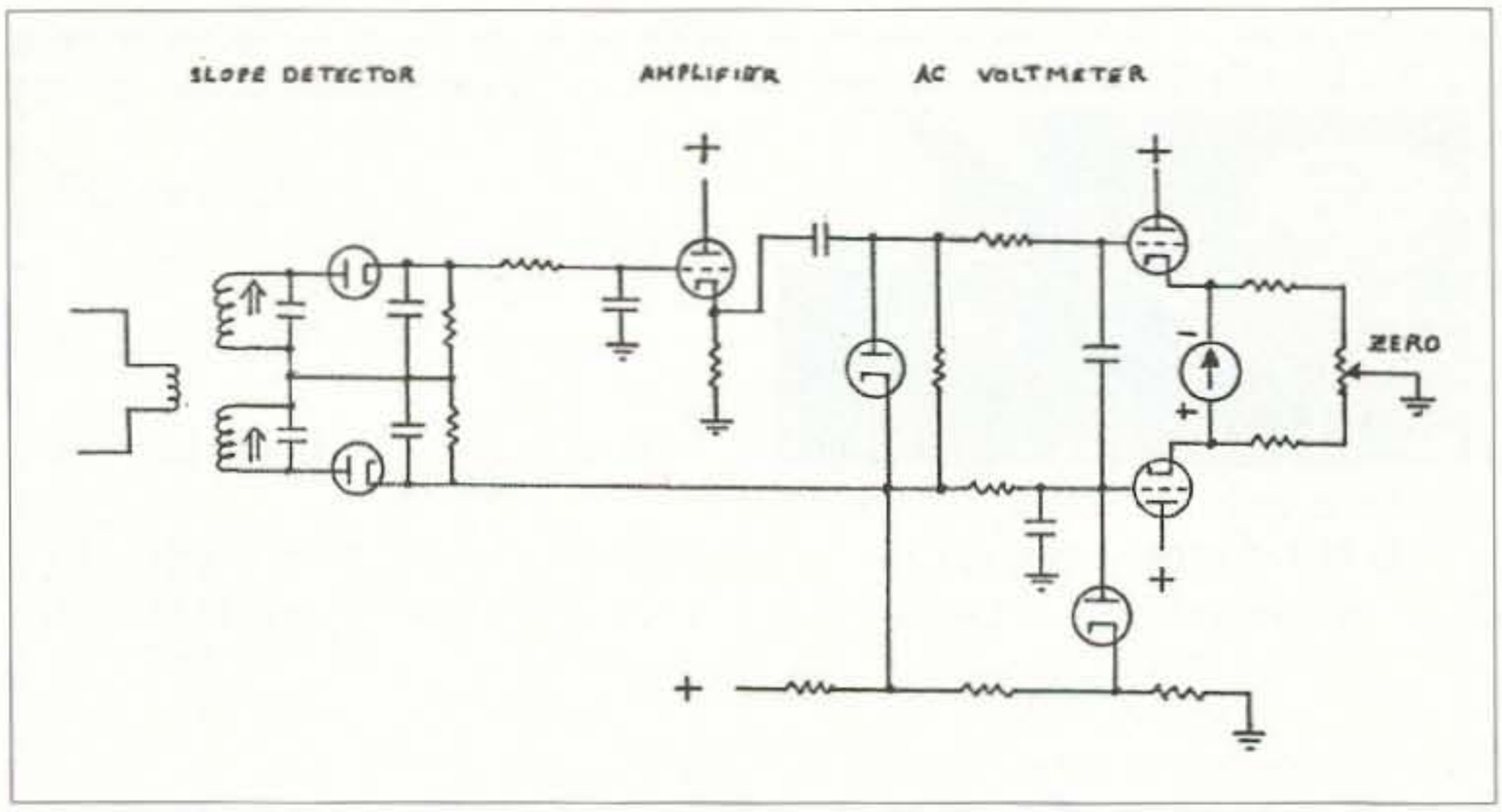


Fig. 3. A detailed layout of the dual-slope detector, amplifier, and AC voltmeter used for making a frequency deviation measurement.

designed to operate on a fundamental frequency from about 26 to 49 MHz to provide a signal mix into an IF of 2 MHz.

To ward off inadvertent signal mixes with weaker signals found on the various bands, the receiver's gain factor is intentionally low. A fairly strong signal is required at the Lampkin's antenna, and one of the benefits is noise reduction that improves the reliability of the measurement. If you've ever opened the squelch of an FM receiver you've obviously heard the white noise that emanates from the speaker. White noise is reduced as a function of signal amplitude and that reduction is important when making a deviation measurement using an FM detector. The objective being to measure the carrier deviation, not display the noise as a factor of deviation.

Referring to **Fig. 3**, the FM detector used in the Lampkin is a dual-diode slope FM detector. In reality, it is two AM detectors offset in frequency such that the combined outputs will produce a linear "S" curve over the desired deviation measurement range. To obtain a linear "S" curve, only a portion of the curve is suitably linear for measurement applications. As shown in **Fig. 4**, the total frequency offset in the two detectors is 120 kHz, and the maximum measurement portion used is 50 kHz (±25 kHz). However, most ham FM systems utilize only the ±5 kHz portion of the curve.

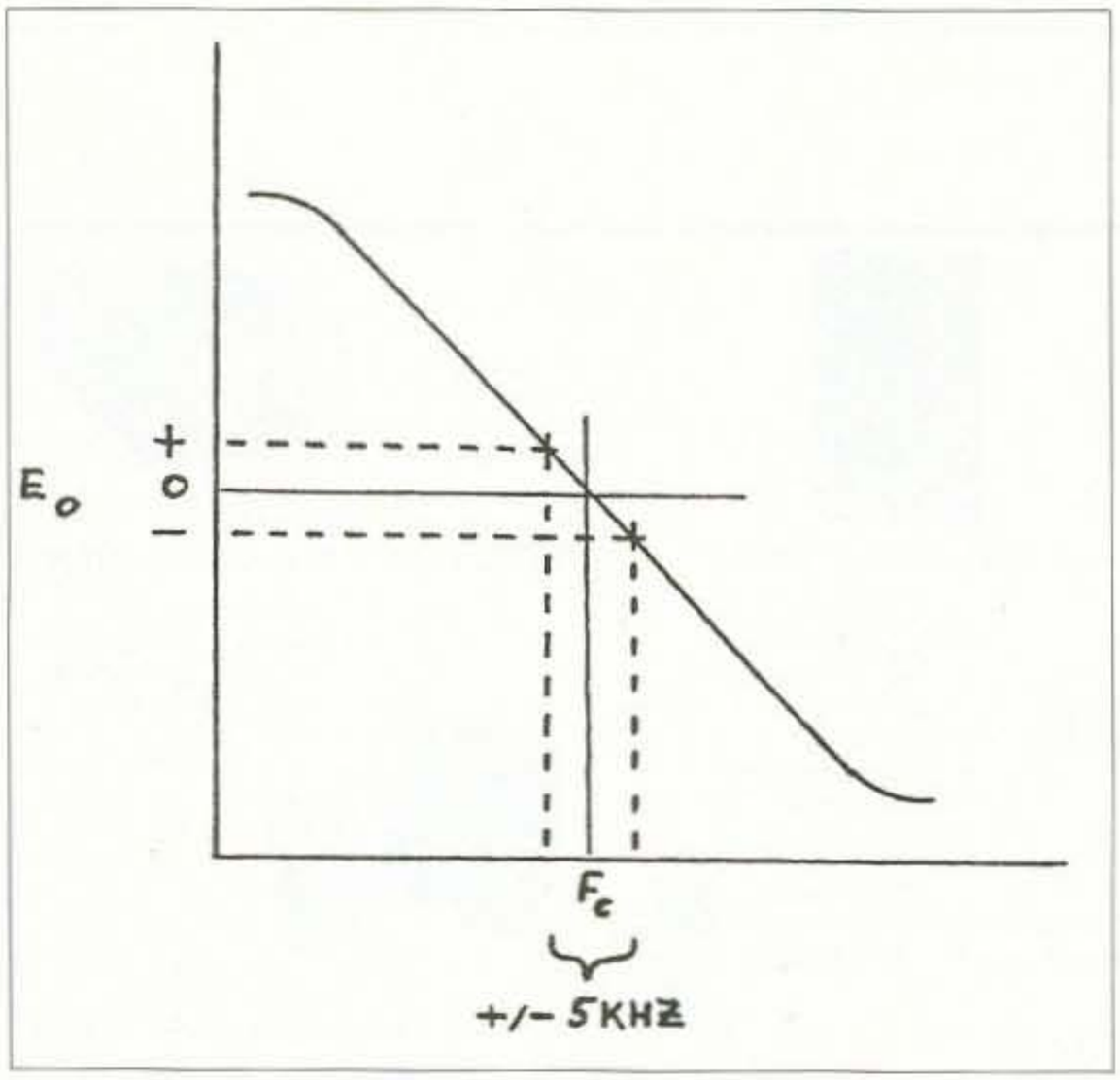


Fig. 4. This is the general shape of the "S" curve produced by the dual-slope FM detector. The curved ends are set at ±60 kHz. A linear deviation measurement may be made at values below 25 kHz.

Apparently there were several models of the Lampkin deviation meter made, with each having the same model number but slight differences in the circuit. Although the schematic shown in **Fig. 1** and the hardware pictured in **Photo B** carry the same model number, the hardware has some slight differences in internal wiring. The schematic matches the ad hardware shown in **Photo A**. The basic model differences are in the measurement scales, where some models are single range while others are multiple range. Otherwise, the operation and capability are essentially the same for all models.

For the age of the instrument, it has a very stable design that was well thought out for the application. As a result, the instrument is well suited for ham radio measurement applications.

Using the Lampkin

Making frequency deviation measurements with the Lampkin is very easy and requires only a few moments of one's time. The important thing to remember is that ample signal must be coupled into the instrument. Coupling is accomplished by close proximity of the Lampkin's antenna to that of the transmitter. With the instrument's selector switched to TUNE MAX, the signal amplitude coupled into the Lampkin should cause the meter pointer to rise to a value of 5–8 kHz, but not exceeding 12–15 kHz, where saturation could occur.

The steps for setting up the instrument and making the measurement are as follows:

1. Warm up the Lampkin for a minimum of 15 minutes to minimize oscillator drift.
2. Press the "quiet" button and adjust the meter ZERO adjustment to achieve a ZERO reading on the meter.
3. In the TUNE MAX position, couple the input signal to achieve a meter indication of 5–8 kHz while adjusting the main tuning dial — any dial setting that achieves the desired signal level is correct.
4. Select TUNE ZERO and adjust the fine tuning knob for a ZERO meter indication. Verify the zero setting by toggling the POS-NEG switch to average the indication.
5. Select MODULATION and speak into the microphone using a reasonably

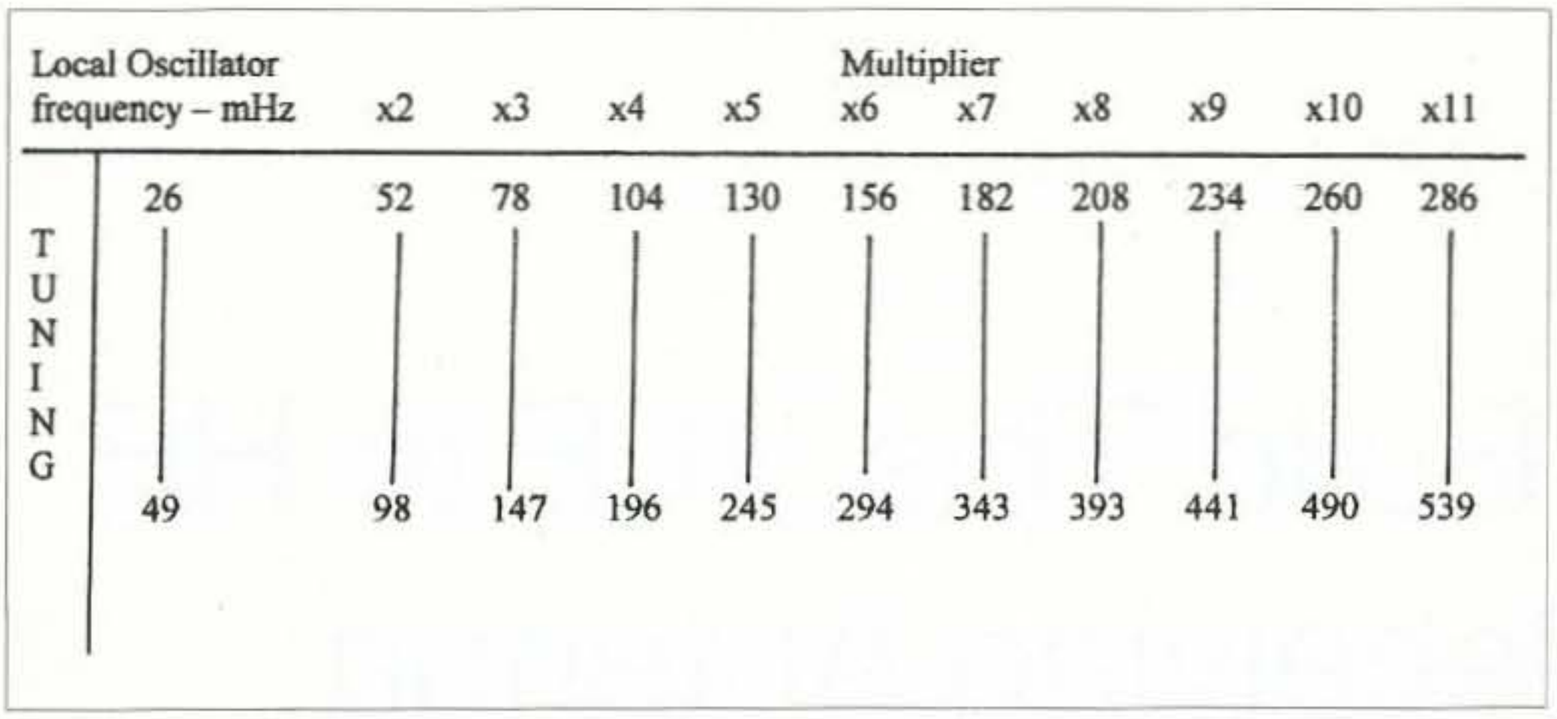


Fig. 5. This chart shows the local oscillator's tuning range with the usable frequency coverage via harmonic mixes. The typical measurement range is from 24–500 MHz.

steady voice note. Observe the meter reading for the indicated peak deviation value.

6. Test complete.

To elaborate on step 3 above, some confusion may occur when using the Lampkin for the first time. Due to the low local oscillator frequency, harmonics of the oscillator will create a number of tuning dial settings that indicate the desired tuning level. **Fig. 5** shows the basic local oscillator frequency and the tuning range covered by the instrument as a function of the oscillator's harmonic. With an IF of 2 MHz, the indicated tuning range will be ±2 MHz of each harmonic frequency indicated. The typical tuning range of the Lampkin is from 24 MHz to 500 MHz. Therefore, when tuning in a transmitter's carrier for step 3 above, it is only necessary to select one of the many possible tuning points on the dial in order to make the deviation measurement.

Setting up and measuring the frequency deviation of a CTCSS tone is fairly difficult with some of the older model Lampkin deviation meters. The later models manufactured accommodated deviation measurements more easily and were capable of displaying a value in the range of 0.5–5 kHz. CTCSS tone deviation is typically within the range of 500–1,000 Hz.

Conclusion

Test equipment by default is desirable only when it's needed to make a measurement. With a piece of equipment such as the Lampkin, it is rarely used unless the operator is involved with frequent equipment maintenance activities. But as a ham, we're responsible for the emissions from our transmitter regardless of who made and/or maintains our equipment. Therefore, it's wise to pay attention and measure the emissions from our gear on a periodic basis. Lampkin FM modulation meters are usually available for a low price, making them a valuable piece of equipment to have included in one's test equipment stable.

The following references are provided for those interested in further study of FM modulation theory and measurement techniques.

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Jack R. Smith K8ZOA
7236 Clifton Rd.
Clifton VA 20124
[JackSmith@cox.rr.com]

YOU Can Build This VLF to HF Loop Receiving Antenna

Part 3 of 3.

Linearizing a nonlinear world: We would like the loop's tuned frequency to linearly track the coarse tuning control. If the loop tunes from 2.00 to 7.00 MHz, we would like the same number of degrees of revolution of the tuning knob to cover 2.00–3.00 MHz as it takes to cover 6.00–7.00 MHz.

If we were using a mechanical variable capacitor, we would use one with plates cut for "straight line frequency." A varactor equivalent of these ingeniously shaped capacitor plates, unfortunately, isn't available. So, how do we approximate straight-line frequency tuning with potentiometer and a varactor diode?

The resonant frequency of an LC tuned circuit is given by:

$$f = \frac{1}{2\pi\sqrt{LC}} \quad [4]$$

where:
f is the frequency in Hertz
L is the inductance in henrys
C is the capacitance in farads

In the loop tuner, C consists of the capacitance of varactor diodes D1–D4, the turn-to-turn distributed capacitance of the loop windings, and strays. (We'll call both of these last two items together C_{stray}).

Equation 5 provides a good fit for the capacitance versus voltage relationship for the MVAM-109 diodes that I used over the range 0.5 volts through 10 volts:

$$C = 8.5 + 447.6e^{\frac{v - v_O}{k}} \quad [5]$$

where:
C is capacitance in pF
$v_o = 1.24$
$k = 2.698$
v is the applied voltage, in volts

If we assume that L is in µH, C is in pF, and f is in MHz, and then substitute Equation [5] into [4], we get [6], the tuning frequency f in MHz as a function of tuning voltage v.

$$f_{MHz} = \frac{159.16}{\sqrt{L(C_{stray} + 8.5 + 447.6e^{\frac{v - v_O}{k}})}}$$

At first glance, equation [6] doesn't look particularly linear. However, it turns out that it isn't too far away from a straight-line relationship, as can be seen in the error plot.

To see if the linearity could be improved, I modeled the behavior of the circuit using an Excel® spreadsheet and experimented with various values of resistance between the wiper on R11 to +12 V or to ground, based upon the 3-turn air loop of 9.3 µH inductance. An excellent tutorial on using resistors to customize pot responses can be found at R.G. Keen's Web page "The Secret Life of Pots," [http://www.geofex.com/Article_Folders/potsecrets/potscret.htm].

A single 3.3k ohm resistor to ground from R11's wiper reduced the tuning error significantly.

Parts availability

A few of the parts may prove difficult to find:

• Varactor diodes D1–D4. I used Motorola MVAM-109 diodes, now unfortunately obsolete. The NTE-618 is a substitute and is carried by major parts houses such as Mouser Electronics, 1000 North Main Street Mansfield, TX 76063; 1-800-346-6873; [http://www.mouser.com]; part number 526-NTE618.

• BN 43-202 binocular core and FR-7 1/2-61 ferrite rod. I found these at Ocean State Electronics, 6 Industrial Drive, P.O. Box 1458, Westerly RI 02891; 401-596-3080; (fax) 401-596-3590; [http://www.oselectronics.com].

• Surplus loopstick. Ocean State Electronics lists an inexpensive 3-1/2-inch, 1/2-inch-diameter loopstick, part number LA-540. I purchased several of these some months ago and measured the inductance as 1140 µH with the supplied coil of approximately 105

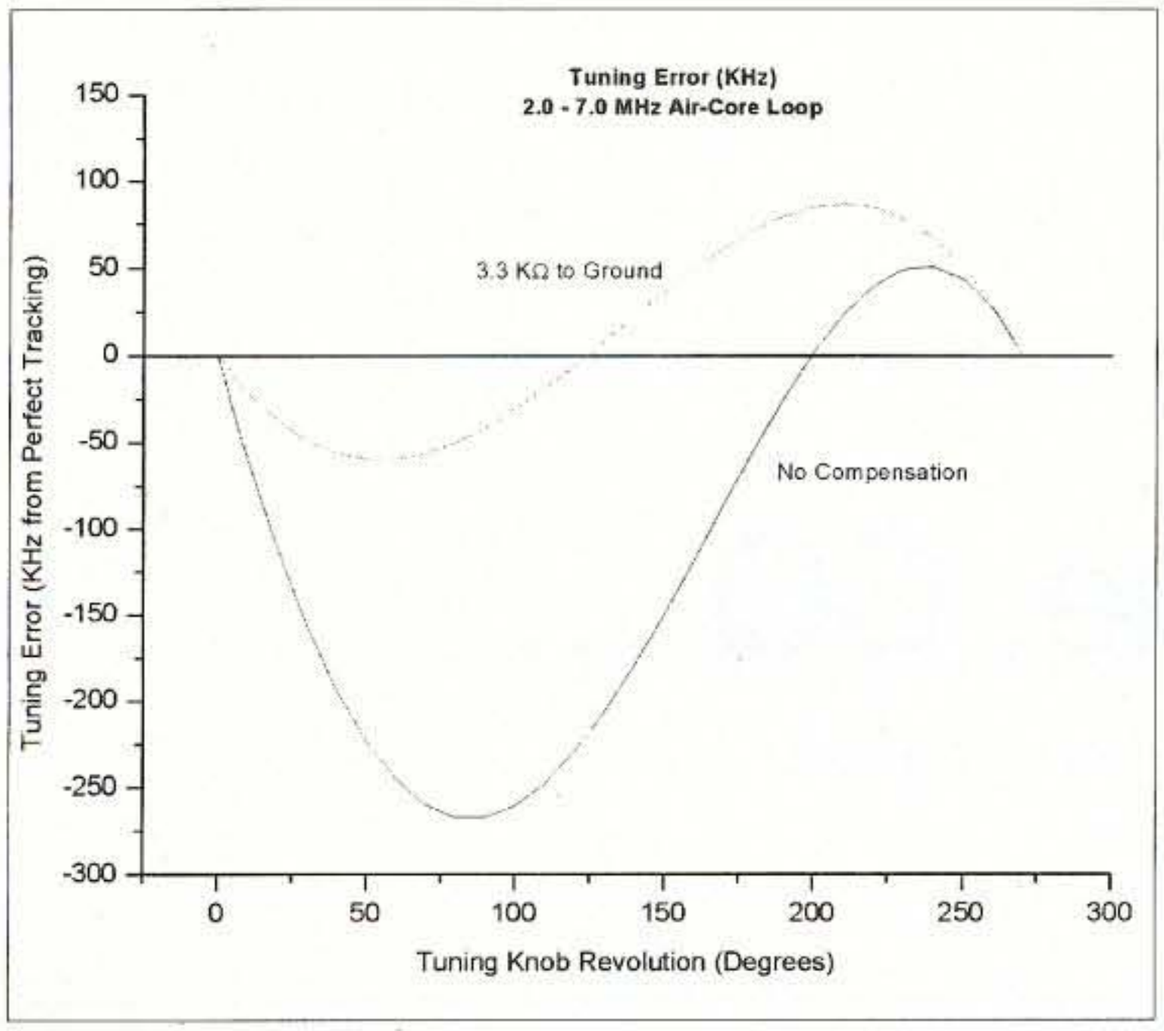

Fig. 10. *Tuning error with and without compensation resistor.*

turns. The approximate tuning range with the tuner is then 97 kHz to 765 kHz, using low and high modes. It would be possible, of course, to remove sufficient turns to move up resonance. (The LA-540 loopstick is not the one referred to in the text.)

• Q-Dope. Ocean State Electronics carries this product.

• Relay K1 is an Omron model G5V-2-H1 with a 12-volt coil. This relay plugs into a 14-pin DIP socket and has contacts optimized for switching low-level signals. Mouser's part number is 653-G5V-2-H1-DC12. Most major supply houses carry Omron relays.

• Printed circuit board. A printed circuit board is available for this project from Far Circuits, 18N640 Field Court, Dundee IL 60118; voice/fax 847-836-9148; [http://www.cl.ais.net/farcir/].

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J.D. Harper K6KSR
8260 Christie Drive
Frisco TX 75034
[k6ksr@earthlink.net]

"CQ Lidsville, CQ ..."

Are you *in one of these QSOs?*

Welcome to the Lidsville Amateur Radio Club net, where you can enjoy complete freedom from tiresome ham radio protocol and FCC compliance. The net meets anytime, anyplace. To find fellow net members, simply scan the band for signals that are overmodulated, severely distorted, and considerably out of band. Then, just check your brain at the door and join the fun!

Hey, we're in luck: There's a QSO in progress ... on 14.145 MHz ...

"Okay, old man, how's my signal over at your QTH?"

"Fine bidness copy, old buddy. Your sig is hittin' my Wisdom antenna just right. We must be in phase with each other."

"Roger that — my rig is phase-modulated. And with my tri-bang beam, I can walk all over anybody — 10-4?"

* * *

"Say, bud, I need an antenna fer my RV. You got any ideas?"

"Roger-dodger. If I was you, I'd get me a G5 — I unnerstan' they're made fer RVs."

"What about a Screwdriver?"

"Don't think you'll need it to set up the G5, but I got one if you need it. You want a regular one or a Phillips?"

* * *

"My beam don't seem to be workin'. Ever' time I rotate it, some signals go away, and others come boomin' in.

"I think it's your grammar match. If I was you, I'd check it fer collusion and oxidation."

"It might be my co-axel cable, too. I ain't waxed it in a while."

"Roger that — that's one way to keep them rotten little es-dubya-r off your cable."

"Oh, double roger that — they just slide right off!"

* * *

"Hey, I tell you 'bout that old guy who jumped on me the other day fer not identifyin'?

"Nope. But I'll bet he was a member of the Frequency Fuzz."

"Well, anyway, this old guy is tellin' me that I gotta identify ever ten minutes, plus during a QSO. So I tells him that I know who I'm talkin' to and the guy I'm talking to knows me, so what's the big deal, I say."

"Right on, old buddy. Whatta they think, we're stupid or somethin'? I'd identify more often, except the dang call the FCC give me is too hard to remember. In fact, the other day this guy came up and asks me, 'Hey, fella, you forget your callsign?' And I got him back real good. 'Yep,' says I, 'I surely did!'"

* * *

"Hey, good buddy, you tell me where I can get me a PL-259–to–AC adapter? I'm fixin' to use my house wirin' for a stealthy antenna."

"That's a tough one — them things is rare. Fact is, I don't 'member seeing one before. That's probly gonna be a special order."

"Maybe I'll just try a Lid-Lashup and go wire-to-wire."

"That'll work. Gimme a call when you test it. I'm lookin' to see how good it works."

* * *

"Talkin' 'bout antennas — you know much about stranded waves?"

"Well, I knowed a couple gals in the Navy what got accidently locked in the beer cooler over to the Hatch Cover Cafe in San Diego... 'bout 20 years ago. You could consider that stranded, hey?"

"Neg-ah-tory, old buddy. I'm talkin' 'bout waves on my antenna feedcable - you know, them spikey things that run up and down your cable and keep your signal from shootin' out the end of the wire."

"Roger that — 'course, I think yer referrin' to standin' waves, which are the ratio of up to down. Now I don't know how true it is, but I heard a fella ham talkin' 'bout how you get rid of them things — some new product called 'Wave Bye-Bye.'"

"Roger and QSL on that, good buddy. I'll see if I can't get me a can or tube or box of that stuff. You know where to get it at?"

"Probly special order."

* * *

"How much power you runnin' over there?"

"Don't rightly know. Don't have a power meter, just a voltmeter and a wattmeter."

"Well, just remember that voltage multiplexed by amps gives you the power."

"Yeah, well, I tried that formulation, but all I get is a bunch of dang numbers."

"Roger that. I wish these manafacters would simplify things with a knob that said, 'low, medium, high, and must-go-to-the-'mergency-room-fer-bleedin'-ears.'"

* * *

"Hey, old good buddy, you got yer amp on?"

"Yep — got my lineal up all the way. How's the sigs?"

"Probly 100 over 9. You're so loud that I had to use my accenuator control or you'da blowed my speaker off the desk."

"I notice that you're crashin' in here, too. I turned my gain all the way down and left the room just so's I could copy you."

"Well, thanks for that report. What's yer 20 BTW?"

"Over here in Murky, Texas. How about you?"

"If that don't beat all! I'm in Murky, too — what's yer street there? Over."

"Lemontree Lane. Yers?"

"I'll be hornswaggled! Hey, Bud, do me a favor — step outta yer shack and look north and tell me what my beam looks like from yer place."

"Don't need to. I can see it from the shack window. Looks fine to me — just up there spinnin' in the wind."

"Roger-dodger, ol' buddy. Hey, you suppose that's what they mean when they say 'eyeball QSO'?" 73

NEVER SAY DIE

continued from page 4

I loved the challenge of working a hundred countries in one weekend. And the challenge of working all 50 states in one night. Of operating from weird places and providing thousands of contacts for DX hunters. Of making contacts through Oscar all over Europe. Of working my home station on 75m from Australia. Of patching DX stations on 20m into 75m roundtable contacts. Well, you've read all that a dozen times, so shut me up with your ham adventures, with stories of the exciting times you've had. Share.

I write about skiing because I want so much to get you to feel the thrill of zipping down a slope. Our language is totally inadequate when it comes to talking about feelings. There's the thrill of scuba diving around reefs. Of being able to go freely up, down, or any direction. It's like flying.

There must be some reason you're interested in ham radio. So, what is it? Share.

Have you got a piece of equipment that's really fun to use? Tell us about it. Make me unable to keep myself from getting one.

Have you gone on a DXpedition and had a ball? Make me jealous. If you haven't yet, how come? There's nothing like getting on from some place and facing a thousand or so ops, all trying to get through to you at once. Talk about king of the hill! You'll never forget one minute of such an experience for the rest of your life.

Get your word processor busy and dump to [design73@aol.com], or send a disk, printout and any illustrations to 73 Magazine, 70 Hancock Road, Peterborough NH 03458.

Share.

Come Visit

Next summer, if you and your family are within driving distance, plan on coming to New Hampshire — and allow some time to visit me and let me share the excitement I get from walking through the pastures of my farm and looking at the unbelievable profusion of wild flowers. I'll even let you buy me a $5 Chinese buffet lunch in nearby Hillsborough. No, I'm not totally 100% a raw fooder yet. More like 90%. Okay, so maybe I'll only live to be 110 instead of 120.

If you subscribe to *NH ToDo* you'll have a long list of things you'll want to do while you're up this way. But at least give me the pleasure of sharing my wild flower excitement with you for a little while. It's an experience you won't forget.

And while you're here, be sure to include a visit to Franconia Notch, where we have the Old Man of the Mountain, the Cannon Mountain Tramway, The Flume, and the Old Man's Foot Basin. Oh, and Clark's Trading Post, with a bunch of old-time music machines. Plus nearby Lost River Caverns. Your family will have a pack of lifetime memories.

9/11 = Big Bucks

Maybe you've read that family members of the WTC victims will be getting an average of $1,185,000, with a minimum guarantee of $250,000, and on up to $4.7 million. And that they're complaining that it isn't enough.

To maybe put that into perspective, family members of American soldiers killed in action get a death benefit of $6,000, half of which is taxable (which puts the net at about $4,500), plus $1,750 for burial costs. Surviving spouses get $833 a month until they remarry, plus $211 per month for each child under 18.

Our beloved Congress, which is responsible for this mess, just quietly voted themselves yet another generous raise. These are the people you have been unable to prevent yourself from re-electing every two and six years. These are the people who voted themselves a $180,000-plus yearly pension benefit, even after only one term in office. A 20-year military retiree gets a $12,000 a year pension.

There are two lessons here: (1) Never Re-elect Anyone; (2) Joining the military these days is an act of monumental stupidity. It's today's equivalent of slavery—with no freedom, little privacy, and not much pay. And, wow, do the food and living standards suck!

The Debt

With all their attention focused on the Enron, WorldCom, and other accounting frauds, the biggest fraud, by a wide margin, has been totally ignored by our semi-vigilant, but carefully blindered media.

Of course, if you ask the president or a congressman how much the federal government is in debt the odds are they'll tell you it's $3.5 trillion. The National Center for Policy Analysis added up the real figures on federal obligations — the stuff that's been swept under the carpet by accounting sleight-of-hand. Like the

$12.9 trillion that's been "borrowed" by Congress from Social Security. Like $16.9 trillion for Medicare. The whole works adds up to $35 trillion, ten times what we're being told. That's $120,000 for every man, woman, child, and Muslim sleeper. Yes, Congress has cooked the books just the way the brass at Enron and WorldCom did. Will we see heads roll? No. More likely we'll see the government printing presses roll out more money, accelerating our inflation to cover their tracks.

Vitamin D

D-which? There's the vitamin D our body makes when we expose it to sunlight. This is the vitamin D our bodies have been making for a million years and depend on. This is the vitamin which helps prevent cancer and a bunch of other diseases. Then there's D2, the synthetic vitamin D we get in supplements, which seems to be of little benefit to us. We need to get out in the sun, the way our ancestors did.

No, it isn't healthy to burn your skin. Just build your tan carefully. Sun screen? NO NO NO! Avoid that stuff like the poison it is. Oh, I haven't gotten you to read Russell Blaylock's book, *Excitotoxins,* yet? Sigh.

Gee, but what about skin cancer from too much sun? It's your diet that does that, not the sun. You need those Omega-3 oils.

A lack of the UV-B rays helps promote cancer, depression, SAD, obesity, infertility, PMS, autoimmune disorders, diabetes, arthritis, fatigue, and so on. So get yourself out into the sun every day and do a couple of miles of fast walking. Hyperventilate to get more oxygen into your system. And no wearing any glasses, either.

You can combine your hamming with your exercise, if you want. I set up a repeater so I could use my 2m HT and make contacts through my home station on 20m. I had a ball talking with friends all around the world while I was doing my daily walks and sopping up D.

Jungle Rot

A note from a Viet Nam veteran thanked me for making him aware of silver colloid. He said that many of the infantry men from the war have been suffering from a recurrent fungus they have called jungle rot. He's tried every kind of antibiotic ointment on the market, plus a half dozen ointments from the VA. None worked. When he tried a weak solution of silver colloid the burning and itching stopped immediately. He put it on twice a day and the rash completely healed.

Speaking of which, I've got a new silver colloid–making kit available. This is item #82 from Radio Bookshop and it includes a 120V power supply, silver wire and instructions. It's $37 via priority mail. You need this stuff to help ward off colds, flu, anthrax, fungus, warts, jock itch, and so on.

Doctors at Work

According to the Journal of the American Medical Association, properly prescribed drugs for properly diagnosed diseases kill over 100,000 patients a year. That's 2,000 per week.

Hmm, hey, guys, what about the death toll from properly prescribed drugs for improperly diagnosed diseases? And deaths from improperly prescribed drugs? Another JAMA report said that half of all prescriptions are either inappropriate or unnecessary.

Then there's busybody Ralph Nader's study which reported 180,000 deaths a year due to hospital negligence.

Plus how many deaths due to diseases caught by hospital patients from other patients?

The next time you bite into a Big Mac or a Whopper, you might mull over these statistics. Oh, did you pass up watching the PBS program on the American meat packing industry? Our national food used to be the hot dog — now it's the burger, made of 49.5% meat, 49.5% fat, and anyone's guess on the other 1%, which includes growth hormones and antibiotics, plus a generous dusting of manure. They're cooked "well done" to try to kill all the pathogens.

Cows no longer graze on grass, they're stuffed with corn in restrictive feed lots. This makes it so they don't have to take several years to grow, but are ready for McDonald's in a year and a half.

The FDA meat inspections? Har-de-har.

Subliminal Messages

Do they work? If so, why?

Researchers have found that visual subliminal messages do work. Audio messages don't. And the reason makes good common sense.

With visuals we have two ways of looking at things … left- and right-brain. We normally read with our left brain, reading one word or phrase at a time at a speed of a few hundred words per minute, while if we learn to read with our right brain we can read a whole page at a time … in a second or two … like looking at a picture. Thus, when something is flashed on a screen, even for a fraction of a second, so short a time that it doesn't make it to our conscious mind, it registers with the subconscious…and can thus influence us.

No, none of those audio tapes being promoted to help people stop smoking or lose weight do any good.

Our Water

Betcha haven't given any thought to where all the prescription and over-the-counter medications go after people take them. Hey, where do you think? The same place products of nicotine breakdown, caffeine, steroids, fecal stuff, insect repellent, detergents, and so on are found … in our waterways and water table.

Lacing our drinking water with chlorine and fluorides doesn't do anything to get rid of the contaminants. Actually, it just makes the water even more dangerous to drink. The chlorine is there to get rid of germs, not to remove used medications.

Gee, do you think that this brew most people are drinking could be linked to the dropping sperm count?

Sperm Counts

Men's sperm counts are dropping. Gee, what a surprise! They've dropped about 50% in the last 50 years and scientists have been trying to figure out what might have caused this.

Is this God's way of limiting the world's population? Gaia seems to be able to self-correct for some problems, perhaps Gaia's doing something. Scientists suspect it's the water.

Our water supply is loaded with PCBs, DDT, estrogen from those birth control pills. One survey found 95 contaminants in waterways across the country. They found the breakdown products of nicotine, caffeine, steroids, insect repellents, antimicrobial soaps, detergents, artificial estrogen, and so on. Yep, and we're drinking that crapola. Well, we are unless we've wised up and are distilling our drinking water.

Check [www.steamdistiller.com] for a $119 still.

Of course that won't keep you from getting loaded with growth hormones and antibiotics when you eat that Big Mac. And there's good reason to suspect that these, too, will be affecting sperm. Same deal with the mass-produced chickens. And eggs. I see where eggs from free-ranging chickens, fed vegetables instead of commercial chicken feed, are going for $4 and $5 a dozen. Hmm, but how many of those veggies are organic, having not been grown in mineral-depleted soil using chemical fertilizer and then sprayed with pesticides to ward off the ensuing bugs?

We've sure made a mess of things by leaving our food supply up to a few giant corporations who have our money in mind, not our health. And then trusting our government

to protect us from these corrupt corporations, who have both our politicians and the federal agencies in their pockets.

It's almost time to start planting your own garden and purifying your water.

Sleeping

Judging from the huge audience listening to the Art Bell show every night, there sure are an awful lot of people who have insomnia. I've probably written about this before, but it's been long enough to do it again. It's Uncle Wayne's way to fall asleep almost instantly. If you haven't any problem with this, and don't know anyone who has, skip on to the next subject.

Okay, here's the easy route to the Nod Land.

The secret is to condition yourself, mind and body. We are creatures of habit, so let's recognize it and start using habits to make life easier for us. Every time, from now on, when you go to bed, get into the same comfortable position. Pretty soon, every time you get into that position, you'll be on an express train to Nod.

Make sure your bedroom is as totally dark as you can make it. Our bodies are hard-wired to sleep best when we keep them in total darkness.

Now, consciously relax your body, one piece at a time. Feel how heavy your arms are. Your legs.

Next, you need to still that racing brain which may be buzzing about something. Think the word "zzzzooo." Over and over … "zzzzoooo."

When I am going to sleep I set the alarm in my brain for when I want to wake up. If it's an afternoon nap, I set it for an hour. Bingo, I wake up within a minute or two exactly an hour later. Your mind will do whatever you tell it to. At night I set my mental alarm for six hours. No matter what time I go to bed, no matter how worrisome the day, I'm asleep in seconds and my mind awakens me six hours later. And this is something anyone can do.

End of today's lesson. Please remember to pay your dues by teaching this technique to any friends who can use the help. And tell 'em about *73*.

Those Pesky Crop Patterns

No, despite some silly debunking, the crop circles, as they're being called, are not being laid down by two old British farmers with nothing better to do. There are reliable reports from as early as 1678 of such strange patterns suddenly appearing in crop fields. Over 9,000 of these often-huge patterns have been recently reported in almost 50 countries, and they've been laid down in just about any kind of crop, including Japanese rice paddies and even snow and ice areas.

The best book I've found on them is *Crop Circles* by Judith Moore and Barbara Lamb. The color photos are superb and worth the $25 price for the 266-page 8-1/2" x 10" book. ISBN 1-891824-32-5. See [www.lighttechnology.com]. Barnes and Noble got me a copy.

No, we still haven't a clue as to what intelligence is creating them. We don't know how or why they're being made, nor can we duplicate the process with any known technology.

It's interesting that crop circle groups have been able to get together and meditate on a pattern, which then turns up the next morning in a nearby field.

Why are they happening? The book speculates at length, but the bottom line is that we just don't know. The book was published in 2001, so it doesn't include the recent replication of the message sent out from the Arecibo dish 30 years ago, with the alteration of the human body depiction changed to a large-headed alien.

This, like UFO sightings, contactee reports, and cattle mutilations, is something for which scientists have no explanation, and thus they're trying to ignore it. Swamp gas. Come on you guys, admit you're totally stumped. Open your ivory tower gate, lower the drawbridge, and at least admit there's a world outside which needs exploration. This is a world into which J.B. Rhine, the Princeton Labs, Dean Radin, and John Mack have ventured with their pioneering work.

Hanky Panky

I wouldn't try to rattle your thoroughly inculcated belief in doctors and the FDA's role in protecting us except for the article in the June 24th *Business Week* on drug research credibility. Or, more accurately, incredibility. Yep, *BW* took a big bite out of the medical advertising hand that feeds 'em.

The drug companies that invent and patent new drugs have to get them okayed by the FDA before they can foist them on the public. And this means they have to get scientists to do research projects. The scientists know that if they come up with negative findings they aren't likely to get any more work from the drug company. And the drug company has no incentive to submit negative project reports to the FDA. They bury them. The FDA does no research, they just depend on the drug companies for this.

The bottom line for all this is right where you know it is. The FDA is in the business of protecting the revenues of the drug industry, not the welfare of the public. As with most things having to do with the government, the public has almost no way to influence what's going on. That's left to lobbyists and their generous drug company benefactors.

Organ Transplants

The only reason anyone needs an organ transplant is because they've ruined the one they started out with. And, unless they make some major changes in their lifestyle, they'll immediately get busy destroying the replacement part. And ditto goes for bypass operations. How are people destroying their body parts? With poisons, stress, lousy nutrition, lack of exercise, lack of sunlight, and dehydration, that's how.

Say When

The government has inched up over the last century from taking 2% of our earnings to a current 47%. It's the old frog-in-the-kettle bit, only we are the frogs.

The result has been that it now takes two people to earn the same relative pay as one used to when I was a kid. One is working for the family, the other just to pay

Continued on page 62

David Larsen KK4WW
Gaynell Larsen KK4WWW
Don Clemens KE4UGF
Kay Clemens KF4EKH
Foundation for Amateur International
Radio Service (FAIRS)
P.O. Box 341
Floyd VA 24091

FAIRS in Dominica

As the saying goes, it was a tough job, but somebody had to do it.

Picture this: A beautiful tropical island, rugged mountains with cascading waterfalls, and a profusion of colorful, exotic plants spilling over garden walls and lining the roadsides. The Caribbean Sea can be viewed from any high point on the west side and the Atlantic Ocean, from the east side. Both are a deep azure blue, with a ruffle of white waves along the beaches.

Now, picture this: You are on this island at the site of the new radio clubhouse in Roseau, the capital of Dominica. It is also up on the side of a mountain overlooking the Caribbean. It has two bedrooms, a bath, kitchen, radio room, conference and meeting rooms. The club has rented this room to you for your vacation and you can make contacts all over the world using either your equipment or theirs.

Photo A. *Dave Larsen KK4WW, director of the Foundation for Amateur International Radio Service (FAIRS), speaking at the DARC ground-breaking and announcing a $5,500 donation on behalf of all FAIRS members for the building project. In the center is the Honorable Reginald Austrie, Minister of Communication and Works for Dominica, and on the right is Clem James J73CI, president of the Dominica Amateur Radio Club. Thanks to the diligent work of Minister Austrie and J73CPL, the DARC is able to lease a land grant of about 1/4 of an acre of land (valued at about $45,000) for the clubhouse.*

Sound like a dream? Well, at the moment it is, but not for long. The ground-breaking for the clubhouse was held on Tuesday, February 5, 2002. It will be located on the side of a mountain overlooking the Caribbean.

The Dominican Amateur Radio Club (DARC) is very active and involved in many community activities. There were about 35 members at the ground-breaking, along with government officials and four members of FAIRS (Foundation for Amateur International Radio Service) from the United States.

The main speaker was the Honorable Reginald Austrie, Minister of Communication and Works. Other officials present were Paul A. Brown, Organization of American States; Daniel T.C. Liao, Chargé d'Affaires, Embassy of the People's Republic of China; and David Larsen, director of the Foundation for Amateur International Radio Service (FAIRS).

During the FAIRS visit in 2001, Clement Pierre Louis J73CPL, Raymond J73RJ, and David and Gaynell Larsen had met with Minister Austrie. He had promised to help secure a plot of land for a permanent location. Minister Austrie has kept his promise, with a land grant of about 1/4 of an acre in an excellent location. About one mile from the ocean — good access — power — water — one mile from Canefield airport, and very close to the capital, Roseau. The club has a 99-year lease on this land, valued at about $45,000, for a very modest annual payment.

The FAIRS goal is to "build global friendship" between people and nations

Photo B. *Some of the Dominica Amateur Radio Club members at a FAIRS gathering in Roseau, Dominica.*

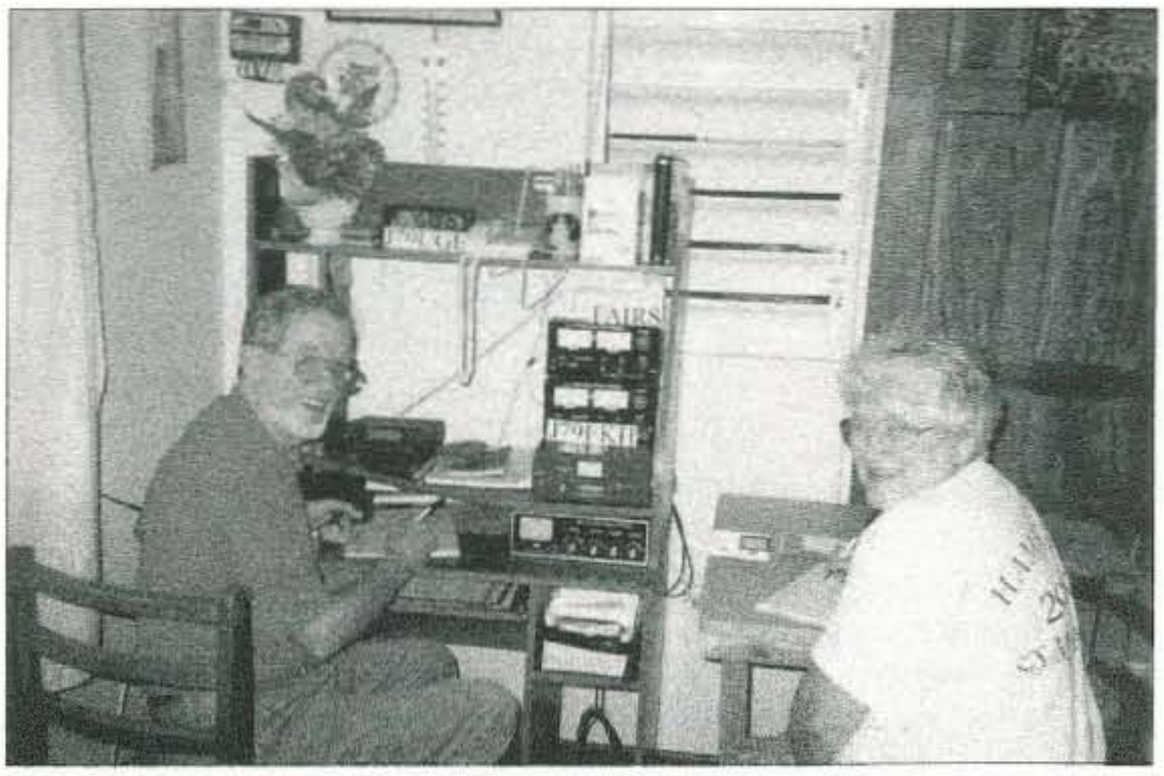

Photo C. *Don and Kay Clemens, FAIRS members operating as J79UGF and J79EKH, at the QTH of Clement and Hetty Pierre Louis. This location in the mountains gives it at least a 20 dB advantage over the stations off the mountain. All who send QSL confirmation cards to N4USA (FAIRS club station) will receive one of our J79 cards in reply. Thank-you, Don, for looking through the logs and confirming all the cards for us.*

Photo D. *Hetty and Clement Pierre Louis (J73HPL, J73CPL) outside their home in Wotten Waven. Clement is Deputy Commissioner of Police for Dominica and also vice president of the DARC. Hetty is also very active in the DARC and has her own beauty shop in Canefield. The FAIRS visitors stayed with Hetty and Clement and really enjoyed operating their ham station and feasting on Hetty's Caribbean meals.*

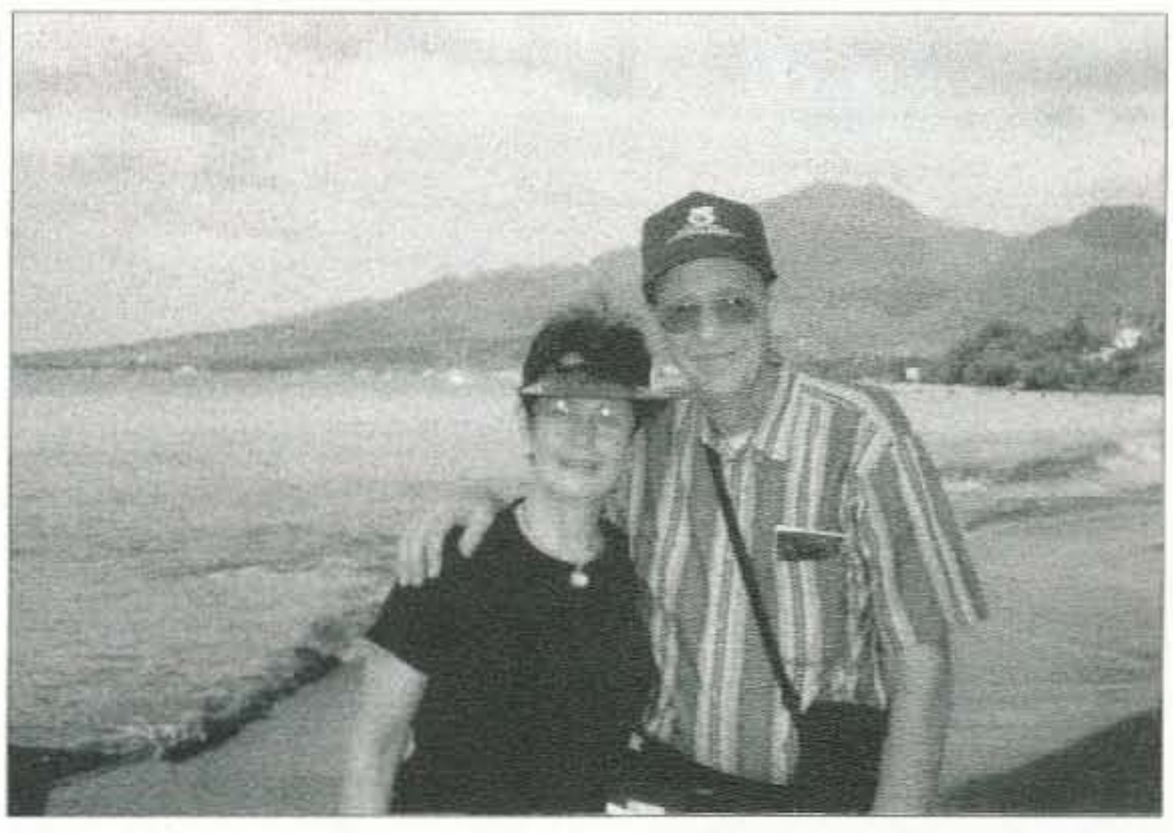

Photo E. *Dave and Gaynell Larsen (KK4WW, KK4WWW), FAIRS directors, near the Caribbean on the west side of Dominica. The whole island is very rugged with mountains and is about 15 by 30 miles in size. A real nature island with beautiful rain forest, rivers, friendly people, and an abundance of tropical fruit and wild life. The Dominicans say that if Christopher Columbus were to return he would find the island just as he did when he discovered it.*

by using amateur radio. At the ground-breaking, David Larsen announced a $2,000 donation, plus and additional $3,500 from individual donors, for a total of $5,500 to assist in building the new clubhouse.

David KK4WW and Gaynell KK4WWW Larsen and Don KE4UGF and Kay KF4EKH Clemens, all of Floyd, VA, have been actively involved in raising funds through FAIRS for several years. This was the sixth visit for FAIRS members to Dominica, during which they have brought radio equipment, generator, handie-talkies, HF radios, antenna, solar panels, repeater battery bank, coax, and lots of tools. They are well-known at the airport.

Now, Dominica has Internet Repeater Link Project (IRLP) capabilities, and they are also up-to-date with two-meter and 440 repeaters across the island and with connections to surrounding islands. Members of the club are very friendly (English-speaking) operators who depend constantly on their handie-talkies for staying in touch with each

Continued on page 59

Fig. 1. *QSL card.*

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 December issue, we should receive it by September 30. Provide a clear, concise summary of the essential details about your Calendar Event.

AUG 31

UNIONTOWN, PA The Uniontown ARC will hold its 53rd annual Gabfest at the club grounds located on Old Pittsburgh Rd., just north of the Intersection of Routes PA-51 and US-119. Start is 8 a.m. Free parking. Free tailgate space with registration. Talk-in on 147.045(+). Table space available. For info contact *Carl WA3HQK*, or *Joyce KA3CUT* at *304-594-3779*.

SEP 7

BALLSTON SPA, NY The Saratoga County R.A.C.E.S. Assn. Inc. will hold its 17th Annual Hamfest Saturday, September 7th, at the Saratoga County Fairgrounds in Ballston Spa. This will be held all under cover, rain or shine. Gates open at 7 a.m., with the hamfest running until 3 p.m. Admission is $5 (includes 1 tailgate spot and free parking). There will be door prizes, a fox hunt, VE exams, and plenty of food. Talk-in on 146.40/147.00 and 147.84/.24. Reserved tables $5 each, first come, first served. Reservations and pre-pay are encouraged. Early setup for all vendors. For further info or reservations contact *Darlene Lake N2XQG, 314 Louden Rd. #84, Saratoga Springs NY 12866;* phone *518-587-2385*. E-mail *[lake@capital.net]*.

SEP 8

SOUTH DARTMOUTH, MA The Southeastern Massachusetts ARA, Inc. will hold its annual flea market on the club's grounds at 54 Donald St., South Dartmouth MA. The event will run from 9 a.m. to 1 p.m. Talk-in on 147.00/.60. Admission $2 (spouse and children free). Food, door prizes, and more. Free space for vendors! For further info contact *Tim Smith N1TI at 508-758-3680*, or by E-mail at *[rt_smith@yahoo.com]*.

SEP 14

GRAND RAPIDS, MI The Grand Rapids ARA, Lowell ARC, and Michigan ARA will co-sponsor a Hamfest at Forest Hills Northern High School, 3801 Leonard St. NE. Hwy. I-96 to exit #38 / Hwy. M-44, north 1 mile to Leonard St., turn right (east). The event starts at 8 a.m. and will run until after 12 noon. Seller setup at 6 a.m. Talk-in on 147.26(+) (94.8 Hz) and 146.52 simplex. Admission of $5 is not required of high school or younger students with a student ID. 8 ft. tables paid in advance are $8 each, non-reserved 5 ft. cafeteria style tables $5 each. Outside trunk sales spaces no additional charge with admission ticket. Friday night overnight parking permitted, no hook ups. VE exams (ARRL VEC) will be held at 11 a.m., all walk-ins. Contact *Ed Novakowski N8UXN [hamfest@w8dc.org]* or *616-458-9029* evenings. Check the Web at *[http://www.w8dc.org/swap.htm]*.

SYRACUSE, NY The Radio Amateurs of Greater Syracuse presents its 47th Hamfest from 8 a.m. to 2 p.m. at the Pompey Hills Fire Dept., Saturday Sept. 14th. Take I-81 exit #15 on to Route 20 East. Go 6 miles to Henneberry Rd. on the left. VE walk-in exams at noon. Admission $5 or 16 years and under free. Large outdoor flea market. Indoor flea market $10 with 8 ft. table, or bring-your-own table for only $5. Breakfast (starting at 7 a.m.) and lunch served. The site is located at 1400 feet above average terrain, so bring your mobile rig and work some DX. Talk-in on 147.90/.30 MHz. Phone *315-698-4558*. Mail to *RAGS Hamfest, Box 88, Liverpool NY 13088*. E-mail to *[ragsonline@hotmail.com]*, or visit the Web site at *[www.pagessz.net/~rags]* for more info.

SEP 21

NEW PORT RICHEY, FL The Suncoast Amateur Radio Club will host the 12th Pasco County Hamfest at New Port Richey Rec. Center, 6630 Van Buren Rd., New Port Richey FL, 9 a.m. to 4 p.m. Talk-in on 145.35(-) rptr. Admission $5, XYLs and under 12 admitted free. 8 ft. inside tables $15 each; electric $5. Tailgate spaces $3 each. You must have admission to enter tailgate or exhibit hall. For info contact *Tim WD8MVU, 727-848-0353*. E-mail *[TRobin@homemail.com]*.

ROLLING MEADOWS, IL The Northern Illinois DX Assn. will sponsor the 50th Annual W9DXCC Midwest DX Convention and Banquet, Saturday, September 21st, at the Holiday Inn in Rolling Meadows IL. Details and registration form are at *[www.w9dxcc.com]*. Friday, September 20th, there will be a Welcome Reception hosted by Carl Smith N4AA and DX Publications. Late Friday, a Hospitality Suite will be hosted by the Northern Illinois DX Assn. Stay late Saturday night for the Hospitality Suite being hosted by the Greater Milwaukee DX Assn. An ARRL Forum and presentations by major DXpeditions will be happening on Saturday at the main event.

SEP 22

NEWTOWN, CT The Western CT Hamfest will be held 9 a.m. to 1 p.m. at Edmond Town Hall, Rt. 6. Exit 10 off I-84. Follow signs. Setup at 7 a.m. Talk-in on 146.67/.17. New equipment dealers, flea market, tailgating, electronics, computers, refreshments. Tables $10, tailgating $6 (each includes one admission). Admission $4, under 12-years-old free. For reservations and info, contact *John M. Ahle W1JMA, 120 Fire Hill Rd., Ridgefield CT 06877*. Phone *203-438-6782;* E-mail *[W1JMA@aol.com]*. This event is being sponsored by the Western CT Hamfest. Thanks to the Candlewood ARA of Danbury CT for this announcement.

SHARONVILLE, OH The Greater Cincinnati ARA annual Cincinnati Hamfest is Sunday, Sept. 22nd, at Scarlet Oaks Vocational School Campus in the Cincinnati suburb of Sharonville OH. Doors open to the public at 8 a.m. Admission $5 in advance, send an SASE; $6 at the gate. Age 12 and under free. Forums include Operational PSK, Old Tyme Ham Radio, ARRL, and more. Outdoor flea market, indoor vendors, food, free parking, radio controlled model car races, hidden transmitter hunts. Talk-in on 146.88 rptr. See *[CincinnatiAmateurRadio.com]*, click on Hamfest link for full details and directions, or contact *Jim Weaver K8JE, General Chairman, 513-459-1661* or *[k8je@arrl.net]*.

SEP 28

HORSEHEADS, NY The 27th Annual Elmira International Hamfest/Computerfest, sponsored by the Amateur Radio Association of the Southern Tier, Inc. and the Chemung County Amateur Radio Emergency Service, will be held at Chemung County Fairgrounds 6 a.m. to 3 p.m. Talk-in on ARAST rptr. 146.70(-) and 444.20. Pancake breakfast starting at 6 a.m. Free flea market, ham and electronic gear preferred. VE exams on the grounds 0900, walk-ins accepted. Dealer displays. Gates will be closed from 12:00 midnight Friday night until 5 a.m. Saturday morning. Plenty of free parking. Bunny hunt. No charge to RVs and trailers coming in Saturday a.m. and going out Saturday p.m. $15 charge for persons staying

on the grounds from 12 midnight to 6 a.m. Advance tickets $5, $6 at the gate. 10 and under admitted free. Make checks payable to *Amateur Radio Association of the Southern Tier, Inc. "ARAST, INC."* Add 55 cents for postage and handling. *Elmira Hamfest, P.O. Box 44, Elmira NY 14902-0044.* Phone *607-738-6857.* For more info, E-mail one of the auto-responders: *[info@arast.org], [hamfest@arast.org],* or *[winterfest@arast.org].* Advance tickets are also available at *Corning Electronics, Inc., 35 Riverside Dr., Corning NY 14830;* or *Tropical Fish Outlet, 2065 Lake Rd., Elmira NY 14901.*

LAWRENCEVILLE, NJ The Delaware Valley Radio Assn. W2ZQ Hamfest, will be held rain or shine, September 28th, at the NJ National Guard Armory, Eggerts Crossing Rd., Lawrenceville NJ. Talk-in on 146.67(-) 131.8. Vendor setup at 0600–0800; general admission 0800–1400. Admission $6 per person, under 12-years-old free. Tailgate vendor $10, includes one admission. Indoor vendor $15, includes one admission. Indoor vendor wall space with electricity $20, includes one admission. Extra tables $10 each. For more info contact *Glenn Costello N2RPM, [abbott0903@aol.com],* phone *609-882-2240.* Visit the Web site at *[http://www.w2zq.com].*

OCT 5

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

OCT 6

MEDINA, OH The Medina Two Meter Group will present the Medina Hamfest at the Medina County Career Center, 1101 W. Liberty St. (State Route 18) Medina OH 44256. This location is just 3 miles west on Route 18 from downtown Medina. Talk-in on 147.030(+). All indoor tables and spaces. Computer equipment, new and used ham gear, ARRL approved. Advance vendors tables $9 each (includes one admission ticket per table). Inside flea market space (includes one admission ticket per space) $7 each in advance. One flea market space is enough room for one 8 ft. table. Two spaces would equal 16 feet. Advance reservations must be received by 09/29/02. An SASE is required for return of tickets. All tables will be held until 9 a.m. the day of the show. Let us know if you have any personal requests. Please send your remittance to the *Medina Hamfest Committee, P.O. Box 452, Medina OH 44258.* Visit *[www.qsl.net/m2m]* for more information. For general questions about the hamfest contact *Mike N8TZY* at *330-273-1519* after 7 p.m., or E-mail *[n8tzy@m3net.net].* For VE exam info call *Fred K8FH* at *440-236-3477.* Walk-ins are always welcome. Testing starts at 9 a.m.

OCT 12

BREMERTON, WA On Oct. 12th, 9 a.m. to 3 p.m., the North Kitsap ARC will host a Hamfest at President's Hall, Kitsap County Fair Grounds, NW corner of Fairgrounds Rd. at Nels Nelson Rd. Talk-in on 146.62(-) PL 103.5 WWRA rptr., or 146.53 simplex. Admission $5, 12 and under admitted free. New and used equipment. Tables $15 each (and one free admission) until 09/30/02; $20 each afterwards. Helpers for renters of personal tables (2 max) $4 each. Commercial spaces $30. Electrical power $2 per table. Contact *Russ Swank KI7PG, P.O. Box 2268, Silverdale WA 98383-2268.* Phone *360-697-6451,* or E-mail to *[nkarc@yahoo.com].* Info available at *[www.silverlink.net/nkarc].*

WASHINGTON TOWNSHIP, NJ The Bergen ARA will sponsor its Annual Fall Hamfest on Saturday October 12th, at the Westwood Regional Jr./Sr. High School, 701 Ridgewood Rd., Washington Township NJ. This is approximately 15 minutes from the GW Bridge and 5 minutes from Paramus NJ. Vendors arrive at 6 a.m. General admission 8 a.m. to 2 p.m. VE exams 8 a.m. to 10 a.m. only. DXCC card checking. Rain or shine. Indoor and outdoor spaces. Lots of parking for tailgating. Admission is $5 donation (non-ham family members free), and vendors $10 per space. Rest room facilities and refreshments available. For more information check the BARA Web site at *[www.bara.org],* or contact *Jim Joyce K2ZO* at *[K2ZO@arrl.net]* or *201-664-6725.* Talk-in on 146.19/.79.

OCT 13

WALLINGFORD, CT The Meriden ARC, Inc., will present the 10th Annual Nutmeg Hamfest & Computer Show, featuring the 2002 American Radio Relay League State Convention, Sunday October 13th, 9 a.m. to 3 p.m., rain or shine, at the Mountainside Special Event Facility, High Hill Rd., Wallingford CT. Exit 15 Rte. 91 (North or South), follow signs. Vendor setup starts at 6 a.m. Inside selling space $30 (booth space with 8 ft. table, and chair). If you reserve and pay in full before Sept. 13th, deduct $5. Outside spaces $20, one tailgate 30 ft. space. General admission is $7. Children under 12 admitted free, but must be accompanied by an adult at all times. Make checks payable to *Nutmeg Hamfest;* send payment to *Andy Purchia N1XXU, 116 Kensington Ave., Meriden CT 06451.* Phone *203-235-8440.* Proceeds from this event will help support public service, scholarship and civic activities. VE exams contact is *Joel Curneal N1JEO, 203-235-6932.* E-mail *[NutmegHamfest@qsl.net];* Web site *[www.qsl.net/nutmeghamfest].*

OCT 20

QUEENS, NY The Hall of Science ARC Hamfest will be held at the New York Hall of Science parking lot, Flushing Meadow Corona Park, 47-01 111th St., Queens NY. Doors open for vendors to set up at 7:30 a.m. Buyers admitted at 9 a.m. Free parking, door prizes, food and refreshments. VE exams at 10:00 a.m. Admission by donation, buyers $5, sellers $10 per space. Talk-in on 444.200 rptr. PL 136.5, or 146.52 simplex. Web site *[www.qsl.net/hosarc].* For further info, call at night only: *Stephen Greenbaum WB2KDG 718-898-5599;* E-mail *[WB2KDG@Bigfoot.com].* For VE exams info call *Lenny Menna W2LJM, 718-323-3464;* E-mail *[LMenna6568@aol.com].*

SELLERSVILLE, PA The RH Hill ARC will host a hamfest at Sellersville Fire House, Rt. 152, 5 miles south of Quakertown and 8 miles north of Montgomeryville. Talk-in on 145.31. VE exams 10 a.m. to 1 p.m., all classes. Bring documents! Indoor spaces $12 (table included), outdoor $6, bring tables. Admission $5. Call the Hamfest Hotline: *Linda Erdman, 2220 Hill Rd., Perkiomenville PA 18074.* Phone *215-679-5764.* Visit the Web site *[www.rfhill.ampr.org].*

OCT 26

RICKREALL, OR Mid-Valley ARES will present its 8th annual "Swap-Toberfest" and Amateur Radio Emergency Services Convention. The Convention will be held on Saturday, Oct. 26th, at the Polk County Fairgrounds in Rickreall. Doors will be open for the convention from 9 a.m. to 3 p.m. the day of the event. Swap table setup will be from 6 p.m. to 8 p.m. Friday night, Oct. 25th; and at 7 a.m. on Saturday morning, Oct. 26th. Self-contained RV spaces available. Talk-in on the 146.86 rptr. PL 186.2. Features include swap tables, commercial dealers, meetings and seminars. Additionally, emergency communications vehicles will be on display from Marion and Polk County Emergency Management, Civil Air Patrol, American Red Cross, and others as available. For more info contact *Dean Davis KL7OR, 503-540-3270,* or E-mail to *[kl7or@arrl.net].* To download a copy of the flyer and pre-registration form (or register online), surf the net for *[http://www.qsl.net/w7oem/swaptobe.html].*

OCT 27

CANTON, OH The Massillon ARC will present their 42nd annual hamfest, "Hamfest 2002" at Stark County Fairgrounds, 305 Wertz Ave. NW. From I-77 N take the downtown exit, turn left (W) on W. Tusc., turn right on Wertz to

Continued on page 59

C.L. Houghton WB6IGP
San Diego Microwave Group
6345 Badger Lake Ave.
San Diego CA 92119
[Wb6igp@ham-radio.com]
[clhough@pacbell.net]

Converting Surplus: Overview Covering Coaxial Relays

Converting surplus equipment has always been a fascinating event, both in the converting and the hunt to locate items to convert. What then do we convert?

Well, we convert the things we can find in surplus, scrounging the scrap dealers and swap meets, looking for candidates upon which to work the fine art of reconstruction, to turn that junk into gold. I am not into collecting old fishing lures or going to sporting events. Maybe I am tweaked towards bias, but professional sports are more big business than sporting events.

A point of view from a test equipment junkie

What gets me up and going, besides my very active grandchildren, is the hunt for a choice piece of microwave surplus material that can be modified into something useful. It would be nice if whatever was located in surplus functioned as is, but then that would take the fun out of the hunt and reconstruction. What then can be found in surplus that seems to be overlooked?

The first major thing that I have observed is coaxial relays, especially the 24-volt-actuated SMA postage-stamp-size microwave variety. Most people shun them for several reasons, with the main one being that they don't operate from 12-volt DC. There have been several articles on how to disassemble these expensive microwave relays and rewind the coil for 12 volts DC. I never did that, as it seemed to be too much trouble. A solution, but not for me. What then?

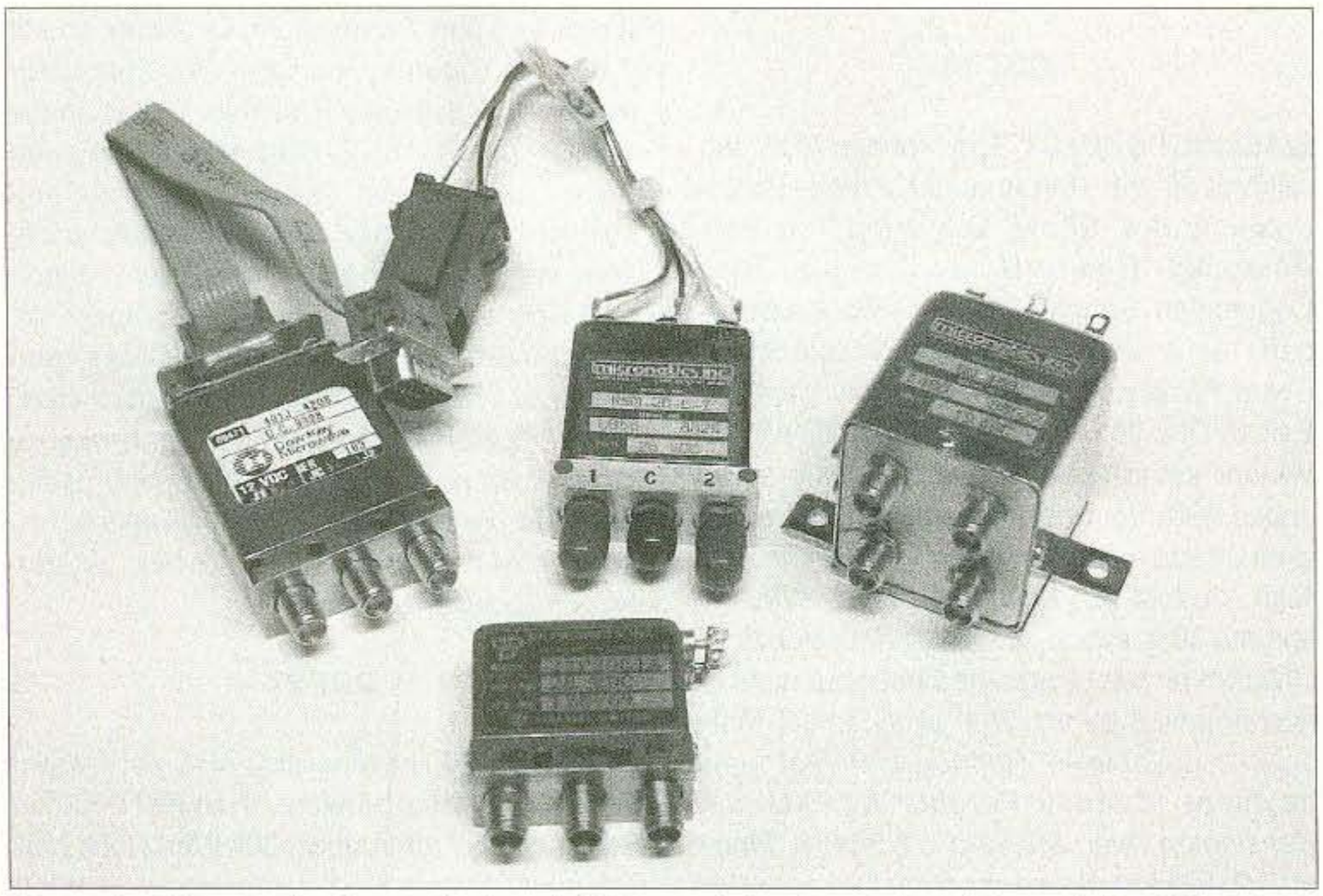

Photo A. *Picture of a few varieties of SMA coaxial relays. From left to right: SMA SPDT latching (left and center top) and a 4-port SMA transfer relay (right top). Standard SMA SPDT 24-volt relay center bottom. All relays rated to 18 GHz.*

Finding a solution

Creating a 24-volt power source to operate these fine relays seemed a project worth taking on. Not wishing to use extra power from batteries for portable operation, main operation from 12 volts was desired for all units constructed. A simple DC voltage booster needed to be developed. In scrounging local sources, I located several DC-to-DC power converters of small physical size that were fully isolated input to output. Of course, if a 12- to 24-volt converter could be located, problem solved. Other alternatives should be explored using other voltage supplies.

A 12- to 5-volt isolated power supply (DC-to-DC power block) seems to be common at most surplus scrap dealers, and can be utilized by stacking the 5-volt output on top of the main 12-volt DC input, creating a +17-volt line for relay switching. Using 24-volt coaxial relays and operating them on 17 volts seemed reasonable. Of 8 relays tested, 4 relays operated from the 17-volt supply. The remaining 4 relays functioned with 19 volts DC applied.

All relays tested in this batch were standard operating relays. DC voltage was applied to switch from Rx common mode to Tx mode. Another type of relay looking similar in physical appearance to the above relay is what is called a "latching" relay. I located some at our local swap meet and purchased the batch. These latching relays were cursed with the old stigma of a 28-volt DC coil. The swap meet seller wanted $5 each for them because wire ends were still soldered to the relays. Such a deal! I counteroffered three for $10 and he accepted, so I took the 6 relays he had.

The relays obtained were Micronetics RSM-2D-L-I type. Without a spec sheet and many no hits searching on the Web for details, I powered them up with my bench supply to test for basic operation and switching contact integrity. They all worked just fine, latching and all. Latching, by the way, means the switch will remain in the selected position even when the DC voltage is removed. To transfer back to its original position another pin needs to have DC applied and it switches back. Again, the DC voltage can be removed and the switch stays in the new latched position — quite a current-saving feature. Nonlatching relays require voltage to be applied all the time the relay is in operated condition. Then when relay voltage is removed, it returns to normal receive condition with no voltage applied. Latching relays require a pulse of DC voltage to toggle to a set state, and no current flows after the latch functions. To go to the other state, it needs a pulse of DC voltage on another control pin and the relay latches in the other state and opens current flow in a new state of operation.

I decided to try the latching relays at a lower voltage switch point and tried 17 volts that I had just used for the other relay tests. All relays latched and switched just fine — no hang-ups or false operations. I set up a simple lamp circuit to watch opening and closure of the SMA relay contacts and finally assured myself that the relays would function not only at 17 volts, but at 12 volts, too.

What a stroke of luck. Every trip foraging through surplus material does not always turn up a gold purse for the search efforts. Many trips turn up nothing. Not to mention trips that did not pan out. If you keep your failures secret, many will think you are a surplus junk man extraordinaire, when in reality what is happening is that a few good trips make up for the many that might have supplied you only with information on new items yet to be received. The early bird gets the worm scenario works here most of the time. If you snooze, you loose. Check out your local swap meets. Lots of dead searches and nothing found, but persistence will pay off, occasionally allowing you to hit the jackpot. It just requires dedication to the search to locate parts inexpensively.

Why, then, was I excited when I located SMA postage-stamp-size microwave coaxial relays? Why not get excited about some BNC or type "N" connectorized coaxial relays? Well, being into microwave operations from 1296 MHz to 10 GHz, it is my opinion that the SMA relay rates

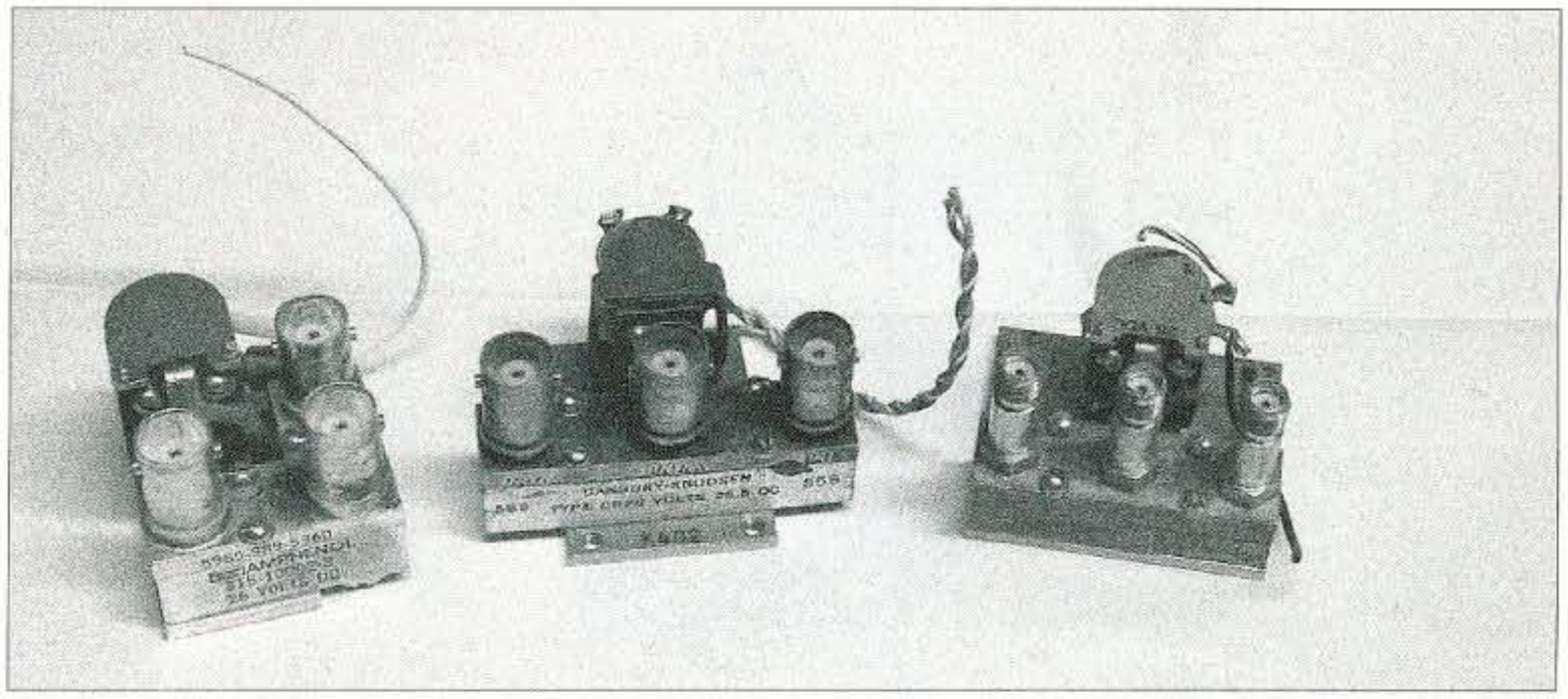

Photo B. *Picture of high-loss BNC relay not usable at 1296 MHz (center top), better suited for low frequencies like 50 or 144 MHz. An early SMA version of a better-than-BNC relay, but still not top performer above 1 GHz, is at far right.*

supreme. They are small, low-profile switches that use a microwave-rated miniature connector. They have been tested to have only a few tenths of loss through the relay contacts and most will handle at 10 GHz, 10 watts of power. It's very important when generating power at microwave frequencies as it is precious and you don't want to give it up to excess loss in components used.

Let's take the common BNC coaxial relay found in many surplus shops and equipment stores, and look at a recent conversion I checked out for performance. The unit I tested used four BNC relays constructed in a 1296 MHz transverter. The four BNC relays in this converter design switched a 1-watt power amp in and out of the circuit and then switched the receive preamplifier back into the antenna after the transmit relays released. I tested the circuit performance and found that I could only get one half of a watt output on the antenna connector and sensitivity was low in receive. Checking loss through the relay contacts, I found that each BNC relay and associated coaxial cable and connectors contributed about 1 to 2 dB of loss at 1296 MHz.

I tested the BNC relays at 2 meters (144 MHz) and found that the loss was a few tenths of a dB. Not wishing to add relays for VHF use to the junk box, I dumped them. When I checked a large "N" connector–type relay, I found a few tenths of loss at 1296 MHz and good isolation between the switched side and open port of the relay. However, I did not want to use a relay as large as the "N" connector unit and thought it would be better to shift them from high power applications for HF to low microwave frequency use. The SMA relay still reigns supreme due to its very low loss miniature size and great isolation between ports at all microwave frequencies from DC to 10 GHz. Some premium types are rated to 26 GHz.

After rebuilding the 1296 MHz converter and removing all the BNC relays, I was able

Photo C. *Picture of large, high-power "N" connectorized on right, and SMA version of same relay on the left. Both rated to 2 GHz for reasonably good performance. Just large and high-power.*

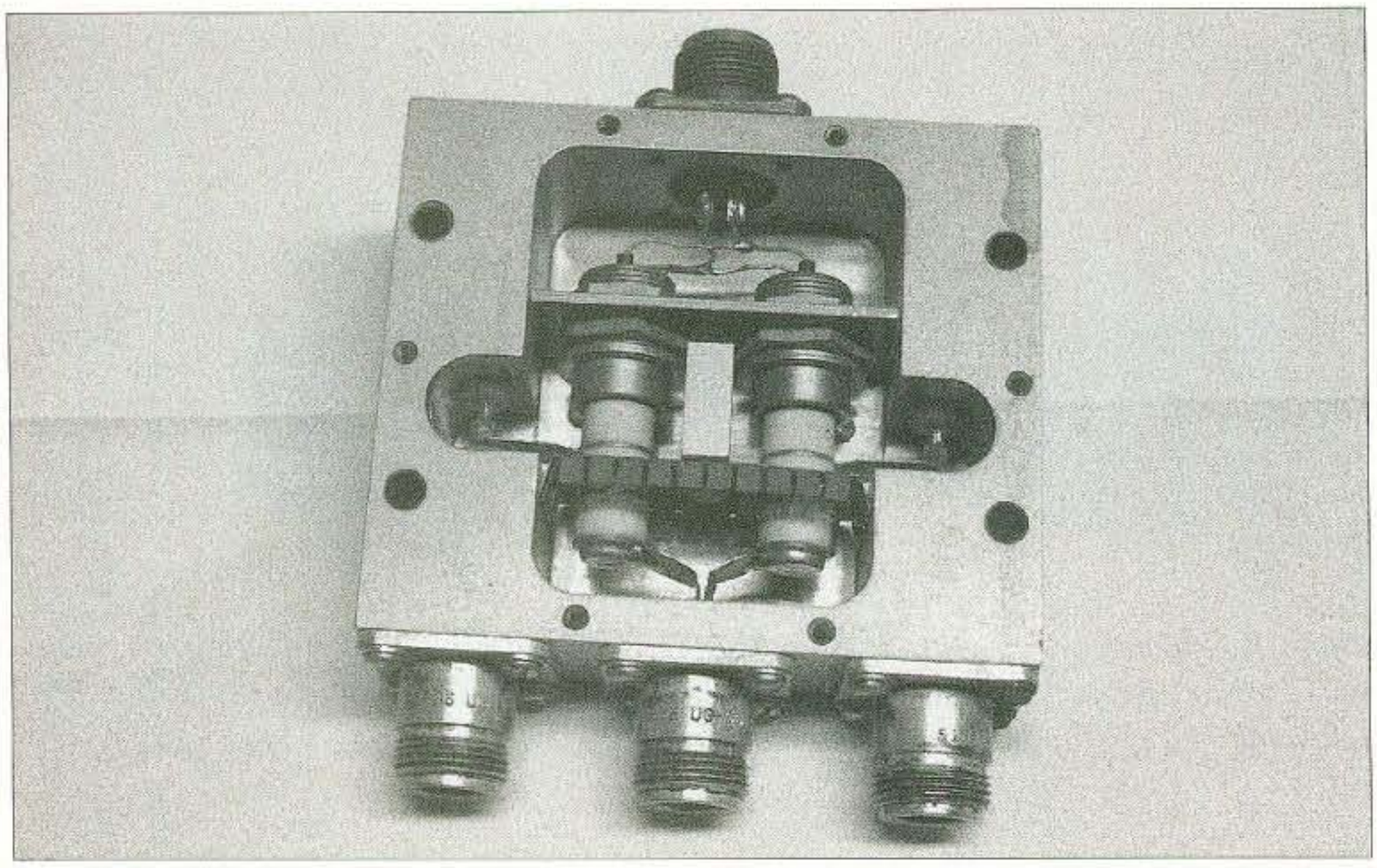

Photo D. *Very high-power coaxial switch constructed with vacuum relay contacts for very high-power handling RF switching capabilities. These types of relays use vacuum switch contacts and solenoid driver coils, which are totally replaceable. Photo with cover removed shows the white ceramic body of each switch element for a single pole double throw (SPDT) coax relay. This coax relay is getting high-tech and very high-power.*

to improve the receive sensitivity some 4 dB on transmit and now have 1.2 watts of power output on the system. Removing the BNC relays and their high switching loss did the trick. By changing the circuit's switching configuration I was able to use only one SPDT SMA coaxial relay to do all the switching. I deemed it was not necessary to switch the preamp and power amp, and let the coax switching take place on preamp in and RF out to the antenna. With the old design using BNC relays, the isolation between preamp and the power RF amplifier would have been very poor and possibly destroyed the RF preamp if switching were done with a single BNC relay. Isolation at 1296 MHz with the SMA relay measured in excess of 30 dB loss between the switched side of the relay and the nonswitched side.

The bottom line with RF coaxial relays is to pick up what you can for your projects but have a handle on which type will better serve your application and frequency of operation specifications. Yes, the SMA connector is the best choice for microwave frequencies. Power specifications roll off as frequency is increased. I haven't observed any real problems running 10 watts of power at 10 GHz. I would not try to push ratings and go for the maximum power, as I am a conservative user and believe in not pushing the maximum envelope. Do I use an SMA relay for switching the 1 and 5 watt amplifiers described in last month's 73 Magazine column? You bet! SMA forever.

Some general rules on SMA coaxial switches are: (1) Small size can handle higher power levels, with some manufacturers claiming several hundred watts at VHF and derated in power at 10 GHz to the 20-watt range. (2) Isolation or crosstalk between open and closed side of the switch is rated in dB and can be as great as 50 dB in some relays. These are maximum ratings for certain types, and I recommend not pushing any device to its maximum ratings.

"N" type relays are rated in the 500- to 1,000-watt range at HF/VHF and are reduced in power to the 50- to 100-watt ranges at frequencies of 2 to 3 GHz. Typically, they are large in size and can be outfitted with SMA connectors as shown in **Photo C**, if you look close. I don't try and push ratings, and I reserve this type of relay for HF to 1296 MHz high-power rigs.

Photo E shows the largest coaxial relay in my collection. It weighs in at 7 pounds, and that's without connectors attached. It's made for very-large-diameter one-inch helix cable for industrial high-power switching. A centerpiece to be sure of, or a great door stop if you're not into very high-power relays.

BNC and related UHF connectors and associated relays are better left for 2 to 30 MHz for the purist. Yes, I know they are used at much higher frequencies, but compared to "N" and "SMA" types, the BNC and UHF connectors are left in the dust. If you locate a relay and want to determine its ratings, try searching the Web for its original manufacturer. However, it might be difficult, as most companies have merged or just gone away.

As with all projects, and especially amateur microwave-related items covering this coaxial relay application, I will be glad to answer questions. Drop me a note on E-mail to [wb6igp@hamradio.com].

Well, that's it for this month. Coming up, I will be covering usage of microwave attenuators, detectors, and other coaxial test devices. 73, Chuck WB6IGP. 73

Photo E. *Now, just when you think you have seen everything, here is a coaxial relay, with connectors, that weighs in at seven pounds. A short section of coax cable is attached with connectors on each end, contributing a half pound. Consider this relay in the multi-multi-kilowatt level. Shown with smaller "N"- and SMA-type relays for size comparison; miniature SMA shown center front is 1-inch square.*

Jack Heller KB7NO
P.O. Box 1792
Carson City NV 89702-1792
[KB7NO@worldnet.att.net]

Digital Imaging and SSTV

There are, I am sure, many of you who fall into my way of thinking about the written word. After all, that is much of what this digital communications is about. We sit down and type in a lively fashion to each other as a simple matter of course. Many of us spend very little time with voice communication. Even those who practice the art of CW without the help of the modern software either manually or mentally write the encoded message.

If you will bear with me for a paragraph or two I will tell you a few recent experiences concerning this month's subject. Many of you will recall some references I have made to the WinLink2000 E-mail system used by RVers and maritime hams to keep in touch when away from their home base.

A few months back, one of the boosters of that system came to town and we had a pleasant chat here in the shack. Cliff KD4ZPB and his better half, Virginia, travel the continent full-time in their fifth wheel and, of course, are users of the WinLink2000 system.

While Cliff was here, I was demonstrating some of the other digital modes available for the use of hams, and realized this was the first time he had seen SSTV. At least, it was news that it wasn't something relegated to UHF as is ATV (real time moving pictures).

This put a little bug in the back of my head. There are probably a lot of you folks who are all set up on the soundcard modes who have no idea how much fun you are missing out on by not sending and receiving images.

This comes a little closer to home when I receive requests for recommendations for PSK or RTTY, and then the correspondent includes SSTV. I wondered about this a little. The reason seems tied to the fact that the recent digital explosion has brought back many inactive hams who at some time had at least a passing interest in SSTV along with the modes they were running on some other hardware called a TNC.

This falls together when you realize that it wasn't too long ago when SSTV required its own hardware. Now, as I said, if you are into PSK you are just about there for SSTV as well. The only little extra needed is to get the microphone so you can shut it off when you transmit an image. And that means is available with many of the commercial interfaces if you don't want to roll-your-own switching system.

The reason I mention the mic problem is that any shack audio, especially digital tones from your computer speakers, really screws up the image you are transmitting if you don't shut the mic down. The other side of the coin is you will need the mic when working SSTV because, in normal cases, you will be using SSB communication in between the image transfer process periods.

So, what I am saying is, if you are doing digital soundcard communications and want a little extra color in the shack, you are probably only a switch away from that capability. Speaking of color, I have a description I use for SSTV images in general when I want to explain what it is akin to. I simply state it is much like a color fax.

I have never seen a color fax machine and do not know if they exist, but the time spent to send a regular fax over the phone line and sending a color image over HF is similar, but the quality of the SSTV over a good path is a thrill to experience.

What brought me to revisit this subject is the XYL (Janet) decided it was time to get me a digital camera. I suppose it was due to a number of hints about "bargains" I was seeing and the fact we were already able to print good quality images on glossy paper from our HP color-sprayer-type printer. It is a very good printer and was reasonably priced a year or two ago. I see printers devoted entirely to this process but this one is very adequate and does all we demand of it.

Janet picked out one that was in the $250 range and asked me to check it out. I was of the opinion that was a few dollars more than necessary, but it proved to be priced about as well as could be and was locally available, so the purchase was made.

The learning curve was not too bad. The settings are available by reading an LCD screen on the back and are fairly intuitive. The packaged software allows an ease of printing multiple images on one sheet of paper. And that is about the best I can say for the included software. Any real editing is best done by other software.

The other software can be whatever you prefer. There are some really great programs out there at numerous hundreds of dollars and they are mostly for the professional art folk who have some distinct needs.

I have a $100 program named Paint Shop Pro. I have version 6 and understand there is a version 7 available. I don't know if I have any reason to upgrade. The "wimpy" version I have does all I can understand, doesn't crash and the results are excellent. Think I will stay put.

What I learned

There is a lot to get under your belt (but it is really easy) if you want to process images and print them at home. The first images we snapped needed some retouching because we were trying too hard to give this thing the "real test." It was necessary on the first batch to learn it all at once.

This was okay, but if you will just not get so serious with your digital camera, you can simply use the included software package and send images out to your compatible printer with the glossy paper loaded and the results are quite good. Subsequent batches have proven that for me.

One important phase of the learning curve had to do with what I call resolution, or quality, or as the camera folk insist, simply

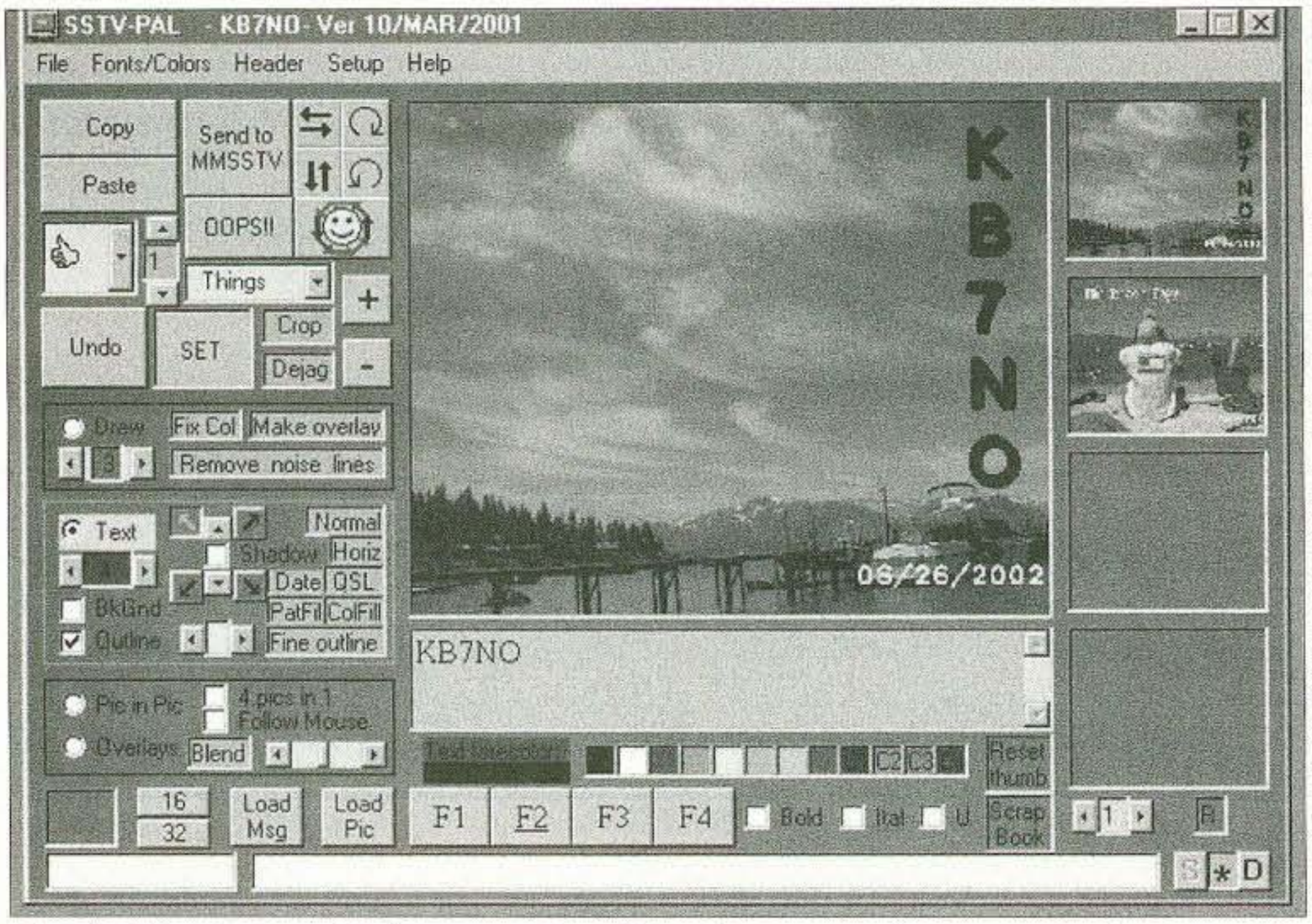

Fig. 1. *SSTV-PAL — This freeware editor does almost everything you want from a graphics program. One thing makes it better — it is designed for the ham who does SSTV. It comes with a help file and, even more helpful, if you click Tooltips ON in the Help menu the program is very intuitive. That is, you move the cursor to a button or pane and instructions display immediately to guide your work. The program is excellent for on-the-fly edits such as inserting your callsign or any small message. Simply type it in the box where KB7NO is displayed and left click on the image and your text is inserted at that point. One click on the little box that says "Horiz" and the text can be toggled to horizontal. Another click and it is vertical again. See article text for file handling, font selection, cropping, image enhancement and returning quickly from goofs. More tricks available than can be explained in one article.*

megapixels. They could get a little clearer on this subject but I think they fear drowning us with facts.

What I find is this camera claims 3.1 megapixels. Its only format is JPEG and the images import into the computer at 72 pixels per inch. This can lead to a very grainy image under some circumstances. However, these images measure 30 inches by 20 inches when inspecting with the real graphics program. No one (practically) is about to print anything this size.

What you usually print is something in the range of 4x5 to 8x10 inches and you use the entire image which then is squeezed down to fit and the pixels per inch increase handsomely. You have good resolution as long as you play by the camera people's rules.

If, on the other hand, you crop (trim the excess) down to a small portion of the original image and print, the result lacks all those extra pixels you just X-ed out and can become a bit grainy. This is especially true if you take that small remaining image and blow it up to an 8x10.

Fortunately, not much of that kind of editing is done with images you want to send via SSTV. The SSTV programs we have available handle these large images similarly to the print options I was describing and the resolution is excellent.

To be honest, unless you have a terrific path, the noise lines in your received image can be much more annoying than a grainy image. Don't get me wrong. You will, on a good day, be amazed at the quality of images you can receive on SSTV.

Now for the fun and the free stuff

What makes SSTV a lot of fun is the editing you can do before you send the image. There is some great software available to accomplish this. In reality, you can get along just fine with most digital images once they are in your computer with a couple of free software packages made especially for SSTV.

Importing the digitized images to your hard drive can be a challenge. One reasonably priced method is to use one of the low-cost flatbed scanners available these days. Somewhere in the $100 area will get you a fair to middlin' scanner that will suffice to scan photos that you feel are interesting. There are cheaper digital cameras than the one I just got that will do the trick. I see some in the $150 bracket that are good enough for the job.

Incidentally, the price keeps going down on cameras as the technology improves, so it is not a good time to buy top of the line. One of these days the technology will improve so you can take a shot of that small child when it smiles — before it simply walks away from the camera as the current technology makes up its mind to snap the shot. I think that is a few years away, so in the meantime, be satisfied to take more predictable, nearly still shots.

The cameras available today will stop an action shot just fine. I did that with a granddaughter who was running across a field the other day and it was not blurred, she was simply about twenty feet closer when the camera finally decided to capture the action.

You will need a method of inserting your callsign and or comments and other minor amendments to the images. I have found the SSTV-PAL program does this very well and it is a marvelous freebie available from [http://users.origin.net.au/~crac/].

This is a terrific little program that works with several SSTV programs including MMSSTV, another freebie, which you can find at [http://www.qsl.net/mmhamsoft/].

With this arsenal of software and a few digital images on your hard drive along with the "normal" lash-up for PSK or other digital modes (and the aforementioned mic switch), you are about in business to have some fun with SSTV.

The process

Since a lot of the steps to making images ready involve file retrieving and saving, I will run through this process as it works here, hopefully not belaboring a mundane subject. But it may be helpful to some who need help in this area.

I have only downloaded images from two different cameras into a computer, so I have not seen them all. However, that is one of the parts that is usually easy. The step that can become difficult is finding them when you want to import them into some editing program and/or your SSTV communications software.

The camera I am using is a Kodak and it states in the user's manual (in fine print) that the images will automatically be stored at [C:\Kodak Pictures] and sure enough the software supplied by the camera manufacturer creates a folder named by the date of image file download and inserts it in the Kodak Picture's directory. Easy to find thereafter for your export to your special editing purposes.

Fun part begins

I just downloaded a set of images from the camera that includes a shot of Lake Tahoe with some interesting cloud formations and wanted to see what the camera would do with those, so we will work with that image. I brought up the SSTV-PAL program to edit the image.

In SSTV-PAL I clicked "Load Pic" in the lower left corner and this caused a file structure tree to pop up in the lower right corner of the program display. Clicking on "C" got me to a default directory for SSTV-PAL which was not where I wanted to go. So I clicked C again and the C root directory displayed and then I merely needed to scroll down to the Kodak Pictures folder, double click on that, and the folder with the appropriate date displayed.

Since all the files are in the .jpg format, it was necessary to click the little JPG box next to the directory display and the images were displayed by number. One step I left out was at the very beginning. I had viewed this dated folder in the Win98 Explore mode and identified the image by number. That is easily done because Win98 graciously displays images as you click on the file numbers. That is how I knew which image number to bring into SSTV-PAL. Double clicking on an image file imports it.

With this image, all I wished to do was add my callsign. Many other effects and changes are possible. To do this, I clicked "Exit Pic" to remove the directory display, and then "Text" which is about a third up from the bottom on the left margin.

This brought up an intuitive gray box directly under the image. Intuitive I say, because the default text in the box says "TYPE HERE." You delete those two words with your cursor and delete key and type in what you want. In this case, it was simply my callsign. Below there, you may choose the color for your text.

All that is necessary to get the text in place in your image is to position the cursor and left-click. Could not be any quicker or easier. Plus, once you have discovered how easy it is to place the text in the wrong place, you have a couple of options to remove it and try again. Right click will do it, or the "OOPS!!" button will also remove the last change you made. A little experimenting is fun and doesn't cost a penny.

You may be wondering how to change the type size, etc. Simple enough, but I had to read the Help File. Simply right click one of the F1, F2, F3 or F4 buttons below the color selections and your Windows Font menu will appear. Then you can choose a font from whatever you have available and adjust the size while you are at it. Also, to the right of those buttons, there are the options for bold, italic and underline.

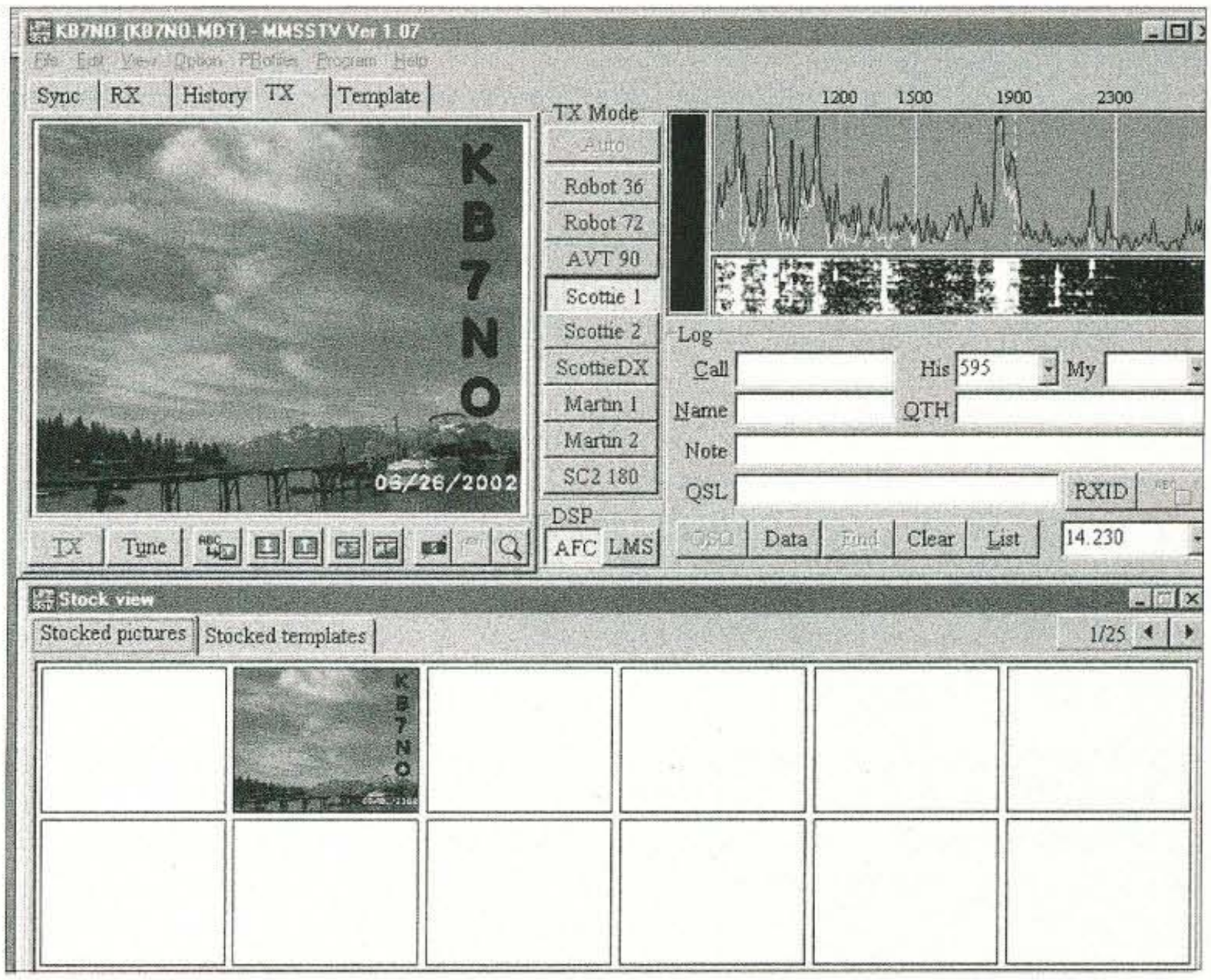

Fig. 2. Ready for Xmit. This is the freeware MMSSTV with the edited image as it was sent from SSTV-PAL. This program is an excellent package for the ham who is using the soundcard communications software for PSK and other such modes. If you are already doing PSK, you are ready except for switching your mic off while transmitting images (see text). If you have not yet experienced SSTV, reception is easy. Simply download the software, install it and tune to 14.230. Those strange warbles will suddenly become pictures right before your eyes. That's about all it takes to give you the bug!

More quick options

This little editor gives you so much power you might be tempted to use it for all your graphics editing. It does have some limitations, but if you have no other graphics program it is pretty darn good once you discover the possibilities.

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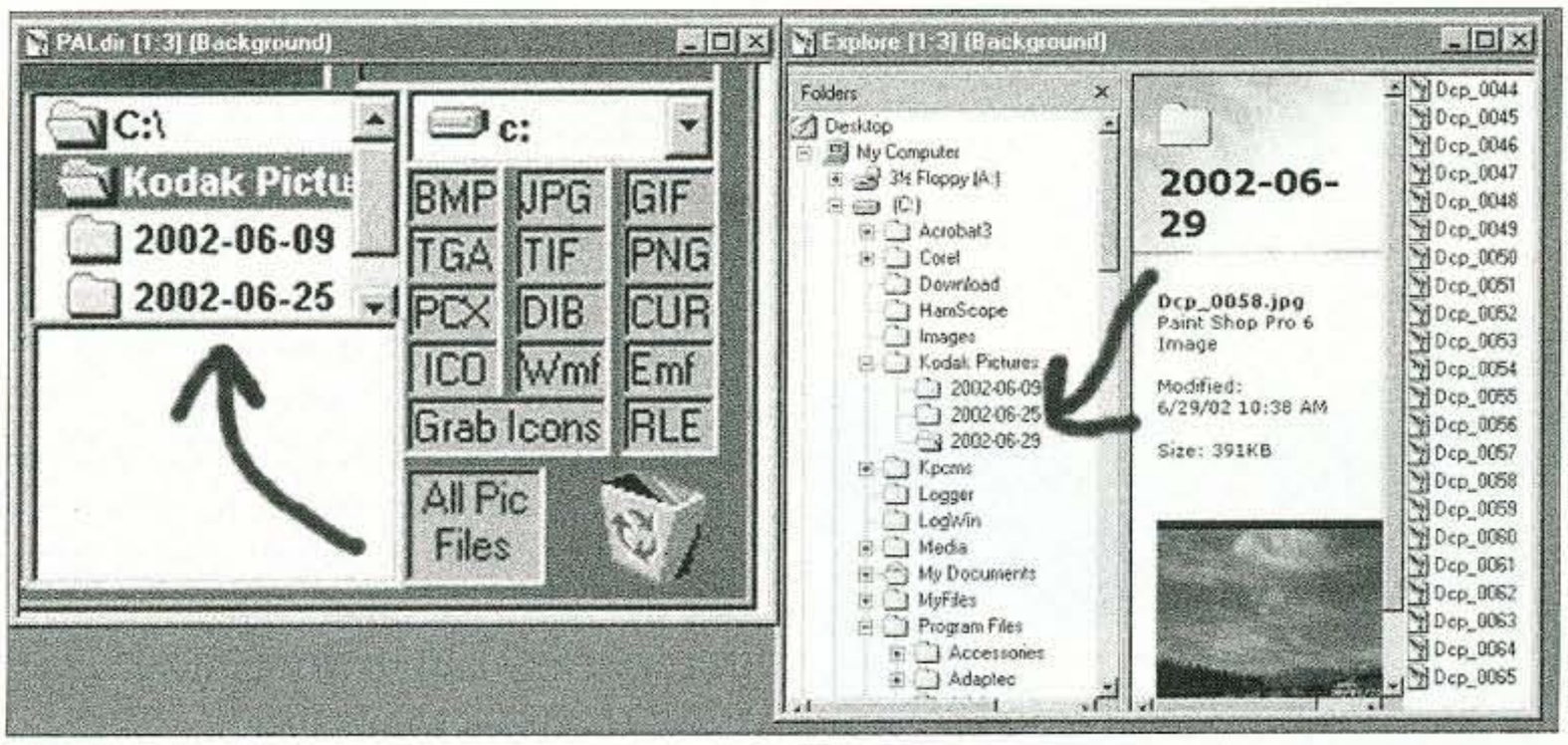

Fig. 3. File import with SSTV-PAL — This is a composite of the little corner of the SSTV-PAL displaying the directory tree and the Windows Explore tool doing the same thing. Though the display on the right is more detailed, you can see they are really finding the same location. Just as an aside, I drew these arrows for emphasis, but the real reason, is this is something you can do with the SSTV-PAL software. Drawing with a mouse is not my best art effort but, again, if you goof, removal is only a click away. Just another fun thing to do with your images. The more toys you learn to play with . . . Fill in the blanks.

Amateur Radio Via Satellites

Andy MacAllister W5ACM
14714 Knights Way Dr.
Houston TX 77083-5640

Field Day 2002

It was the best AMSAT Field Day since the days of AMSAT OSCAR-13. It was also the first Field Day for AMSAT OSCAR-40. Numerous stations in North America were expecting great things from AO-40. They were not disappointed.

But there's more. Just before the beginning of Field Day, Pat Gowen G3IOR sent E-mail to [amsat-bb@amsat.org] about slow CW, 3-digit number groups he had received on 145.974 MHz. The transmission exhibited Doppler shift during the 11 minutes that Pat could hear the signal. Was it another illegal ham-band interloper, or signals from the past? Field Day was quickly forgotten when the truth was discovered.

Field Day is one of the most popular on-the-air contests/activities in amateur radio. It is held each year on the fourth weekend in June. The event is sponsored by the American Radio Relay League (ARRL) as an emergency preparedness exercise. During the 24-hour period, US. and Canadian participants strive to make as many contacts as possible operating in remote locations from tents, campers, vehicles, or just a simple set up in the middle of a field.

The ARRL Field Day rules consider the amateur satellites as a separate band and provide a 100-point bonus for the first satellite contact. The Radio Amateur Satellite Corporation (AMSAT) version of the event considers each satellite as a separate band, encourages international participation and has additional rules for digital communications. Many Field Day groups have made efforts to put more emphasis on their satellite stations, both for ARRL points, and to simultaneously make contacts in the AMSAT competition.

Field Day 2002 via satellite

Last year AMSAT OSCAR-10 was surprisingly good. This year however, AO-10 was silent. This 19-year-old hamsat can be quite unpredictable since the onboard computer gave out over a decade ago. It is simply an uncontrolled, but functional Mode "B" (70 cm up and two meters down) transponder in space. Taking it's place this year was AO-40. Putting together a small, portable station for AO-40 is surprisingly easy. In place of the large two-meter beam required for AO-10 downlink signals, a small dish- style antenna with a 2.4 GHz to two-meter downconverter does the receiving job, while a typical 70-cm satellite yagi takes care of the uplink. Some stations on Field Day used the L-band AO-40 uplink with appropriate dishes or Yagis.

The Fuji satellites, F-O-20 and F-O-29, were both in analog (SSB and CW) mode for Field Day. Contacts were plentiful for those that were prepared for the exceptional Doppler shift associated with the 70-cm downlink. The signals can drift as much as 20 kHz in the course of an overhead pass. Satellite newcomers had problems keeping up.

The Russian RS-12/13 hamsat was "OK" for Field Day, but due to the activation of the 15-meter uplink (Modes T and K), it was difficult to get more than a few contacts. It's hard to tell the difference between satellite operators on the 15-meter uplink and the HF crowd that are inadvertently retransmitted. There have been no reports of any successful RS-15 contacts during Field Day 2002.

Operation via UoSAT-OSCAR-14 was once again, as expected, super crowded! This single-channel FM Mode "J" (2 meters up and 70 cm down) repeater in the sky was

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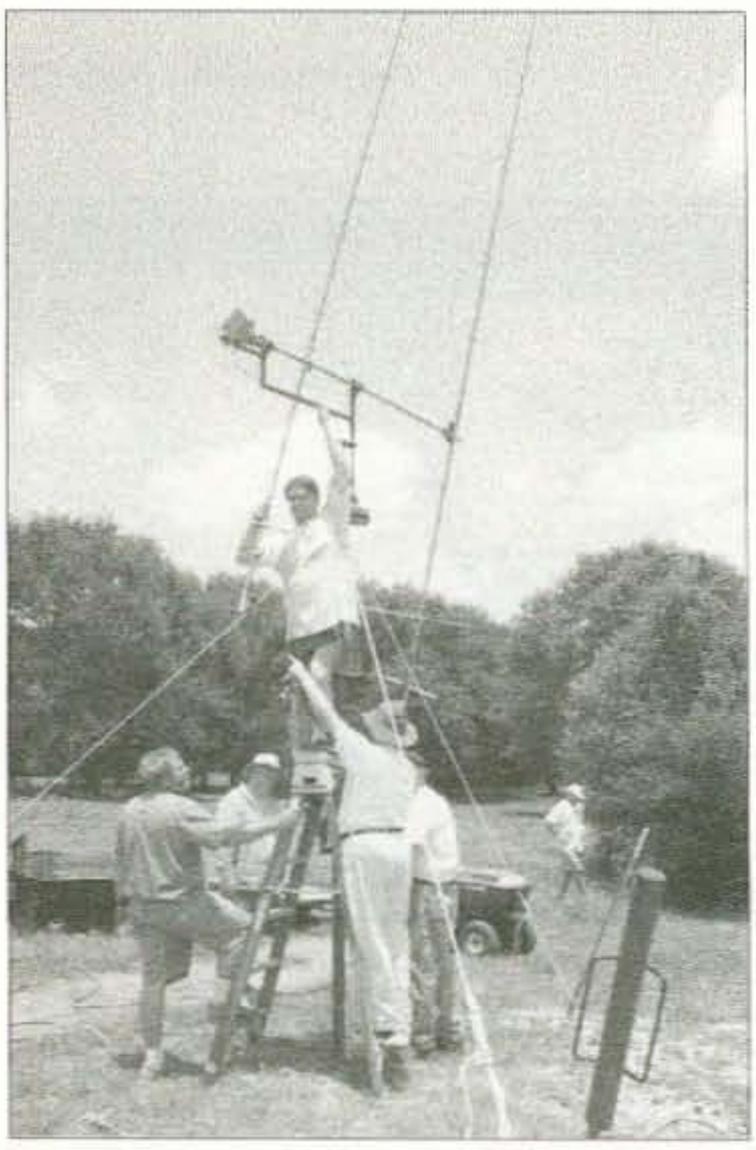

***Photo A.** Ron AG5RS makes antenna adjustments at the K5OE Field Day 2002 site.*

***Photo B.** An elegant system for L-band uplink and S-band downlink for AO-40 operation during Field Day 2002 at K5OE.*

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Photo C. *Close-up view of the dual band (L & S) circular patch feed on the AO-40 dish.*

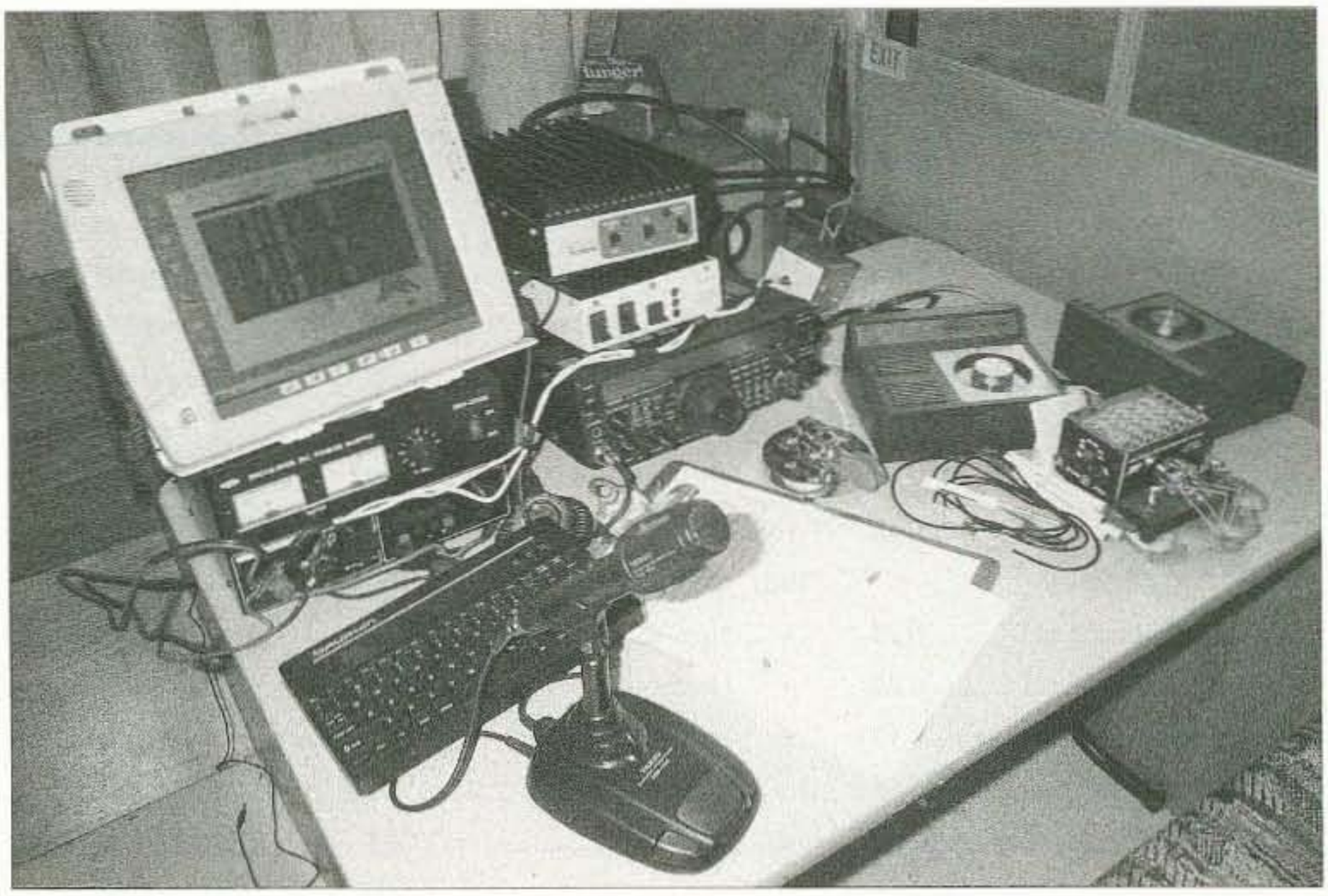

Photo E. *One of the other well-equipped hamsat stations at the K5OE Field Day 2002 site.*

HAMSATS

continued from page 48

working well even though it sounded like hundreds of stations were trying to access the satellite simultaneously. The result was that only a few contacts are made, usually by the stations with the biggest antennas and the strongest transmitters. It was wild, but at least it was only temporary. Unfortunately there were a number of stations trying to get their 100-point ARRL Field Day bonus using HTs and small beams. Most were disappointed, but changes in the AMSAT rules made it possible for at least a few more stations to make contacts with something less than monster antenna arrays and high-power two-meter amplifiers. The modified rules specify that each station is allowed credit for only one contact per FM satellite during Field Day. Participants were encouraged to make their single contact and move on to other hamsats for the duration. Some exceptions were heard, but the really "big guns" followed the recommended procedure, made their one contact, and left.

UoSAT-OSCAR-22 was the only active 9600-baud digital satellite. For the duration of the event, stations did their best to upload a Field Day greeting message and download as many as possible. Rule changes put in place for Field Day 2000 allowed digital contacts that use the amateur-radio satellites as flying digipeaters. UO-22 supports this mode in addition to its BBS-style system.

PCSat (NO-44) was only active for one pass at the beginning of the event this year.

Although contacts with the International Space Station were not counted for AMSAT Field Day operations in 2001, they were in 2002.

Valery was operating Field Day from the ISS this year. Many stations simply quit making Field Day contacts long enough to get some personal QSOs with the ISS.

The Houston connection

The Houston AMSAT Group had decided months in advance of Field Day to have a hamsat-only outing using the callsign K5OE (Jerry Brown). Three stations were commissioned to cover all of the analog and digital satellites. The primary radio for AO-40 and UoSat-OSCAR-22 was a Kenwood TS-2000 with 1.2 GHz module. A pair of Yaesu FT-847's were set up for all of the other satellites.

While the two complete arrays of KLM two-meter and 70-cm Yagis looked impressive, the five-foot dish with a dual-band (13 and 23 cm) circularly-polarized patch antenna was something to admire. The basic design was from K3TZ, but Jerry K5OE and made it a dual-band unit. A 1.2 GHz linear amplifier at the base of the dish provided plenty of power for the L-band AO-40 uplink. A 100-dB G3WDG filter in the 2.4 GHz line kept the uplink from blowing

Photo D. *Jerry K5OE snags another one during Field Day 2002.*

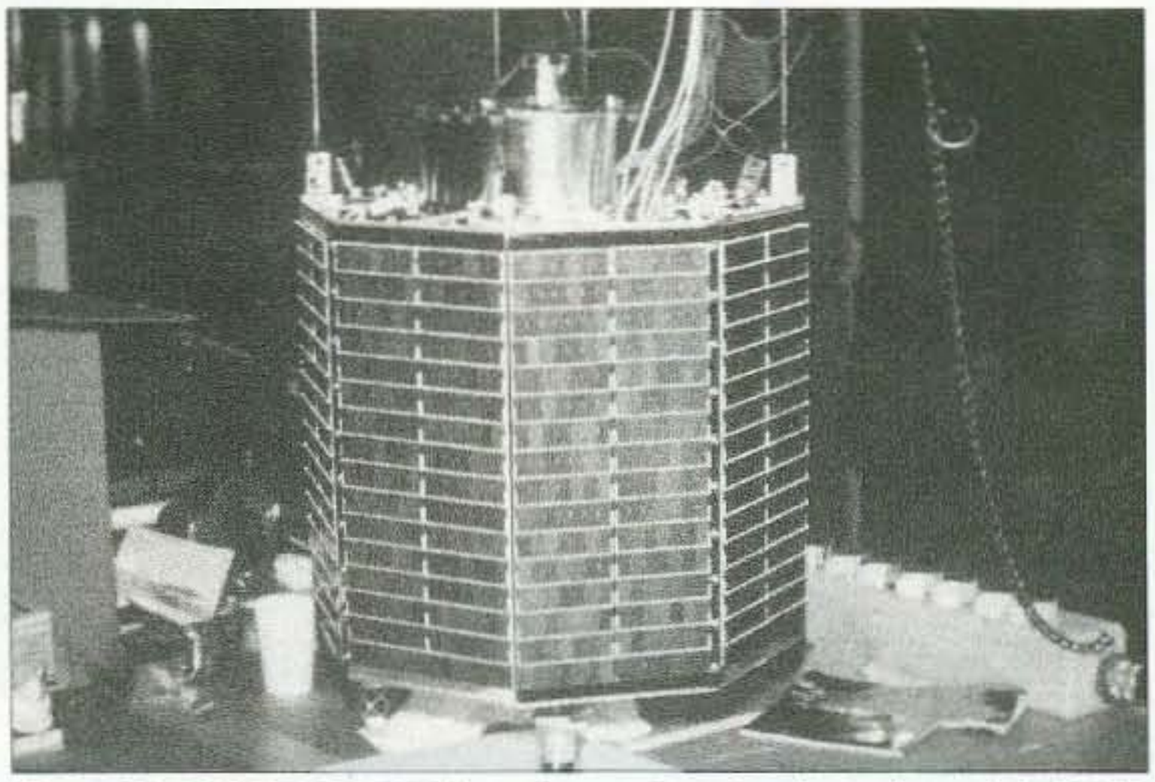

Photo F. *AMSAT OSCAR-7 on the test bench prior to launch in 1974.*

Photo G. *AMSAT OSCAR-7 at the thermal vacuum chamber with Karin and Karl Meinzer, Marie Marr, Jan King and Perry Klein, in 1974.*

out the DB6NT preamp and Drake downconverter.

The main KLM antenna array was computer controlled with a UNITrack interface. Tracking software included WinOrbit and InstantTrack. The 9600-baud digital system ran on WISP while PCSat work was accomplished with Windows Hyperterminal. The Kenwood TS-2000 has a built-in 1200 and 9600-baud Terminal Node Controller (TNC).

Most of the gear worked very well with the exception of some problems with the rotators on the second KLM array, the occasional Longhorn bull, mosquitoes, the Texas heat and the occasional attack from our host's (Ron AG5RS) killer pug dog. High points of the outing included the air-conditioned tent, a fantastic generator, great radios, excellent operators, no rain, the swimming pool and the Texas BBQ. We're doing this again next year. While sunspot cycle 23 has started its decline, the hamsats are looking and working quite better all the time.

The surprise

AMSAT Board Member and Vice President of User Services Bruce Paige KK5DO was at our Field Day site this year, but left early due to other commitments. Just after we cleared the site to head back to town, Bruce called on the cell phone to tell us that AMSAT OSCAR-7 was on the air. What?!? The last time anyone had heard AO-7 was in June, 1981. How could this be? I rushed home with the orbital data relayed by Bruce and made my first AO-7 contact since June 11, 1981. Unbelievable! The signals were acceptable on my home station using the Mode "B" 432 MHz uplink and 145 MHz downlink. Chirp was noted on CW and the SSB voice signals warbled, but it worked. Weeks later AO-7 was still working, and may be with us for a while, during it's second life.

When AO-7 (known as AMSAT OSCAR-C prior to launch) went into space as a secondary passenger on a Delta rocket from Vandenberg Air Force Base in Lompoc, California, on November 15, 1974, there were no PCs, cell phones, and most home rigs still used tubes. AMSAT OSCAR-6 had been launched two years earlier, but AO-7 was an advanced, multi-band hamsat with a projected lifetime of three years. When the satellite went silent (for the first time) after 6.5 years of operation, it had been running only on solar cells for a few years. One of the nickel-cadmium batteries had gone open circuit allowing the satellite to work only when illuminated by the sun. The end came when that cell shorted, or at least that's the theory.

Studies of the current CW telemetry from AO-7 show that one of the battery cells has once again opened up, thus allowing the solar panels to pass their energy on to the satellite's transponders and control systems. A satellite in space goes through thermal stress as it constantly transitions from light to dark, and back again. This stress may have been the catalyst that caused the cell, or some other cell in the string to open up. ALL of the major subsystems in AO-7 are apparently working, at least when the satellite is in sunlight. It is hoped that the batteries stay the way they are for a long time to come.

Index Name	Possible limits	Decoding parameters	Assignment of parameters
RS 21			Satellite callsign
UBS	N=100.. 150	U=N/10 Volts	On board voltage
IBS	N=10.. 250	I=N/100 Amperes	On board current
USUN	N=0.. 156	U=N/10 Volts	Solar array voltage
ISUN	N=0.. 255	I=N/100 Amperes	Solar array current
ITXA	N=0.. 170	I=N/100 Amperes	435 MHz TX D.C. current
PTXA	N=0.. 70	P=N/10 Watts	435 MHz TX UHF power output
TTXA	N=50.. 150	T=N-78 deg C	435 MHz TX temperature
ITXB	N=0.. 150	I=N/100 Amperes	145MHz TX D.C. current
PTXB	N=0.. 70	P=N/10 Watts	145MHz TX VHF power output
TTXB	N=50.. 150	T=N-78 deg C	145MHz TX temperature
TFLV	N=30.. 180	T=N-78 deg C	Top flange temperature
TFLN	N=30.. 180	T=N-78 deg C	Bottom flange temperature
TPPA	N=50.. 150	T=N-78 deg C	Instrument A board temperature
TPPB	N=50.. 150	T=N-78 deg C	Instrument B board tempterature
MTX	N=0.. 255	Controller data	Housekeeping info
MRX	N=0.. 255	Controller data	Housekeeping info
RS 21			Satellite callsign

Table 1. *This is the correct table for the Kolibri (RS-21) telemetry equations that should have been published in our July issue. Sorry about that.*

Working OSCAR-7

First load up on information and be prepared for any of AO-7's modes. The best source of information is the AMSAT Web site [http://www.amsat.org]. There you will find frequencies, operating tips, telemetry descriptions, the satellites specifications, old photos and a lot of history. AMSAT is even promoting a new award for seven confirmed contacts via AO-7 in the 21st century. They have also reprinted the AO-7 SWL cards that

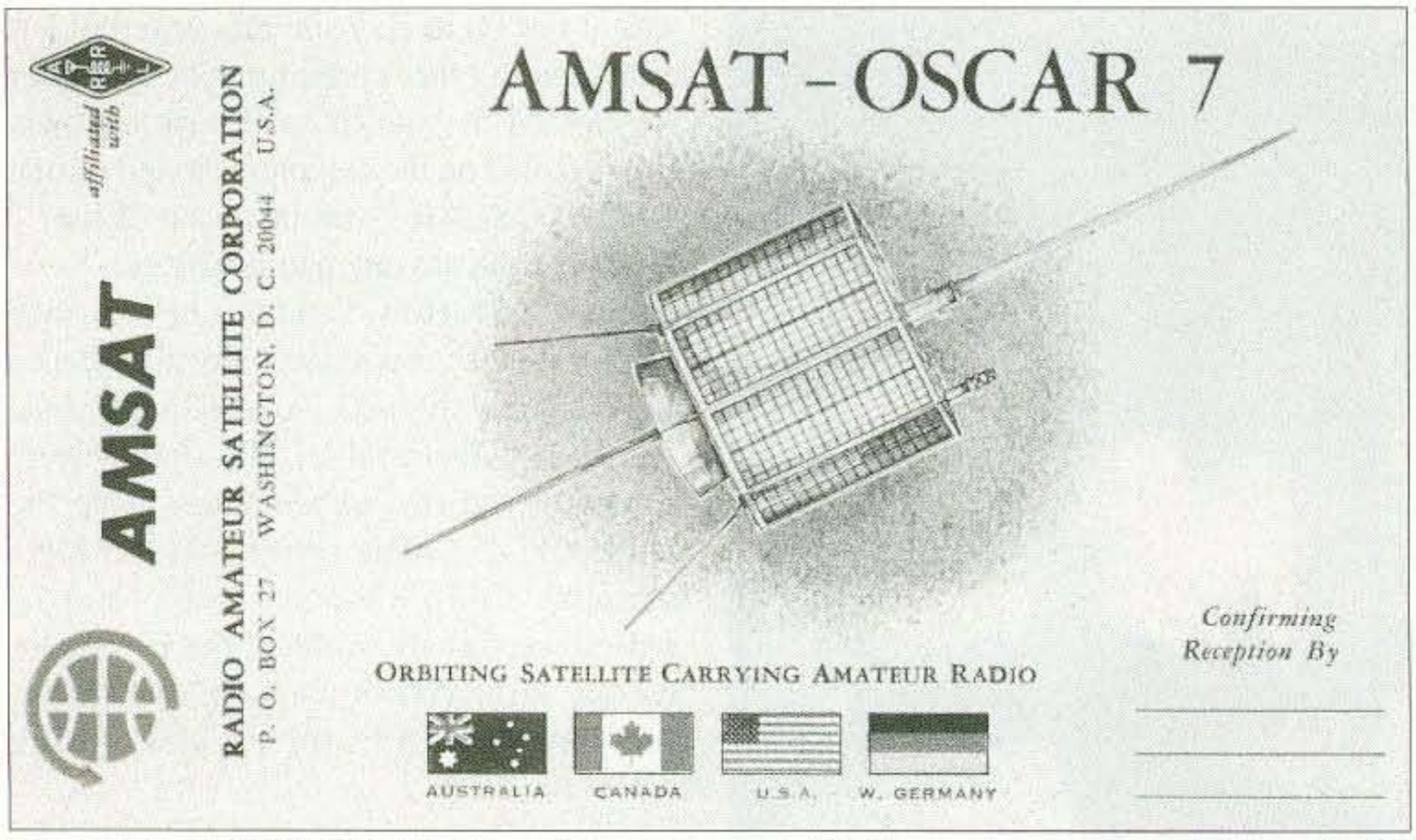

Photo H. *AMSAT OSCAR-7 Short Wave Listener's (SWL) cards are once again available from AMSAT.*

were first introduced in 1974 along with photocopies of the AMSAT Newsletter from November, 1974, complete with many facts and history about the satellite.

When AO-7 first awakens after a period of darkness, it can come up Mode "A" (two-meter uplink with 10-meter downlink), Mode "B" (70-cm uplink with two-meter downlink), Mode "C" (low-power version of Mode "B"), or Mode "D" (recharge). The 435.1 MHz CW beacon may also be heard when the satellite is in Mode "A" or Mode "D". The letters assigned to the modes are from the labels of the flip-flop digital circuit outputs that turn on the specific transponders. Volunteer ground control stations began work in July to send commands to AO-7 for a less random operating pattern. A small number of the original control boxes still existed and were dug out of various garages and basements. Hams don't throw away anything.

Questions have arisen concerning the legality of the 70-cm uplink. The 432.125 to 432.175 MHz transponder input is no longer authorized for the Amateur Satellite Service, although it is still within the US. Amateur Radio Service. Fortunately, the FCC license for AO-7 has been maintained and is still active in the FCC system as W3OHI. For US hams, operation through the 70-cm uplink, is valid per the FCC license. Other countries will have to decide whether to "grandfather" AO-7 operations. For all hams though, it is a good idea to be a good neighbor to any weak-signal 70-cm

Continued on page 62

AMSAT-OSCAR 7

A joint project of amateur groups in Australia, Canada, Germany and the United States, coordinated by AMSAT, the Radio Amateur Satellite Corporation.

Launched: November 15, 1974, at 17:11 GMT.

Orbit: 910 st. miles (1460 km) circular, sun-synchronous, polar orbit, 101.7 degree inclination, 114.99 minute period. Passes repeat on a two-day cycle around 8-9 AM and 8-9 PM local time.

Size: Octahedral (eight-sided) in shape, 14.17 inches (36.0 cm) high, 16.7 inches (42.4 cm) diameter. Weight: 63.7 pounds (28.9 kg).

COMMUNICATIONS SYSTEM SUMMARY

Two-to-ten Meter Linear Translator (Operable in Mode A)

Uplink: 145.85-145.95 MHz, circularly polarized canted turnstile (use LHCP in northern hemisphere, RHCP in southern hemisphere); 80-100 watts recommended user EIRP.

Downlink: 29.40-29.50 MHz, 1-2 watts output, linearly polarized dipole antenna. A ten-meter preamplifier is recommended for reception. Telemetry Beacon on 29.502 MHz.

Seventy-centimeter-to-Two-meter Linear Translator (Operable in Modes B and C)

Uplink: 432.125-432.175 MHz, circularly polarized canted turnstile (use RHCP in northern hemisphere, LHCP in southern hemisphere); 100-200 watts recommended user EIRP.

Downlink: 145.975-145.925 MHz, 6-8 watts output (in Mode B) (3-4 watts in Mode C), circularly polarized canted turnstile (use RHCP in northern hemisphere, LHCP in southern hemisphere). 6-10 db of antenna gain is recommended for reception. Telemetry beacon frequency 145.972 MHz.

Note: Passband in this translator is inverted (USB signals become LSB, and vice versa). The use of USB for the uplink is recommended.

435.1 MHz Beacon (Operable in Modes A and D)

Output: 435.103 MHz, 300 Mw, circularly polarized canted turnstile (use LHCP in Northern hemisphere, RHCP in southern hemisphere). 6-10 db of antenna gain is recommended for reception.

2304.1 MHz Beacon (Operable in Modes A, B, C, or D)

Output: 2304.091 MHz, 40 mw, circularly polarized quadrifilar antenna (use RHCP for reception in northern hemisphere).

Photo I. *The back side of the AO-7 SWL card provides complete data on the satellite's modes and frequencies.*

Joe Moell P.E. KØOV
PO Box 2508
Fullerton CA 92837
E-mail: [Homingin@aol.com]
Web: [http://www.homingin.com]

What's New in Transmitter Hunting?

For many years, hidden transmitter hunting was one of the best-kept secrets in ham radio. From the 1960s through the '80s, it was rare to read about mobile T-hunts or on-foot foxhunts in ham radio magazines or to see a program on this topic at a ham radio convention, except in southern California. But things have changed for the better.

The upsurge of interest in competitive radio direction finding (RDF) since "Homing In" first appeared in November 1988 has been steady. As more and more hams are discovering the fun, they are applying the latest technologies to make it easier for everyone to achieve success. There is a good chance that transmitter hunts are going on nearby. You may be able to get all the details at the next hamfest or ARRL convention in your state. For instance, there will be a three-hour forum at the Duke City Hamfest, August 23 in Albuquerque, New Mexico. There you can hear directly from the people who put on the First USA Championships last year.

This plot isn't sinister

The annual Foxhunt Forum at the Dayton Hamvention® gets bigger and better every year. The 2002 forum was a two-hour session with nine topics on the agenda. Hosts and organizers were Bob Frey WA6EZV and Dick Arnett WB4SUV of the OH-KY-IN Amateur Radio Club (**Photos A** and **B**). They began with the usual introductions and polls of the 150 attendees. Then Brian DeYoung K4BRI of Alexandria, Kentucky (**Photo C**) took the podium to reveal the details of his Polar Plot and Polar Plot 2 software, the first such programs to display RDF beam bearings on a "palmtop" computer or personal digital assistant (PDA).

Mobile T-hunters have long recognized the advantages of polar displays over the typical "turn it and read the S-Meter" approach. A polar display helps sort out unwanted signal reflections. They show up as momentary non-correlated spikes on a polar plot, compared with the steady lobe representing your RDF antenna's pattern (**Photo D**). That lobe, when averaged over several blocks of driving, usually shows the correct direction to the hidden transmitter, unless you're in an area where direct signal is completely blocked and the only way that the signal gets to you is via a constant reflection from something big, such as a mountain.

Over the years, several polar display projects have been featured in "Homing In," starting with the motorized quad system of JaMi Smith KK6CU on the cover of the November 1992 issue. JaMi used the storage-scope display of a Tektronix medical monitor, powered by a DC-to-AC converter.[1] He won his share of southern California T-hunts with it, but he had to be careful that the high-current scope didn't drain his car battery.

Next came Jerry Boyd WB8WFK of Albuquerque, who was first to use a computer for

Photo A. *Bob Frey WA6EZV of Cincinnati enjoys both mobile T-hunting and on-foot radio-orienteering. For mobile hunts, he uses a doppler setup.*

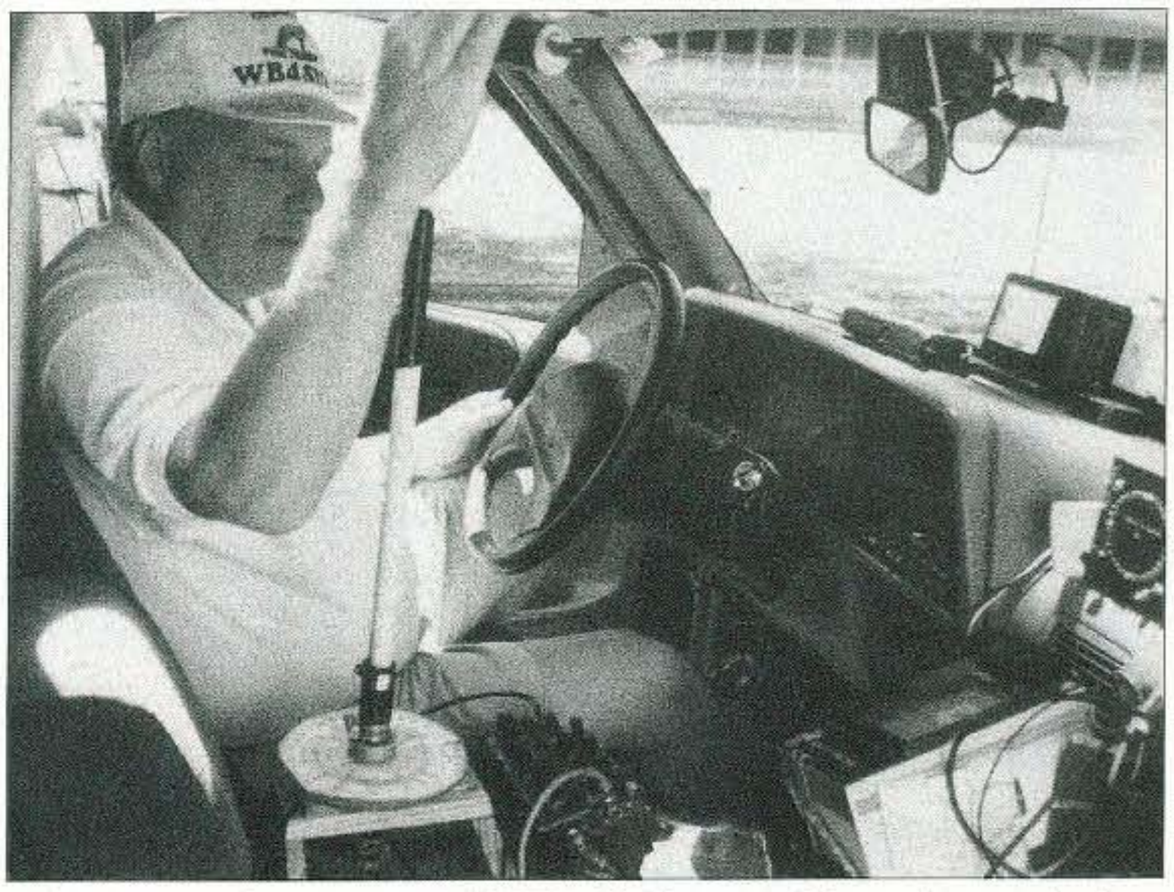

Photo B. *Dick Arnett WB4SUV of Erlanger, Kentucky, works in a hospital, so it's no surprise that he uses a surplus medical monitor as a storage-scope display for polar-plotted RDF bearings. It's in the lower-right corner of this photo.*

Photo C. *Brian DeYoung K4BRI crosses the 80-meter finish line at the 2002 USA ARDF Championships in Georgia. He also likes mobile T-hunting with his computerized polar bearing display.*

the display. His original version had a PC with 386 processor, which wasn't fast enough to trace the bearings for complete antenna rotations in real time. Over the years, he has upgraded the computer and achieved much faster response.[2]

Next came RADAD by Tom King KA6SOX and Kerry Provancha KK6OS of Santa Barbara, California. RADAD displayed bearings on the long-persistence cathode-ray-tube (CRT) of a surplus marine radar set. The directors and trigonal reflector of their innovative motorized yagi revolved around a fixed vertical driven element, so no RF slip rings were required.[3]

Other polar display projects in "Homing In" have included the Foxcopter by Bill Rupp NØMKJ of Muskego, Wisconsin,[4] and an ambitious CRT whirligig by Dave Bullock G6UWO and John Wood GØPSI of Nottingham, England.[5]

Then there was my NorthScope, made from an old Heathkit SB-620 panadaptor with long-persistence CRT and a fluxgate compass sensor atop the hand-rotated RDF quad.[6] It shows azimuth-versus-strength in polar form like the others, but the circular display always has north at the top. That makes it easy to detect subtle bearing shifts as I drive the winding roads of southern California hills and mountains in the dark. I still use it on nearly every two-meter mobile hunt.

K4BRI says he first decided to build a PC and PDA polar display after seeing the mobile installation of Dick Arnett WB4SUV at a local T-hunt. Brian's first computerized version was more like WB8WFK's setup, with a continuous-turning potentiometer attached to the 8-foot rotating antenna mast supporting his 4-element 2-meter T-hunting quad (**Photo E**). Brian tapped into the S-meter circuit of his Kenwood mobile set. He only needed a few components for his hardware interface because an 8-pin PIC processor took on all the work of converting the azimuth pot and strength signals from analog to digital and streaming them at 9600 baud to the PC (**Photo F**).

As Brian turns his antenna, the PC paints a polar pattern of signal strength versus azimuth. From the keyboard, he adjusts the persistence of the display — how long the old traces last as new data comes in. When he turns a sharp corner, a touch of the "C" key clears the screen so that new relative-to-car bearing data is displayed without confusion. There are software settings for threshold and gain of the S-meter circuit to match a wide variety of radios.

Not content with Version 1 of the software, K4BRI just completed an upgrade that includes a sonar-like "waterfall" display of bearing history that's very useful in areas of high signal reflections. For those like me who prefer bearings relative to north instead of to the vehicle heading, the new program accepts NMEA serial data from a GPS set. Vehicle course direction is displayed as a small vector in the lower corner of the screen, along with antenna position relative to both the vehicle and to north. GPS sets can't determine a vehicle's orientation while it's stopped, so direction-of-travel data is only updated when vehicle speed is 3 MPH or greater, as determined from the GPS data stream.

Both versions of POLAR.EXE run in

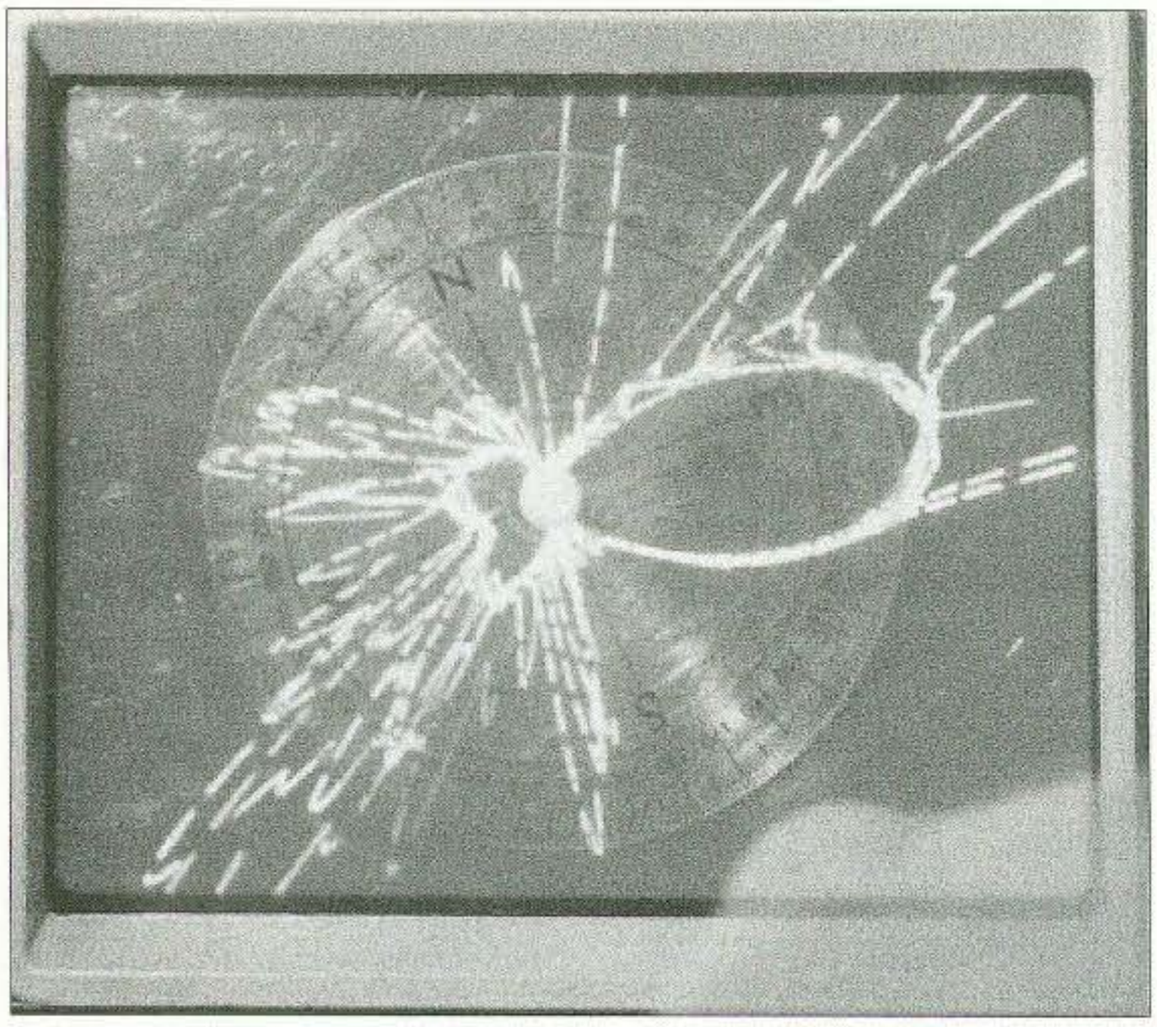

Photo D. *In this polar display illustration from an actual transmitter hunt, the consistent lobe toward the right shows the correct bearing, while the spikes in other directions are signal reflections. This display belongs to JaMi Smith KK6CU.*

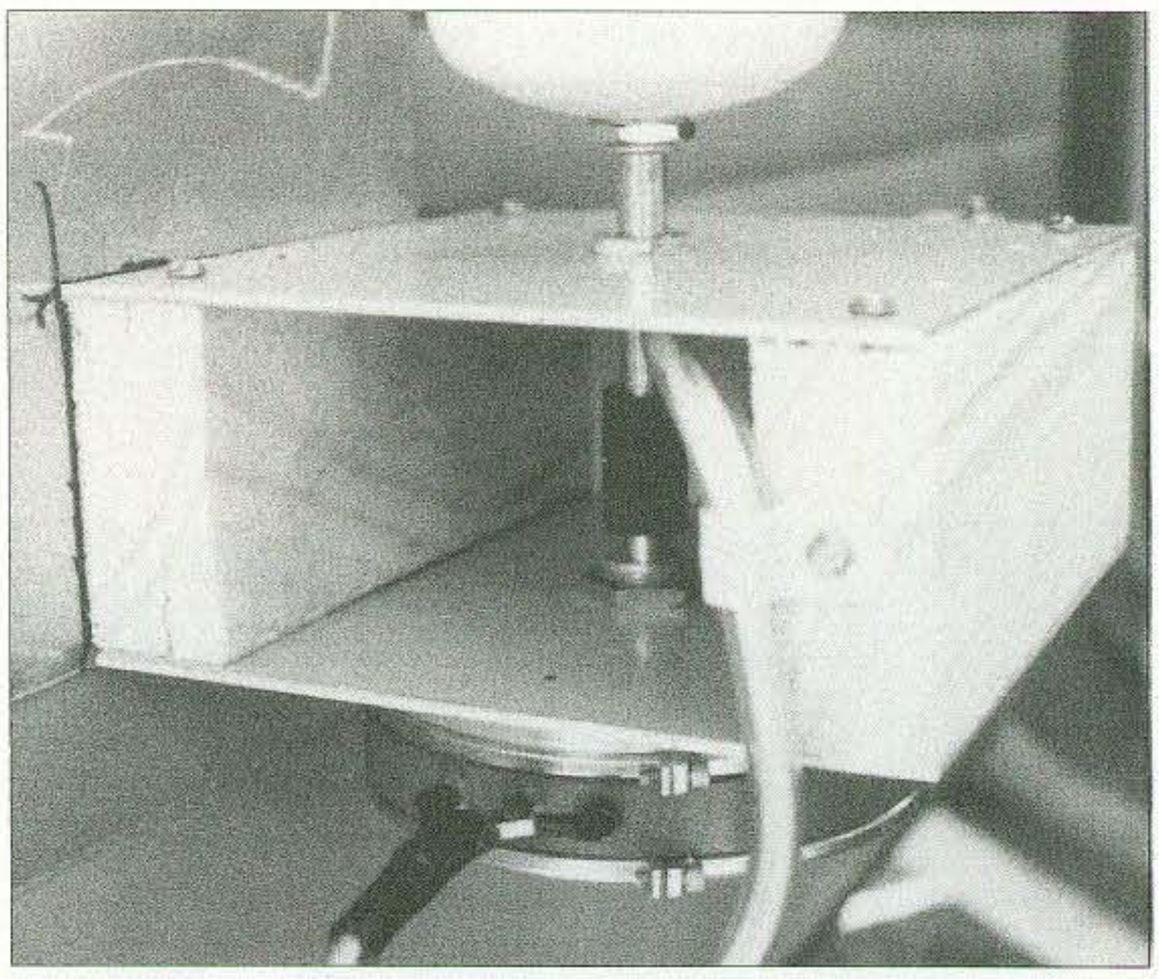

Photo E. *This is how Jerry Boyd WB8WFK of Albuquerque attaches the bottom of his mobile antenna mast to the continuous-turning potentiometer that senses azimuth. The pot must be linear-taper with minimum dead zone. The assembly mounts to the inside of the driver-side door.*

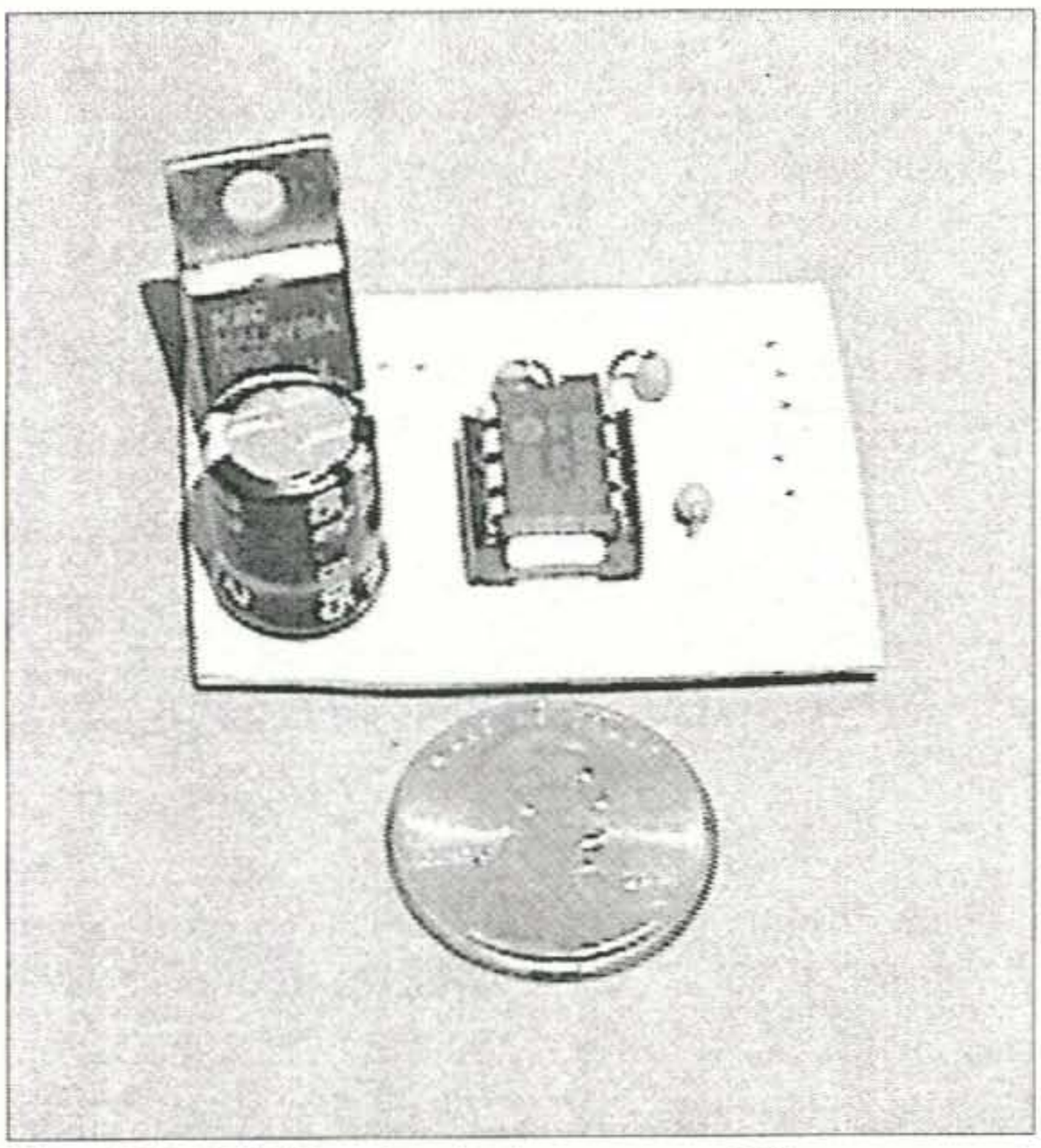

***Photo F.** In K4BRI's polar plotting system, a PIC processor and a few other components interface the analog azimuth and strength information to a PC or PDA.*

DOS mode under Windows and are available at no cost from Brian's Web site: [http://www.qsl.net/k4bri/polar.htm]. You can also download the schematic and construction data for his Version 1 interface. Consider sending $25 to Brian for a PC board and all the interface components, especially if your workshop doesn't have PIC-burning capability.

Did you think I forgot about the PDA display? Brian has an embedded Visual Basic version of the polar program that runs on his Journada or other Windows CE device. For the details, send E-mail to him at the address on his Web site. The PDA display might be just the ticket if you're T-hunting alone and don't want the hassle of mounting a laptop in your vehicle. But from experience with PocketAPRS, I know that PDAs are difficult to read while driving. If you don't hunt alone, you'll probably prefer to use a notebook PC, even if your navigator has to hold it on kneetop.

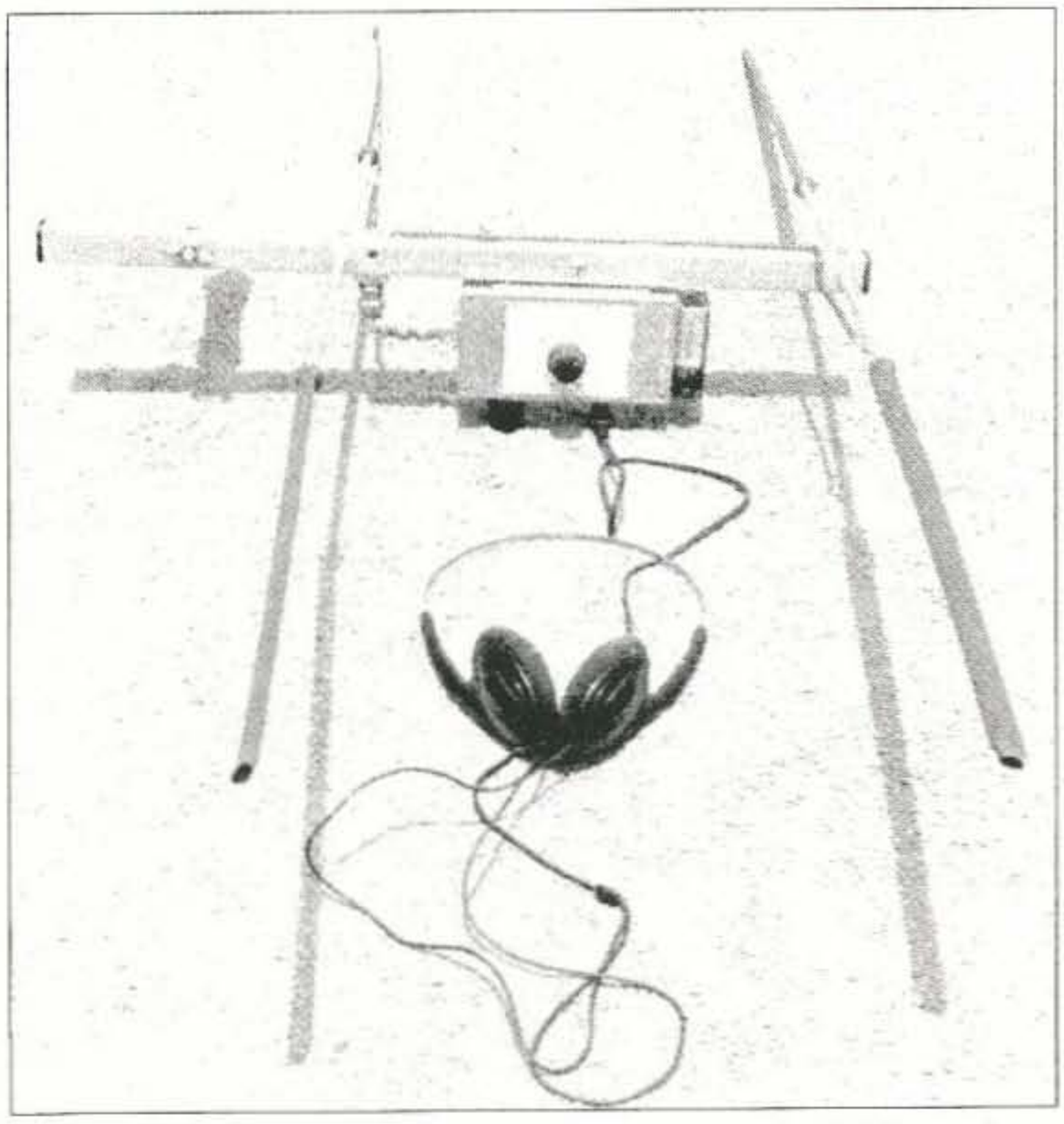

***Photo G.** The Ron Graham potentiometer-tuned ARDF receiver-antenna set for two meters is popular in both the northern and southern hemisphere. KI7XF and KK5YY have designed add-on digital tuners for improved performance.*

S-Meters and PLLs

Next presenter at the 2002 Hamvention Foxhunt Forum was Marvin Johnston KE6HTS of Santa Barbara, who explained the joys of 80-meter radio-orienteering. Small rod or loop antennas work very well at 3.5 MHz. With almost no signal reflections from buildings and trees, it's much easier for newcomers, especially young persons, to have rapid success in radiosports on 80 meters.[7]

Marvin turned the

podium over to Ernie Howard W8EH of Middletown, Ohio, to tell about his modifications to the Icom IC-706 "DC to daylight" mobile transceiver for external S-meter output. Mobile T-hunters need such takeoffs to drive their large dash-mounted meters and polar displays. There are straightforward ways to tap the signals in almost any receiver,[8] but most hams prefer to do this surgery on older rigs that don't have tiny surface-mount components. Ernie showed that it's possible to be bold and take a soldering iron to an in-warranty radio with good results.

Last of the technical presenters was Gerald Schmitt KK5YY of Los Alamos, New Mexico, who described in detail the low-cost PIC-based phased locked loop (PLL) tuner he is perfecting. He thinks it's ideal for ARDF receivers and QRP rigs. KK5YY is the second to devise a PLL tuner for the Ron Graham two-meter ARDF set from Australia. (The first was Harley Leach KI7XF.)

ARDF sets from Ron Graham VK4BRG[9] are very popular both in the USA and down under, but they are best for single-frequency hunts because they are tuned across the full band with a one-turn potentiometer (**Photo G**). Adding a PLL makes it much easier to QSY on multiple-frequency hunts. Here's hoping that KK5YY and KI7XF will publish their designs soon.

The next section of the forum covered the latest news of international-style on-foot foxhunting (called ARDF and radio-orienteering). Bob and Dick reviewed their experiences at the First and Second USA ARDF Championships and at the 2000 ARDF World Championships in China. Then they gave a brief promo for the Third Championships, for which they are Co-chairs. They invited everyone to come to Cincinnati from July 30th through August 3, 2003, for these events.

With help from early announcements, Bob and Dick are sure that they will be welcoming competitors from all over the USA next year, and plenty of foreign visitors too. They were already well into the preparations as WA6EZV gave me an update in early July: "We have four potential sites within 45 minutes of the dormitories. I have official maps for all sites and I've run them all. There's a nature trail a half-mile from the dorms where we can have a practice course. It's already mapped.

"We've already got the dormitories pretty well arranged," Bob continued. "We have six committees listed on the Web site [http://w3.one.net/~bfrey/] and we're starting to draft letters to the nearby clubs. One group is investigating medals, pricing and design. Another is designing the T-shirts. A fellow is working with university transportation about buses. We're writing letters to get water and medical supplies."

Shortly after this issue arrives in your mailbox, Bob and Dick will be returning from the 2002 ARDF World Championships in Slovakia, where they are promoting the 2003 USA Championships to radio-orienteers in two dozen countries. "We arranged for some 2-inch round buttons with the logo and '2003 Region 2 Championships' on them," Bob says. "I also have some T-shirts with the logo on the pockets."

This hidden T might attack!

To top it all off, the 2002 Dayton Foxhunt Forum concluded with some other ways that hams are using RDF, including tracking of accidental and deliberate interference, plus wild animal management (not on ham radio frequencies, of course).

As regular readers know, hams across the USA have monitored for tag transmitters on migrating endangered birds. Others, such as Terry Hudson KT9V of Solsberry, Indiana, are volunteer trackers of four-legged animals such as mountain lions.

"One of Terry's bobcats recently strayed out of Indiana and ended up in Mt. Airy Forest about four miles south of me," says WA6EZV. "Terry was out of the area but he knew it was down here. WB4SUV came over and was able to pinpoint its location in the woods. About three days later it was hit by a car."

WA6EZV and WB4SUV are already making plans for the 2003 Dayton Foxhunt Forum. The Hamvention will be May 16th through 18th. More information is at the Dayton Amateur Radio Association Web site [www.hamvention.org]. But you don't have to go to Dayton to learn about the fun of RDF. There may be a good program on the subject at a club or hamfest near you.

It's too late to invite you to my talk at the ARRL Southwestern Division convention in early August, but there are knowledgeable local experts on RDF all over. If they aren't talking at a nearby hamfest, they will probably be eager to present the topic to your local radio club. Web sites and E-mail contacts for many of them are on the RDF Links page of my "Homing In" Web site. Be sure to send news of your local RDF activities to my electronic or postal mail addresses, listed at the beginning of this article. Happy hunting!

Footnotes

1. Details in "Homing In" for October and November 1992.

2. Details in "Homing In" for January and February 1993.

3. Details in "Homing In" for November 1993.

4. Details in "Homing In" for March 1994.

5. Details in "Homing In" for April, June and July 2001.

6. Details in "Homing In" for July, August and September 1997.

7. More about 80-meter ARDF is in "Homing In" for November 2000.

8. Details in Chapter 5 of *Transmitter Hunting – Radio Direction Finding Simplified* by Moell and Curlee, published by TAB/McGraw-Hill, ISBN number 007-1560068.

9. Web site [http://users.mackay.net.au/~ron]. 73

On the Go

Mobile, Portable and Emergency Operation

Steve Nowak KE8YN/Ø
1617 Hickory St.
Omaha NE 68130-1529

Setting Up a Temporary HF Station

Last time, we discussed some of the aspects of setting up a HF amateur radio station in an emergency situation. This month, we'll focus on various designs to make actually operating as convenient as possible.

There are three major things you want to achieve in setting up a radio operating position: access to power, access to the antenna, and access to the people you are supporting. Let's look at each of these in general and see how we can apply them.

Access to power

A number of the places where we amateurs may be called upon to provide support may already have backup power systems for their own purposes. Hospitals have several redundant layers of power, including multiple power feeds to the building, on-site generators, and some level of battery backup. If you have established a good rapport with your agency, you probably already know where an emergency power outlet is that you can use. Obviously, many of these are already planned for other uses, so we can't assume that we'll get first right of refusal for a particular outlet. In hospitals, most emergency power outlets are identifiable because they are red. The actual outlet itself or both the outlet and the wall plate may be red.

If you are setting up in an area that does not have emergency power capability, you may need to provide your own power. Dragging a deep cycle lead-acid battery up several flights of stairs may not be the ideal approach, especially if you would have to repeat the trip multiple times to recharge the battery. I tend to avoid using elevators when there is a distinct possibility of the power being interrupted, so the stairs become a necessary evil.

One last issue – if you are recharging a lead-acid battery, this is best not done inside, since the recharging process produces hydrogen gas that is highly flammable. A pilot light for a gas stove or gas water heater or other flame, or even a spark, can lead to an explosion.

Access to the antenna

You can get a dynamite signal by constructing an antenna on the top of a tall building, but placing the operating position close to the antenna may mean you are inconveniently separated from those you are supposed to be serving. On the other hand, a ground-mounted antenna may not provide the signal you would like. Once again, the ideal situation is to plan in advance with the site you may be serving. Many hospitals have an identified location for their amateur radio operator with emergency power and a connection to a permanently mounted antenna, at least for VHF. In other cases, the local Red Cross or Salvation Army office may be the planned location for HF coverage and can be fully equipped before a need ever arises. Some have a fully loaded tower with yagi and rotor, as well as various dipoles, long-wires, slopers, etc. This is ideal, but it is still best to plan on operating under less than such ideal circumstances.

Access to the people you're supporting

The operating position needs to be located so that people can ask the ham operator to get certain information or send certain information without inconveniencing either.

If you have to set up a station location on short notice, it would be ideal to be near some type of window. This could provide a path for coax leading to the antenna and a lead-acid battery could be located just outside for charging safety. In areas subject to hurricanes, the hurricane shutters provide protection, but may also prevent the routing of cables. In this uncertain day and age, I'd prefer not to be sitting with my back to a window if I were providing communications services to a public service department. I

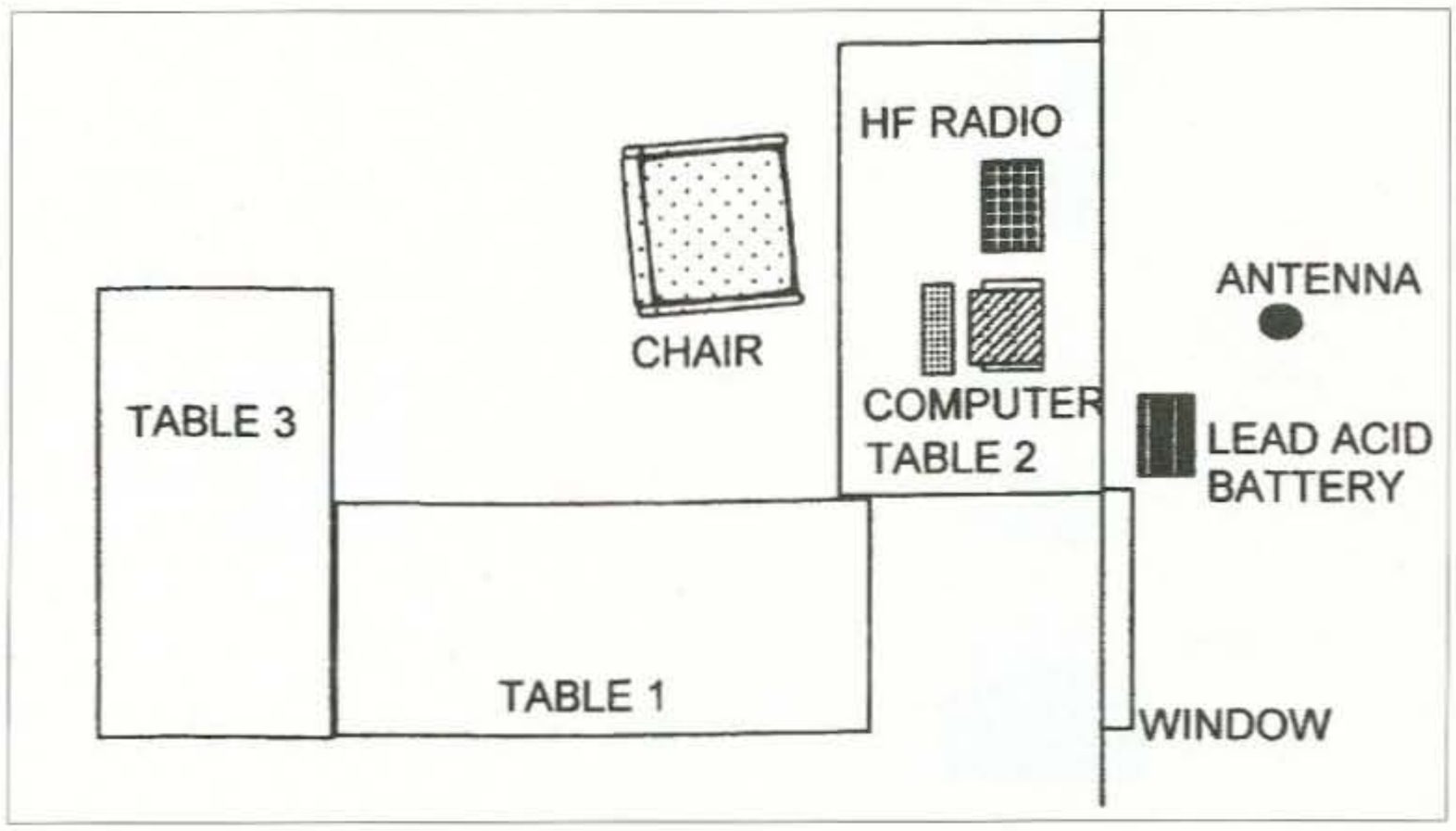

Fig. 1. *By being located near the window, cables can be led outside for connection to the antenna, ground, and battery. A yellow "Caution" tape around these items may keep people away from being injured. Tables one and three keep the operator separated from the general population.*

would prefer to be near the window but not in line of sight. You never know.

Fig. 1 shows one possible station layout. I've based this on items readily available in a hospital or school. Tables, such as those found in the cafeteria, provide an operating location as well as a border of sorts. Well-meaning people may not realize that in sub-optimal conditions, a high degree of concentration may be required when operating. The battery and antenna are located just outside the building but easily connected through the window. It may be advantageous to rope off the area to keep people from coming into contact with the antenna. Likewise, the battery may prove a tempting target, so it may be wise to conceal it and/or chain it to something solid.

Some clubs take a whole different approach and set up their station in a van or camper so that it can be taken to where it is needed and put on the air almost immediately. In some cases, the use of a van has an added advantage in that it is managed and or funded via a public service agency or perhaps the Red Cross. As such, the vehicle is identifiable and known, which often makes it easier to access the location where the station is needed.

Fig. 2 shows one possible layout for a van. The idea is loosely based on the communication van used by the Brevard Emergency Amateur Radio Service (BEARS) on the east coast of central Florida.

VHF and UHF equipment should be readily accessible to the driver. In an ideal world (one with no budgetary constraints), I'd put something like the Kenwood TMD-100 or Alinco DR 135-TP so that I would have access to 2 meters while driving. I'd also have APRS available using the same rig. There are times, such as during hurricane season, when a mini weather station transmitting data via APRS would be helpful to the National Weather Service. Temperature and humidity sensors could be permanently mounted or all sensors, including a wind direction and speed indicator, field-mounted on site. In a van, radios with detachable control screens may free up more working space. The actual rig could then be placed under the operator's seat.

I'd mount the other radios along one wall of the van, either in one line, or in a mini cubicle arrangement as shown. This would leave a small but usable aisle along the other side. Of course, with a van I'd love to include a solar array on the roof and a gas- or propane-powered generator that could provide power when needed without running the van engine.

With either design, there are a number of safety issues that need to be addressed. You want to limit access to a certain degree so that the amateur radio operator on duty can concentrate. You also want to make sure that others do not operate the radios without permission. In addition you want to make sure that people cannot inadvertently come into contact with antennas or other connections that could expose someone to high levels of radio frequency exposure or result in an RF burn. As mentioned earlier, any lead-acid storage batteries need to be located in a well-ventilated area. Unlike our ham shacks back home, operating in this environment will expose equipment to many people of all ages who have no understanding of the potential dangers that might exist.

Designing a potential operating location can be a lot of fun and makes a great project. This is one of those activities that can involve both new hams and experienced ones, with both groups being able to contribute. Let me know what ideas you and your public service team may have with regard to the ideal operating location. 73

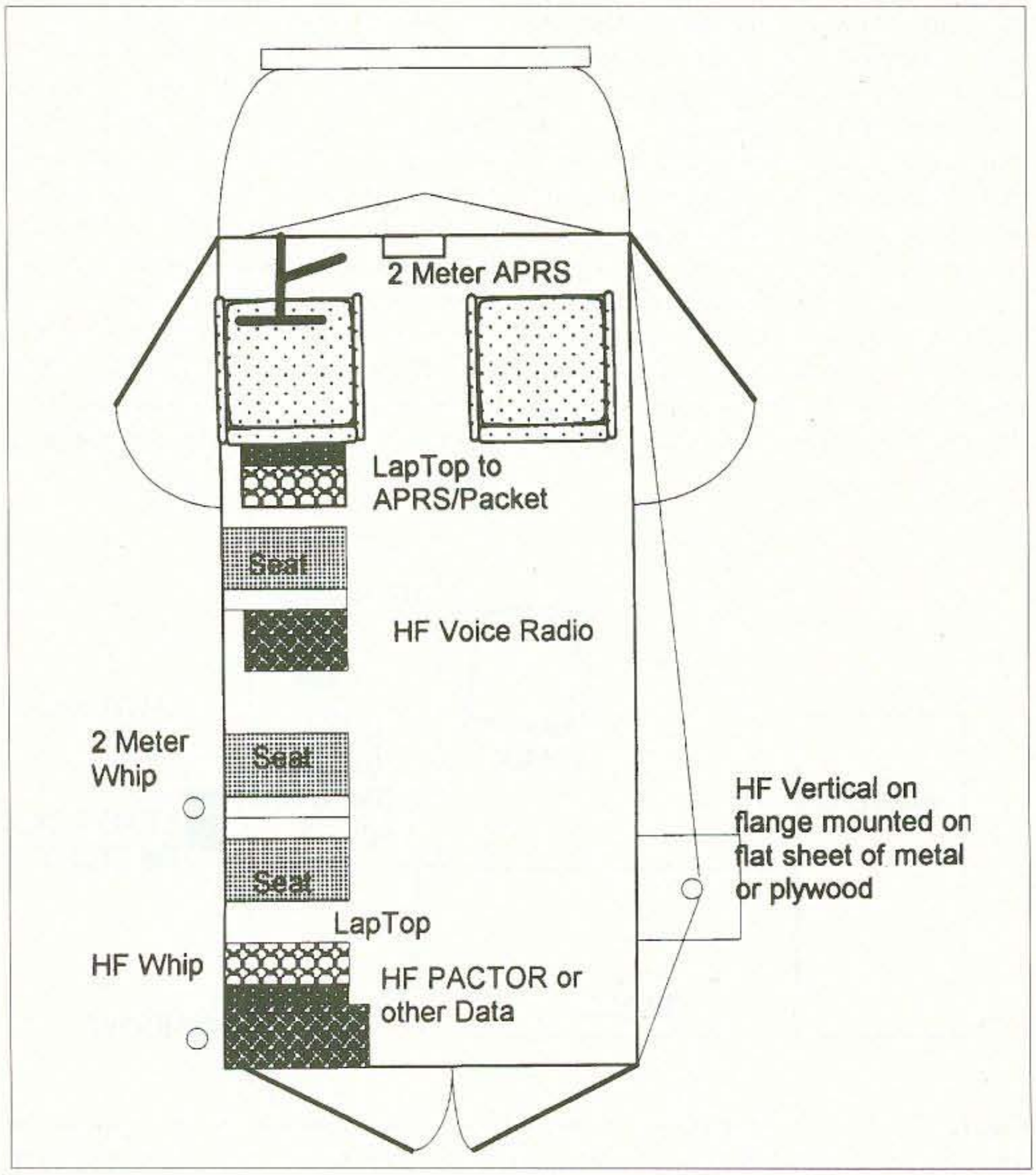

Fig. 2. *The trick with a van is to coordinate space for operations while allowing passage from one position to the next.*

Amplifier Testbench Report

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equal plus and minus voltage power supplies. Most op amps, however, don't have a "ground" terminal, and it isn't difficult to use a single supply voltage. In this case, the noninverting (+) input pin needs to be held at a voltage equal to halfway between the supply voltage and ground. R5 and R6 are a simple voltage divider to provide Vcc/2 bias to pin 3. C2 keeps the DC off T1 and also prevents R8 from loading down the voltage divider. (The input resistance of the CLC400's noninverting input exceeds 200k ohms, so its current doesn't significantly alter the voltage division ratio of R5 and R6.) Since we are using a single power supply, a DC voltage of Vcc/2 appears on the output pin and is blocked by C1.

I hope that readers will feel free to contact me with any questions. 73

FAIRS in Dominica

continued from page 39

other. We heard Australia and the U.S.A., and even talked to an amateur in Vancouver BC on the IRLP. It certainly is an exciting use of the Internet and amateur radio. Look at the Web site [www.IRLP.net] for more information about how to build and use an IRLP link.

Our hosts, Clement and Hetty Pierre Louis, J73CPL and J73HPL, live in a beautiful home in Wotten Waven — a community of about 280 people. It is located at 900 feet in elevation and 4 miles from Roseau on the west or Caribbean side of the island. Clement has a small farm with many varieties of tropical fruits and vegetables. The view from their home of the lush green mountains is really spectacular. Sleeping up on the mountain with no sounds except the cool air and forest sounds was really nice. Hetty treated us to great Dominican meals — much of the ingredients for which were grown on their own farm. We really can't say in words how much we enjoyed visiting and staying with Clement and Hetty, but it was so relaxing and enjoyable — they were really just great to us!!

Our HF radio operation took place at the station located in the home of Clement and Hetty Pierre Louis. Don J79UGF and Dave J79WW helped Clement and Hetty set up the station in 2000. The station consists of a two-element triband beam up 30 feet on a pole. The beam also has a single element on 12 and 17 meters. For 40 and 80, a G5RV is used. Their home is at a wonderful location for ham operations. It is also near the end of the power line and a very quiet location with almost no local RF noise — the S-meter does not show any noise! The equipment is an Alinco DX 70 HT HF transceiver with an Ameritron 500 watt solid state amplifier and MFJ antenna tuner. The four of us made over 3,000 contacts in our limited "spare" time during the 10-day stay. We were surprised to work so many QRP SSB stations, many with only 1 or 2 watts.

Clement has been busy constructing a guest house behind his home. It should be completed by April. It will have three bedrooms, two baths, and kitchen, and if you rent it you can use the antennas we used during our visit. It puts out a mighty strong signal, as indicated by the contacts we made all over the world. A tower and beam are in the works to be installed at the guest house. However, the present antennas are very good.

Contact Hetty J73HPL for more information on their amateur radio guest house. Whether you come by cruise ship or fly into Melville Hall from connections in San Juan, Puerto Rico, you can rent a car and spend time touring the beautiful corners of this small island (15 by 30 miles). There are also several diving and snorkeling establishments that would be happy to have your business.

Please look up the FAIRS Web site [www.fairs.org] for more information about the activities of FAIRS, and the Dominica project. 73

Calendar Events

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fairgrounds. From I-77 S, take 4th St. NW exit, turn right (W) into grounds. Setup at 6 a.m. Admission $5, under 12 free; 8 ft. tables with electricity $12. Handicap accessible. Indoors and heated. Free parking. Talk-in on 147.18(+). Tables contact is *Terry Russ N8ATZ, 3420 Briardale CR. NW, Massillon OH 44646.* Visit the Club Web site at *[www.qsl.net/w8np].* There will be an auction at 10 a.m. 15% commission charged on all items sold. You may buy back your own items at no charge.

WESTMINSTER, MD The Carroll County ARC will hold its 13th Annual Mason-Dixon Computer & Hamfest 8 a.m. to 3 p.m. at the AG Center in Westminster MD. Vendor setup begins at 6 a.m. VE exams begin promptly at 9 a.m. Great food, and free radio checks. For more info visit [www.qis.net/~k3pzn], E-mail [k3pzn@qis.net]; or write CCARC, P.O. Box 2211, Westminster MD 21158. Donation $5, children under 12 free. Tailgate space $5 per 12 ft. space. Vendor and tailgating setup 6 a.m. General admission 8 a.m. 8 ft. tables inside. $12 per table, every 4th table free. Tables guaranteed only if reserved by Oct. 5th with full payment. No pay, no reservation. Mail to *Mason-Dixon Computer & Hamfest, P.O. Box 2211, Westminster MD 21158.* MD State law requires vendors to collect Sales tax. E-mail *[k3pzn@qis.net].* VE exams, pre-registration required. Contact *Phil Karras KE3FL, 3305 Hampton Ct., Mt. Airy MD 21771.* Phone *301-831-5073;* E-mail *[ke3fl@juno.com].* Testing will be conducted on the hamfest premises. On-site exam check-in begins promptly at 9 a.m. No admittance to exam room after 10 a.m. Required for VE exam: original FCC license plus one copy, two forms of ID, one with photo; any CSCEs; exam fee, $10 cash only.

CALENDAR EVENTS, ETC.

SEP 6, 7, 8

PLATTEVILLE, WI The Hidden Valleys ARC will have a special event station "W9D" (Wisconsin 9 Dairy). This station is for the 55th Annual Dairy Days in Platteville WI. Around 2500 kids are expected to be there through the weekend. We will be operating during daytime hours Friday, Saturday, and Sunday, on 80–6 meters SSB and CW; also 2-meter FM. Certificate/QSL available on request. Please send with an SASE. Write to *HVARC, P.O. Box 112, Platteville WI 53818.* If you have any questions please E-mail to *[kb9ryi@arrl.net].*

SEP 7 & 8

NORWICH, CT The Radio Amateur Society of Norwich (RASON), will celebrate the activation of the New London Ledge Lighthouse (#USA-542), by operating a Special Event Station on CW, Phone and RTTY in the General portions of the HF bands. QSL to *RASON, P.O. Box 329, Norwich CT 06360.* For up-to-date info, see *[www.rason.org].* 73

The Digital Port

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I found it has a crop tool which works like a whiz. You do have to exercise a little caution when cropping to keep the perspective. But if you miss and get something out of proportion, the OOPS!! Feature will let you get as many stabs as you need to get it right.

Also, when you click the "Sunny" icon next to the OOPS!! button, you will find you can adjust brightness, contrast and gamma to get your image to look just the way you think it should. And if you are really adventurous, the program extends the possibility of drawing freehand along with inserting objects from the "Things" pull-down.

The idea of the software is to give the ham the at-the-fingertips flexibility to take an

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PROPAGATION

Jim Gray II
210 East Chateau Cir.
Payson AZ 85541
[akdhc2pilot@yahoo.com]

Skip, Skip, Skipping Along

Solar activity will decrease to low or moderate levels this month with a few isolated CME's and M-class flares thrown into the mix. No extraordinary events are foreseen, and in fact only one day is forecast to be Poor (P) at all latitudes! Only 7 other days are listed as Fair-to-Poor (FP) so you might say that things are looking up for HF operators. While this is certainly good news, don't get too excited because coronal hole effects will limit most of the bands to Fair (F) conditions most of the time.

As mentioned in my last column, non-polar coronal holes are a prominent feature of post-peak solar behavior and each one can exist for months or even years. They are going to be with us more often than not through the back end of Cycle 23 and will prevent DXers from enjoying many long stretches of good propagation. If the current holes persist (this being written in early July) then we can expect the first half of September to be mediocre at best. The 16th–18th and 22nd–27th will provide some Good (G) DX'ing conditions however, and I've even included two Very Good (VG) days within those intervals.

For seasonal effects, we can expect storms in the Atlantic and Carribean to disrupt the lower frequencies (upper bands) since September is at the heart of hurricane season. To counter-balance this, the lengthening hours of darkness will provide more opportunities on 40 to 160 meters should there be any periods free of tropical activity. Also, given the declining sun angle, 10 and 15 meters should be open longer as the MUF's (maximum usable frequencies) continue to increase. As is most often the case for early autumn, most activity will be concentrated on 15, 17, and 20 meters, but the other bands should begin to pick up as time passes. All in all, September will not meet seasonal expectations, but will be a long shot better than what we experienced during most of the summer. Until next time, 73!

Band-by-band summary

10 and 12 meters

Conditions will improve throughout the month and all parts of

EASTERN UNITED STATES TO:

GMT	00	02	04	06	08	10	12	14	16	18	20	22
Central America	15/17	17/20	17/20	17/20	17/20	15/17	15/17	10/12	10/12	10/12	17/20	10/12
South America	15/17	15/17	20	30/40	30/40			10/12			12/15	12/15
Western Europe	30/40	30/40	17/20	17/20				10/12	10/12	12/15	17/20	17/20
South Africa	20/30	40	20/30	20/30					10/12	10/12	12/15	12/15
Eastern Europe	17/20	30/40	40/80	40/80	30/40			15/17	10/12	15/17	15/17	17/20
Middle East	20	20	20						10/12	10/17	15/17	15/20
India/ Pakistan	17/20	17/20						15/17				
Far East/ Japan	10/12		17/20				17/20	17/20			15/17	10/12
Southeast Asia	15/17		17/20	17/20			17/20	15/17	10/12			15/17
Australia	10/12	17/20	20	20	20	30/40	30/40	17/20				10/12
Alaska	10/12		20				17/20	20			15/17	10/12
Hawaii	10/12	12/15	17/20	17/20	20/30	20/30	17/20	17/20				10/12
Western USA	20/30	20/30	20/30	30/40	30/40			10/12	10/12	10/12	15/17	17/20

CENTRAL UNITED STATES TO:

Central America	15/17	15/17	17/20	17/20	20/30			10/12	15/17	10/12	10/12	10/12
South America	15/17	15/17	20/30	20/30	17/20			10/12			10/12	12/15
Western Europe								12/15	12/15	12/15	17/20	17/20
South Africa			17/20	17/20					12/15	12/15	15/17	17/20
Eastern Europe	30/40	30/40	30/40						12/15	12/15	17/20	17/20
Middle East	20	20							15/17	15/17	15/17	
India/ Pakistan	15/17	17/20						12/15	12/15			
Far East/ Japan	10/12	12/15	17/20	17/20	17/20		17/20	17/20				10/12
Southeast Asia	10/12		15/20	17/20					10/12	10/12		
Australia	10/12	15/17	15/17		17/20	20/30	30/40	17/20			12/15	10/12
Alaska	10/12	12/15	17/20	17/20	20		17/20	17/20				10/12
Hawaii	12/15	15/17	15/17	17/20	17/20	20/30	30/40	17/20		10/12	12/15	12/15

WESTERN UNITED STATES TO:

Central America	10/12	12/15	15/17	17/20	30/40				10/12	10/12	10/12	12/15
South America	10/12	12/15	15/17	17/20	17/20						10/12	10/12
Western Europe	17/20				17/20			17/20	17/20	20	20	20
South Africa	17/20	20		20						10/12	12/15	12/15
Eastern Europe	17/20	17/20							15/17	15/17	17/20	17/20
Middle East	20									15/17	15/17	20
India/ Pakistan		15/17	17/20						12/15	15/17		
Far East/ Japan	10/12	10/12	12/15	17/20	17/20	17/20			17/20			15/17
Southeast Asia	10/12	10/12						17/20	15/17	17/20		
Australia	10/12	12/15	15/17	15/17	17/20	17/20	17/20		17/20			
Alaska	10/12	10/12	15/17	17/20	17/20	17/20		17/20	17/20			15/17
Hawaii	10/12	10/12	12/15	15/17	20/30	20/30	30/40		12/15	10/12		
Eastern USA	20/30	20/30	30/40	30/40	30/40			10/12	12/15	12/15	15/17	17/20

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.*

September 2002

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

the globe should eventually become workable during daylight hours. In general, work from east to west as the day progresses, but expect southeasterly through southwesterly paths to be better than those near the auroral zone. For folks hunting exotic contacts, try morning and evening gray-line paths over the poles and listen for polar echo as an aid to identifying signals coming from Asia. Daytime short-skip will normally be somewhere between 1,000 and 2,000 miles.

15 and 17 meters

Openings will be longer than those on 10 and 12 meters, and signal strengths will continue to improve as the month passes. Long-path propagation should be particularly good so look for interesting opportunities to Asia and the Far East at the times shown on the band-time-region chart. However, the best openings will still be to Central and South America, especially from early afternoon through mid-evening. Phenomenal skip up to 2,400 miles is possible on these bands on Good (G) days, but the average will usually be from 1,000 to 2,000 miles.

20 meters

"Twenty" will be your mainstay as usual and can be worked around the clock, but nighttime will provide the strongest signals. Try long-path propagation across the Antarctic for forays into Asia and the Far East, and look for strong short-path propagation to Australia, Indonesia, and the South Pacific. Short skip could be as limited as 500 miles during the day but will normally be from 1,000 up to 2,200 miles at night.

30 and 40 meters

Hurricane season will continue to make life difficult here, but during quiet periods there should be some great DXing opportunities between sunset and sunrise. Central and South America will be your mainstays of course, but Eastern Europe, Africa, and the Middle-East could provide some interesting variety, especially for those east of the rocky mountains. Skip will vary between 800 and 2,000 miles at night but expect only 600 to 800 miles during the day.

80 and 160 meters

Check these bands when 40 meters comes alive. Although tropical activity will still curtail activity here, continental nocturnal thunderstorms will no longer be as much of a problem as they were during the summer months. Look for peaks just after midnight and again just before sunrise, a situation that pleases both night-owls and early risers. Short-skip will normally vary between 900 and 2,000 miles. 73

The Digital Port

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image and make it ready to send over the air quickly using ham recognizable symbols and phrases. It was written for this specific purpose and does the trick with much less effort than software aimed at the commercial graphics artist.

Out into the airwaves

Once you get the hang of handling your image files and editing and saving them, you will quickly amass a library of images you can share with hams over the air. The final piece of the puzzle is to get the image into a communications program so you can get on the air and play.

You will find in the SSTV-PAL program setup a provision to work with a number of different programs. I don't think I have found a bad SSTV program. They all work. The program I recommend to "get your feet wet" is MMSSTV.

Once you have chosen the communication software (in this case, MMSSTV) you wish SSTV-PAL to send images to, and you have an image displayed in the SSTV-PAL window, you need only click the box that says "send to MMSSTV." The image will magically appear in the MMSSTV display and you are ready to transmit it or save it to the "stock" folder in MMSSTV.

How do you save the images to the stock folder in MMSSTV? Just click on the image, hold the left mouse button down, drag it to one of the little panes below the regular program, and release the button. It is saved. You can check on it with your Explore tool. It will take on an assigned name such as TXStock1 and may not be in the format you expect, but it will be saved and come up when you open the program; and be available to drag in ready for transmit when you feel the urge.

So much for the quick lesson in file handling and use of two super pieces of freeware available to the ham to realize his image fix. As I mentioned, there are other programs available for SSTV. The accepted standard is ChromaPix. It is a commercial piece with a worth-the-price fee. I recommended these other two programs because they can get you going for pennies. If you like what you get into, then is the time to make choices to make a proper investment.

Other items

I mentioned the WinLink2000 network earlier. I had a few complaints the last time I reviewed the use of that system. During the recent time when an afficionado of that group visited, I downloaded the later version 3 of the AirMail software and my PK-232MBX worked flawlessly to connect via Pactor to the system to exchange a few messages. This was a great improvement.

I am not sure what made the improvement. My first thought was it must be the new and improved software, and that may be true. However, I believe I installed the DSP filter chips in the 232 in the time elapsed between tests. So that may have had an effect as well. Whatever the case, it is possible for a user with only Pactor I to exchange short messages over the system without going to the expense of the more sophisticated equipment running the Pactor II. For what it is worth, I was satisfied. The difference is speed. Pactor I can be dramatically slow by comparison and long messages would be a real pain.

Last month I mentioned getting a board with more serial ports to make life easier and take advantage of some of the toys that really need more than one port on the computer. Well, two things. First, I was gone a lot of last month. Second, I ordered wrong and the board had to go back for exchange.

Hopefully, I will have that little project together by next month and can tell illustrious stories of toys all working so well that I will hold you spellbound for hours. Really, the problem with the modern computers is they are being designed to plug the "other" toys in rather than the stuff you and I use.

That is, the digital camera has a USB port I can plug into on the front of this computer. When I go to plug in my radio control module or the PK-232MBX, or simply a PTT circuit, the single 9 pin serial port on the back of the computer is situated so that I have to plug in a handful of adapters and prop them in place so they don't fall on the floor. Somebody's a plottin' to get us guys. I'll see what I can do for an answer.

And what about *The Chart?*

As I mentioned last month, *The Chart* has vanished from *73*. I have started a Web site at [http://kb7no.home.att.net/]. I hope to load that up with info you can use along with an updated version of *The Chart*. There is an advantage to the Web site for you since you can get the URLs you want and click on them instead of the tedious typing method.

That's it for this month. Thanks for all the kind words via the E-mail. Glad to help where I can. [KB7NO@worldnet.att.net] 73 and all the best, Jack, KB7NO. 73

Hamsats

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enthusiasts within range of their transmitted uplink signal.

The receivers on AO-7 are quite sensitive. Amplifiers are not necessary, but only cause "FMing" of the transponder. That's the chirp on the CW and the warbling on the SSB signals. Don't use FM or any other continuous-duty uplink signals.

Back to the future, or forward to the past? It's time to enjoy a piece of history firsthand. The designers and builders of AO-7 are to be congratulated on an incredible job well done. There aren't many 27-year-old satellites still providing active service from orbit, and this one was built by hams with passion.

AMSAT OSCAR-7 – on the air again!

Letters

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fireman would be required to know what the ECS is, what skills an ECS member possesses, what areas an ECS member should have access to to provide their service, and knowledge of what an ECS I.D. is.

You are correct in that we don't need to reinvent the wheel. Someone (the ARRL?) needs to say to the appropriate people or agency, "Yes, it is a good idea. We have 50% of what is proposed already within the amateur radio community. Let's figure out what else we need (additional national-based training) and, most important, how we get the ECS to be a required part of local public safety agencies' disaster plans."

As a secondary benefit of the increased awareness of amateur radio's capabilities, maybe the "antenna problem" would receive more positive consideration from local governments.

I would be interested in any comments you have.

Our comment is that we would like to hear how other readers feel about this. Thanks, Robert.— J.B.

Ben Alabastro W1VM, Rutland VT. Dear Mr. Burnett, I roared with laughter after reading your "sulfuric acidy" remarks about Bill Pasternak WA6ITF's flamboyant comments about the … er … resurrection of *73 Magazine* by Wayne. Ah, yes, creativity is alive and well!

I have been subscribing and reading *73* for years. To me, *73 Magazine* is on the cutting edge of amateur radio. Best of 73!

And same to you, Ben, along with thanks for the kudos. Been called a lot of things in my life, as the saying goes, but can't say that "sulfuric acidy" is one of them. Lots of great folks in the Rutland area, 73 to all. — J.B. 73

QRX

continued from page 7

thinks that some people are. It also believes that the FCC should not allow certain RF telemetry equipment in health care facilities. The Taskforce holds the opinion that these RF fields will have what it calls the "unwanted, illegal, and unconstitutional effect of depriving electrically sensitive persons of access to health care."

Well, it turns out that the electrosensitivity issue was considered by the FCC some time ago in Docket 95-177. After the matter was given consideration, it was dismissed. More information can be found at [http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-02-135A1.doc].

Thanks to the FCC, via Newsline, *Bill Pasternak WA6ITF, editor.*

Atomic Coffeemaker

If you are a ham who has trouble waking up to keep those wee-hours DX schedules, the answer may be as close as the local appliance store. How about an atomic time coffee maker?

No, we aren't kidding. We discovered this one in an appliance store in the Ft. Lauderdale, Florida, area. It's called the Perfect Time Coffeemaker, and, according to its manufacturer, Melitta Salton, Inc., it's the first such device using radio frequency reception of atomic clock signals to keep it in sync with the National Bureau of Standards timekeeping system.

Melitta Salton claims that the internal clock provides accurate time right out of the box by monitoring the WWVB broadcasts from Boulder, Colorado. All the user need do is to select his or her time zone and the coffeemaker does the rest. It even automatically adjusts to Daylight Savings Time, and its internal backup batteries keep it going during short duration power losses. Salton also says that it also brews good coffee. And what more could any DX hound ever ask for?

Thanks to Newsline, *Bill Pasternak WA6ITF, editor.*

Vocabulary Lesson

Arbitrator [ar'-bi-tray-ter]: Cook who leaves Arby's to work at McDonald's.

Avoidable [uh-voy'-duh-buhl]: What a bullfighter tries to do.

Rubberneck [rub'-er-nek]: What you do to relax your wife.

Subdued [sub-dood']: Like a guy that works on one of those, like, submarines, man.

Thanks to the Penn Wireless Association's X-MITTER, *July 2000.* 73

Never say die

continued from page 37

the government. So what's improved as a result of all this taxation?

Today, because mothers are forced to work, 64% of the three top five-year-olds are stored in day care centers. A recent study showed that 70% of these provide mediocre to simply awful care.

With less than half the states having any minimum requirements for child-care centers, and with employees often making less than parking lot attendants, there's an annual 30% turnover rate.

The result is that our children are being given a minimum of help and exposure to new ideas and experiences at the critical time of their lives when their brains are wide open for development. This is a loss of brain growth that can never again be regained.

This is a time when children could be learning a dozen languages, listening to all kinds of music, learning to use their hands creatively by drawing and using clay. When they could be learning to play an instrument. All of these things build skills and increase IQs.

How did we let ourselves get into this mess? By being kept entranced with watching TV and sports. We know about Tiger Woods, ball and hockey players, but we're totally ignorant about how the money the feds and our states take out of our pocket is being spent.

Oh, we see endless TV exposés of government waste and corruption, but we never translate that into enough personal concern to do anything about it. Our political parties are organized and we aren't, so we're just sheep to be shorn.

Step one: Get mad. Step two: Don't ever donate to any candidate's re-election fund. Step three: Never vote to re-elect anyone (NRA).

Carping

I'm constantly carping about the government education monopoly, another black hole for our tax money. According to the National Center for Educational Statistics, we're coughing up an average of $7,000 per government school pupil per year. That's twice the average for private schools. In some areas, such as Washington, D.C., they're spending an average of $9,000 per student.

Laura Schlessinger now says that government schools are beyond reform and need to be abandoned. Well, as Michael Medved says, "The government makes a mess of everything it does." And we're paying the tab.

Sending one's kids to a public school

Continued on page 64

Wise Up!

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

.....Wayne

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

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

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

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

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

My WWII Submarine Adventures: Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the *Drum*. $5 (#10)

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

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

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

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

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

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

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

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

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

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

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

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

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

1996 100 Editorial Essays: $5 (#72)
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Colloid Reprint. April 97 article on a silver colloid maker, history, and how to use the stuff. $5 (#98).

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

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

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

Stuff I didn't write, but you need:

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

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. $25 (#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 and wondered at their weird gate. Wait'll you see it speeded up. It looks exactly like they're running on Earth! They catch NASA in dozens of give aways that the photos and films had to have been faked. With our gov't it seems to be just one cover-up after another. $40 (#93)

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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 November 2002 classified ad section is September 10, 2002.

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Wanted: Information and References on PRC-6 Walkie-Talkie. Louis L. D'Antuono, 8802 Ridge Blvd., Brooklyn, NY 11209. Tel: 718-748-9612. After 6:00PM. BNB654

NEVER SAY DIE

continued from page 62

these days should be classed as cruel and unusual punishment.

A few years ago they did a program about Erasmus Hall High School, my old school in Brooklyn. What was a beautiful and pretty good 150-year-old school back in the 1930s, when I went there, with 120 afterschool clubs we could join, had been turned into one of the most dangerous schools in the city. I loved singing in the Choral Club, where we did radio performances. And the Savoyards, where we put on Gilbert and Sullivan operettas for the 10,000 students.

And the Radio Club (W2ANU), which helped get me licensed. And the Camera Club, which had me spending many hours a week in a darkroom developing and enlarging photos. And the Book Club.

And so on.

All eventually pfffft.

Hey, it's your money the politicians you've elected are spending on this baloney. 73

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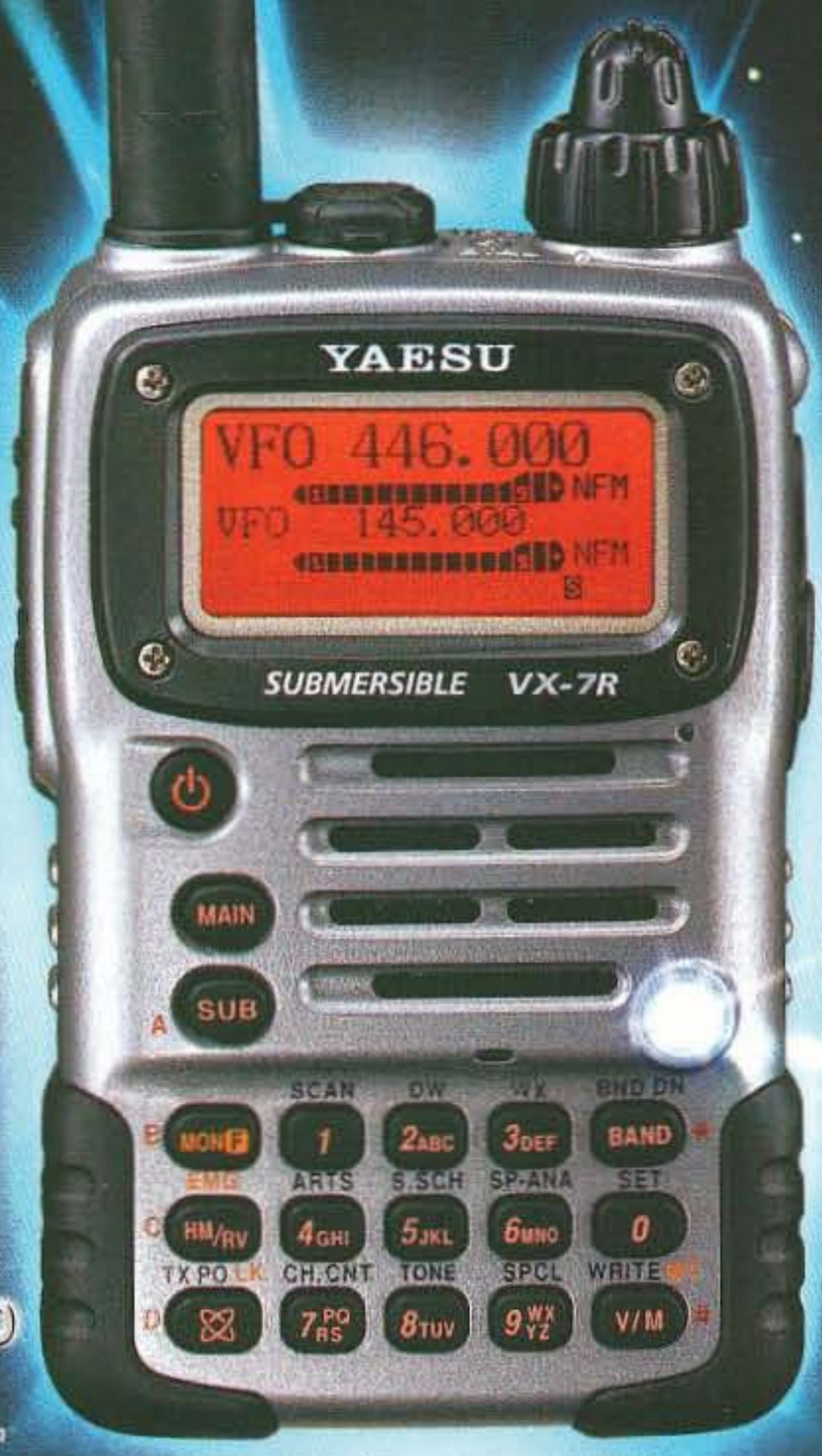

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