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	CONT.	ICS	WT.(LBS)
SS-10	7	10	3.2
SS-12	10	12	3.4
SS-18	15	18	3.6

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •

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PERFORMANCE SPECIFICATIONS

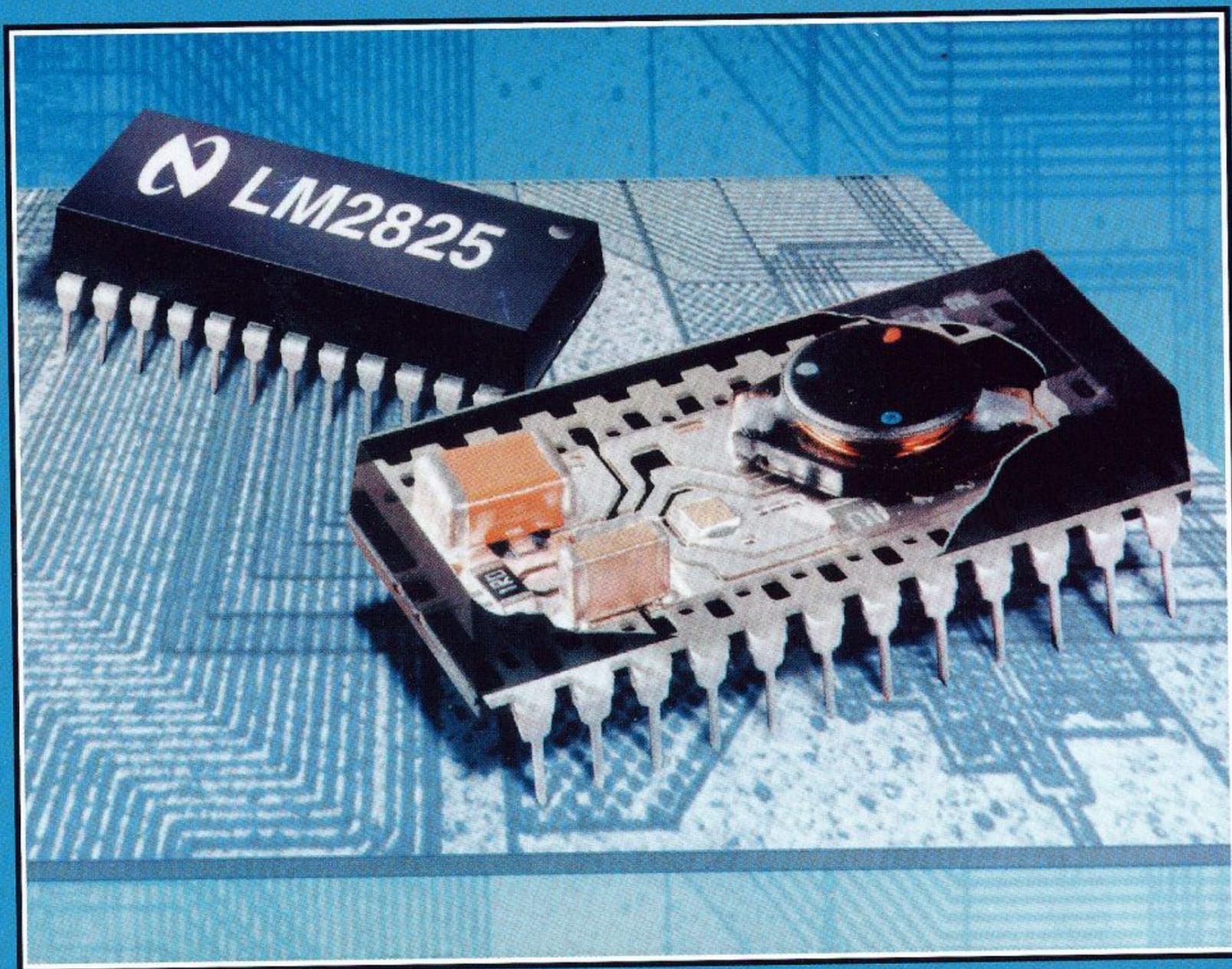
Including Ham Radio Fun!

JUNE 1998
ISSUE #453
USA \$3.95
CANADA \$4.95

International Edition

73[®] Amateur Radio Today

Cutting-Edge Technology Trims Power Supply Size



1 XSTR Fun Radio

How to Involve Kids

Ham Shopping the Web

Review:

Ham IQ Test

20m Micro-Vertical

A Real Simple Patch

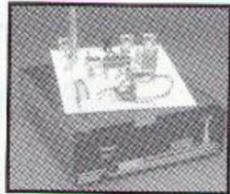


Synthesized FM Stereo Transmitter



Microprocessor controlled for easy frequency programming using DIP switches, no drift, your signal is rock solid all the time - just like the commercial stations. Audio quality is excellent, connect to the line output of any CD player, tape deck or mike mixer and you're on-the-air. Foreign buyers will appreciate the high power output capability of the FM-25; many Caribbean folks use a single FM-25 to cover the whole island! New, improved, clean and hum-free runs on either 12 VDC or 120 VAC. Kit comes complete with case set, whip antenna, 120 VAC power adapter - easy one evening assembly.

FM-25, Synthesized FM Stereo Transmitter Kit.....\$129.95

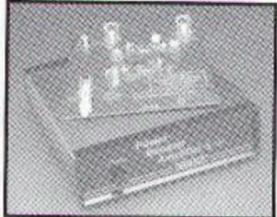


Tunable FM Stereo Transmitter

A lower cost alternative to our high performance transmitters. Offers great value, tunable over the 88-108 MHz FM broadcast band, plenty of power and our manual goes into great detail outlining aspects of antennas, transmitting range and the FCC rules and regulations. Connects to any cassette deck, CD player or mixer and you're on-the-air, you'll be amazed at the exceptional audio quality! Runs on internal 9V battery or external power from 5 to 15 VDC, or optional 120 VAC adapter. Add our matching case and whip antenna set for a nice finished look.

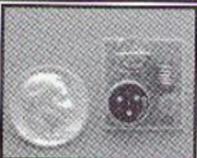
FM-10A, Tunable FM Stereo Transmitter Kit.....\$34.95
CFM, Matching Case and Antenna Set.....\$14.95

RF Power Booster Amplifier



Add some serious muscle to your signal, boost power up to 1 watt over a frequency range of 100 KHz to over 1000 MHz! Use as a lab amp for signal generators, plus many foreign users employ the LPA-1 to boost the power of their FM Stereo transmitters, providing radio service through an entire town. Power required: 12 to 15 volts DC at 250mA, gain of 38dB at 10 MHz, 10 dB at 1000 MHz. For a neat, professionally finished look, add the optional matching case set.

LPA-1, Power Booster Amplifier Kit.....\$39.95
CLPA, Matching Case Set for LPA-1 Kit.....\$14.95
LPA-1WT, Fully Wired LPA-1 with Case.....\$99.95



Micro FM Wireless Mike

World's smallest FM transmitter. Size of a sugar cube! Uses SMT (Surface Mount Technology) devices and mini electret condenser microphone, even the battery is included. We give you two complete sets of SMT parts to allow for any errors or mishaps-build it carefully and you've got extra SMT parts to build another! Audio quality and pick-up is unbelievable, transmission range up to 300 feet, tunable to anywhere in standard FM band 88 to 108 MHz. 7/8" w x 3/8" h x 3/4" h.

FM-5 Micro FM Wireless Mike Kit.....\$19.95

Crystal Controlled Wireless Mike

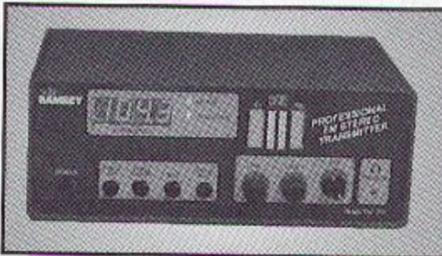


Super stable, drift free, not affected by temperature, metal or your body! Frequency is set by a crystal in the 2 meter Ham band of 146.535 MHz, easily picked up on any scanner radio or 2 meter rig. Changing the crystal to put frequency anywhere in the 140 to 160 MHz range-crystals cost only five or six dollars. Sensitive electret condenser mike picks up whispers anywhere in a room and transmit up to 1/4 mile. Powered by 3 volt Lithium or pair of watch batteries which are included. Uses the latest in SMT surface mount parts and we even include a few extras in case you sneeze and loose a part!

FM-6, Crystal Controlled FM Wireless Mike Kit.....\$39.95
FM-6WT Fully Wired FM-6.....\$69.95

RAMSEY

Super Pro FM Stereo Radio Transmitter



A truly professional frequency synthesized FM Stereo transmitter station in one easy to use, handsome cabinet. Most radio stations require a whole equipment rack to hold all the features

we've packed into the FM-100. Set frequency easily with the Up/Down freq buttons and the big LED digital display. Plus there's input low pass filtering that gives great sound no matter what the source (no more squeals or swishing sounds from cheap CD player inputs!) Peak limiters for maximum 'punch' in your audio - without over modulation, LED bargraph meters for easy setting of audio levels and a built-in mixer with mike and line level inputs. Churches, drive-ins, schools and colleges find the FM-100 to be the answer to their transmitting needs, you will too. No one offers all these features at this price! Kit includes cabinet, whip antenna and 120 VAC supply. We also offer a high power export version of the FM-100 that's fully assembled with one watt of RF power, for miles of program coverage. *The export version can only be shipped outside the USA, or within the US if accompanied by a signed statement that the unit will be exported.*

FM-100, Professional FM Stereo Transmitter Kit.....\$299.95
FM-100WT, Fully Wired High Power FM-100.....\$429.95

AM Band Radio Transmitter



Ramsey AM radio transmitters operate in the standard AM broadcast band and are easily set to any clear channel in your area. Our AM-25, 'pro' version, fully synthesized transmitter features easy frequency setting DIP switches for stable, no-drift frequency control, while being jumper settable for higher power output where regulations allow. The entry-level AM-1 uses a tunable transmit oscillator and runs the maximum 100 milliwatts of power. No FCC license is required, expected range is up to 1/4 mile depending upon antenna and conditions. Transmitters accept standard line-level inputs from tape decks, CD players or mike mixers, and run on 12 volts DC. The Pro AM-25 comes complete with AC power adapter, matching case set and bottom loaded wire antenna. Our entry-level AM-1 has an available matching case and knob set for a finished, professional look.

AM-25 Professional AM Transmitter Kit.....\$129.95
AM-1 Entry level AM Radio Transmitter Kit.....\$29.95
Cam Matching Case Set for AM-1.....\$14.95

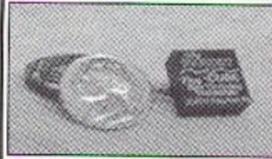
Tone-Grabber Touch Tone Decoder / Reader



Dialed phone numbers, repeater codes, control codes, anywhere touch-

tones are used, your TG-1 will decode and store any number it hears. A simple hook-up to any radio speaker or phone line is all that is required, and since the TG-1 uses a central office quality decoder and microprocessor, it will decode digits at virtually any speed! A 256 digit non-volatile memory stores numbers for 100 years - even with the power turned off, and an 8 digit LED display allows you to scroll through anywhere in memory. To make it easy to pick out numbers and codes, a dash is inserted between any group or set of numbers that were decoded more than 2 seconds apart. The TG-1 runs from any 7 to 15 volt DC power source and is both voltage regulated and crystal controlled for the ultimate in stability. For stand-alone use add our matching case set for a clean, professionally finished project. We have a TG-1 connected up here at the Ramsey factory on the FM radio. It's fun to see the phone numbers that are dialed on the morning radio show! Although the TG-1 requires less than an evening to assemble (and is fun to build, too!), we offer the TG-1 fully wired and tested in matching case for a special price.

TG-1, Tone Grabber Kit.....\$99.95
CTG, Matching Case Set for TG-1 Kit.....\$14.95
TG-1WT, Fully Wired Tone Grabber with Case.....\$149.95
AC12-5, 12 Volt DC Wall Plug Adapter.....\$9.95

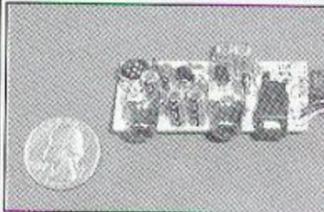


The Cube World's Smallest TV Transmitter

Perfect video transmission from a transmitter you can hide under a quarter and only as thick as a stack of four pennies - that's a nickel in the picture! Transmits color or B&W up to 150' to any TV tuned to cable channel 59 with a solid 20 mW of power. Crystal controlled for no frequency drift with performance that equals law enforcement models that cost hundreds more! Deluxe model includes sound using a sensitive built-in mike that will hear a whisper 15 feet away! Units run on 9 volts and hook-up to most any CCD camera. Our cameras shown below have been tested to mate perfectly with The Cube and work great. Fully assembled.



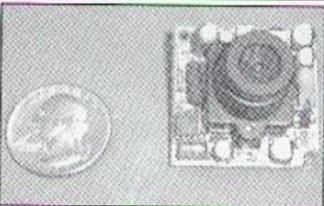
C-2000 Video Transmitter Cube.....\$89.95
C-3000 Video and Audio Transmitter Cube.....\$149.95



CCD Camera Interface Board

Here's a nifty little kit that eases hook-up of your CCD camera module to any video monitor, VCR or video input TV set. The board provides a voltage regulated and filtered source to power the camera (CCD Cameras require a stable source of power for best operation), sensitive electret condenser mike for great sound pick-up and RCA Phono jacks for both audio and video outputs. Runs on 11 - 20 VDC

IB-1 Interface Board Kit.....\$14.95



CCD Video Cameras

If you're looking for a good quality CCD board camera, stop right here! Our cameras use top quality Japanese Class 'A' CCD arrays, not the off-spec arrays that are found on many other cameras. You see, the Japanese suppliers grade the CCDs at manufacture and some manufacturers end up with the off-grade chips due to either cost constraints or lack of buying 'clout'. These cameras have nice clean fields and excellent light sensitivity, you'll really see the difference, and if you want to see in the dark, these are super IR (Infra-Red) sensitive! Available with Wide-angle (80°) or super slim Pin-hole style lens. Both run on 9 VDC and produce standard 1 volt p-p video. Add one of our transmitter units for wireless transmission to any TV set, or add our Interface board (below) for Audio sound pick-up and direct wire connection to any Video monitor or TV video/audio input jacks. Fully assembled.

CCDWA-2 CCD Camera, wide-angle lens.....\$99.95
CCDPH-2 CCD Camera, slim fit pin-hole lens.....\$99.95
IR-1 IR Illuminator Kit.....\$24.95

Call for our Free Catalog !

RAMSEY ELECTRONICS, INC.
793 Canning Parkway
Victor, NY 14564

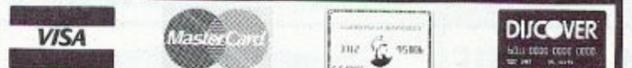
Order Toll-free: 1-800-446-2295

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Technical Info, Order Status

Call Factory direct: (716) 924-4560

www.ramseyelectronics.com



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ISSUE #453

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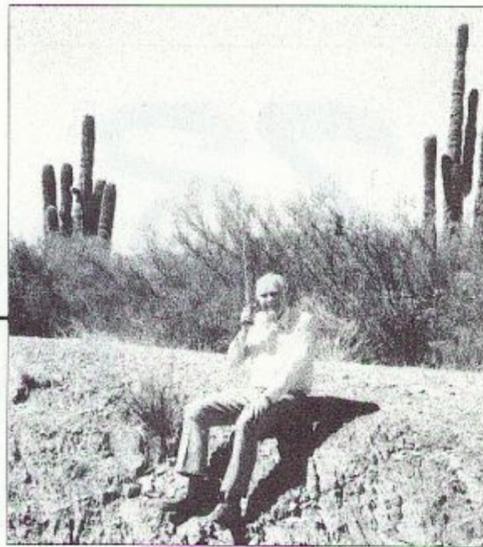
Feedback: Any circuit works better with feedback, so please take the time to report on how much you like, hate, or don't care one way or the other about the articles and columns in this issue. G = great!, O = okay, and U = ugh. The G's and O's will be continued. Enough U's and it's Silent Keysville. Hey, this is *your* communications medium, so don't just sit there scratching your...er...head. FYI: Feedback "number" is usually the page number on which the article or column starts.

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NEVER SAY DIE

Wayne Green W2NSD/1



Mea Culpa

Good heavens, here it is June already! Of course, magazine deadlines being what they are, I'm writing this in early April. We had an early spring here in New Hampshire, with two days in late March of 80° weather! Thanks, *El Niño*. But there are still some small patches of snow out there in the woods, and the crocuses are just now blooming.

After 60 years as a ham — sixty years in which I've done about everything there has been to do in the hobby — I have to admit that I need some new aspect of the hobby to get my juices flowing. I've rag-chewed, DXed, DXpeditioned, pioneered VHF, NBFM, RTTY, SSTV, 10 GHz, aero mobile, computers, hi-fi, SSB, satellites, and so on. Am I burnt out, or is there a shortage of as yet unexplored ham territory?

My work with the New Hampshire Economic Development Commission got me interested in politics, education, health, and ecology, so I've been researching these fields — as you know from my editorials, if your memory hasn't been destroyed by a lack of trace minerals in your diet.

My pioneering instincts have led me into learning all I can about how we can be healthy, and into the paranormal, with things like dowsing, past lives, precognition of the future, those pesky ETs, and stuff like that.

It was this pioneering drive that got me so deeply involved with repeaters and 2m FM, which has given the world cellular telephones. Hey guys, we hams did that!

We did it first and the hams at Motorola and G.E. pushed their companies to get involved.

Alas, not so much has come of our pioneering in RTTY, SSTV, and packet radio.

Anyway, as I find new areas of interest to learn about I'll do my best to stir what few embers of pioneering fire may be left in your breast — and blow some hot air on them to try and kindle new flames.

I hope I'm not boring you with my enthusiasm for health. There's so much baloney out there, both from our medical establishment and the alternative health field, that it's discouraging. Worse, I see almost all of you held prisoner of your habits — which are making you fat and sick, and are cutting 20-30 years or more off your lives. You should be like Norman Vaughn, climbing Mt. McKinley at 95, and not worried about breaking a hip if you slip. If you take care of your body it'll bounce when you're 95, not break.

I do appreciate hearing from you, and love it when you find a newspaper or magazine clipping about something I should know about. I'm not a big fan of E-mail — it's too slow to use and there's too much garbage to sort through. That 32¢ filter for snail-mail works best for me, so please use the US mule.

If you're into something new and exciting in amateur radio, I want to hear about it. I keep asking you to write about any ham adventures you've had, but nothing happens. As I keep telling you, my life has been full of adventure, and most of it hap-

pened because of amateur radio. If you haven't had adventures, that's your fault. They're there — if you dare!

Like I used to talk with Robbie 5Z4ERR in Nairobi a lot. He kept pushing me to come over for a visit. Then Jim K2ORS got me a wonderful cookbook by Herter. Fabulous! Herter had also written a book on how to go on a real inexpensive African hunting safari, so I wrote about it in my editorials, lined up some hams to go with me on the safari, and we had the time of our lives. I also got to operate from Robbie's station in Nairobi and work a ton of DX from there. Wow! That was worth two!!

We hunted and brought back all sorts of great trophies. We visited game parks to photograph the animals. We even got up into northern Kenya, Uganda and Tanzania. The adventure is out there waiting for you, so what's your problem?

When I started 73 in 1960 I moved it as quickly as I could from Brooklyn to New Hampshire and hired on a half dozen ham college dropouts for \$20 a week, plus room and board. We were living in a 40-room 250-year old house, with me doing the cooking. We had a great time. We bought a house halfway up Mt. Monadnock and set up a bunch of towers and huge antenna arrays on all the UHF and VHF bands. Like 336 elements on 2m, with a kilowatt rig (which I built myself). We had a ball! We had a humongous signal, all the way down to North Carolina.

If you haven't managed to have any adventures, at least

you could review the next piece of new ham equipment you buy (if you like it). When you have fun with some new gear, share your excitement and help reward the manufacturer with more sales. If you can think of any new ham horizons for me to get excited about, let me know. Otherwise I'll keep pushing cold fusion, making money, health, and fixing America's problems.

Those License Numbers

As our HF bands are gradually getting less clogged with QRM I'm hearing many amateurs saying that after all, why do we need more hams? Let's keep our bands as a private club for those of us who are left.

In looking at the FCC numbers I see that expirations, either physical (Silent Key) or mental (dropped out), are running around 5% per year for Advanced, General and Tech-Plus, near 10% for Novices, and about zero for Techs. Well, since the Tech license only started in 1991, we won't be seeing those drop-out numbers reflected until 2003 (there's a two-year grace period).

The 5% expirations are half offset by new licensees, so our net loss is only around 2.5% per year. That's 25% in 10 years.

I see that the new Tech licenses have dropped in half this year as compared to 1997, so that well seems to be drying up, giving us a net loss of total hams this year. It's only a 0.5% loss so far, but there's no good reason to expect the drop not to escalate.

It's interesting that the same thing has happened in Japan! Their number of new amateur licenses was less than half that of just three years ago. Their total number of stations peaked in 1995. I expect we can thank the Internet for most of this loss of interest.

Do we have any reason to expect Tech licensees to renew their licenses? How many years does it take to get bored with talking to the same small group over the local repeater?

I doubt it will take 12 years, even for Chief Wiggam's kid. Look at how fast CB came and went! And it was a lot of fun while it was here. I had a great time with it — for a couple of years. I even took a CB rig with me when I flew to other cities and had a wonderful time talking with people.

Two meter repeaters were a blast in the 1970s, but then I found myself getting on the air mostly when I was visiting other cities, just as I had previously with CB. Now I seldom take an HT with me on trips. Burnout, I guess. So, circa 2003, if some major catastrophe hasn't wiped us all out by then, I expect we'll see monumental drops in the number of licensees. Unless, of course, the ARRL decides it's time to actually *do* something. Never happen.

Should we worry? Why? Does anyone much care?

Rumor

According to an ARRL letter there has been a rumor going around the bands that Cushcraft may be going out of business soon. Well, I know they cut their ads in 73 several years ago, and that *has* to have hurt their sales. Apparently they've had to cut back even further on their advertising and lay off workers. Back when Les Cushman WIBX was running the company Cushcraft had a reputation for making excellent antennas. Well, with the exception of the Ringo Ranger, which I found disappointing. But I did put up a 336-element 2m beam of theirs at my QTH up on Mt. Monadnock which gave me one whale of a signal for about 600 miles. But I haven't seen any signs of new developments from the company in years, so I'm not really surprised to hear about the rumor.

One other factor — they've largely been advertising in *QST*, but, as you know, the new hams (almost all Techs) are *not* joining the ARRL, which they see as the enemy. So, with the sunspots still weak, and their ads reaching an older, gradually disappear-

ing audience, it's no wonder sales are way off. Thirty years ago I watched almost the entire ham industry die, advertising away loyally in *QST* until bankruptcy killed them. Is history about to repeat itself?

The Fun of Building

With parts so difficult to get these days, most of our newer hams are missing out on the thrill of building their own equipment. When I started out I was living in New York City, so I had a choice of a bunch of stores with endless tables full of parts. Tubes, sockets, pots, capacitors, switches — anything you could think of was available, and relatively cheap. So I bought parts. If I needed a variable capacitor I'd buy a dozen so I'd have what I needed the next time.

I built receivers, transmitters, amplifiers, test equipment and all kinds of gadgets. Then, after World War II, when stores filled up with war surplus stuff, so did my cellar, then my garage. Then three neighbors' garages. I spent many years at my work bench building stuff and modifying surplus.

When I moved from New York to New Hampshire in 1962 it took four van loads to get all my stuff up here. But by 1965 I saw that transistors were winning, so I had a huge auction and got rid of almost everything I had. I rented the local armory and filled dozens of tables with my stuff. I hated seeing boxes of hundreds of tubes going for \$5, but I wanted good homes for my parts and equipment more than the money.

Every now and then I need something and sort of wish I'd kept maybe one ton of the old parts. Antenna relays haven't gone out of style yet.

One of the reasons I publish so many simple construction projects in 73 is my wish to share the fun of building with as many readers as I can. It's one of

those indescribable thrills. English is a lousy language for expressing feelings, so all I can do is hope you'll give it a try and see what I'm trying to communicate.

These days it's impractical to try and find the parts for many projects, so we turn to our kit catalogs. To buy parts now you usually have to buy in bulk, and there aren't the bargains of my younger days. Back then we had thousands of American electronics firms building things. It was a lot cheaper for them to buy more parts than they needed for a production run than to run out, so there were always a bunch of parts left over which were sold off for peanuts, just to get rid of them. Old-timers will remember the dollar Poly Paks™ bags of parts.

Looking through the latest Ramsey catalog got my building juices going again. John has some great kits in there. They look like a lot of fun. His FM transmitters could have the FCC upset with you, though they've pretty much

been ignoring most of the micro-broadcasters so far. But then you could build Ramsey's amplifier and start pushing things.

There's lots of great video stuff, motion detectors, light beam communicators, and so on. Call (800) 446-2295 and get the 32-page catalog and see if it doesn't get to you too. Then get out your soldering gun, clean the tip, and let's see what you can do.

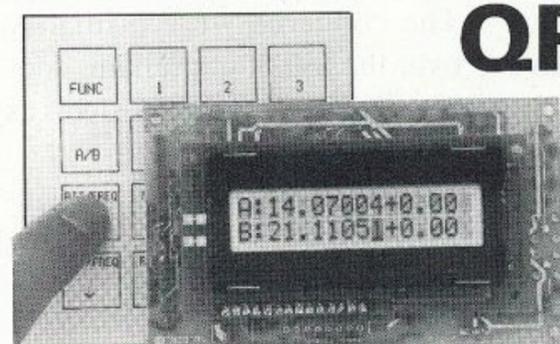
One more thing: if I do suck you in on building, I'm going to be really upset if you don't drop me a note and let me know how much fun you've had. Hey, I need some feedback!

Yes, Ramsey has plenty of ham gear — eight pages of it. Heathkit may be dead and buried, but we still have some great kits available to us.

For that matter you ought to look into all those great MFJ kits too.

You have been letting me down by not reporting on the

Continued on page 39



QRP VFO!

High power keypad controlled direct digital synthesis VFO for low power enthusiasts

Get base station performance from your QRP rig with keypad controlled VFO featuring:

- ✓ Keypad entry of frequency
- ✓ 10 Hz to 40 MHz frequency range
- ✓ Digital VFO with 10 Hz resolution & display
- ✓ Variable rate incremental keypad or rotary tuning
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- ✓ 100 memories for VFO A&B
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LETTERS

From the Ham Shack

Thomas Miller WA8YKN. I read with interest Kenneth Stone's lengthy letter in the April issue of 73. Mr. Stone wrote to me earlier claiming to have designed a circuit which he wanted to market under the name "Bioelectrifier." His complaint with my circuit seemed to be that I had negligently designed it to use a component not found in his "junk box." Since I've been using "Bioelectrifier" as a trademark since 1995, I told him that he would have to come up with a different name. "Bioenergizer" is close enough to be an obvious knock-off, but it is, at least, different.

The circuit Mr. Stone wanted to market used a 555 timer IC driving three transistors, one of which acted as an inverter, and the others as output drivers. I've received dozens of versions of this same basic design over the past few years. It's odd that many people seem to think that a 555 timer IC is *simpler* than a two-transistor multivibrator ...

the 555 contains *two dozen* transistors. Simply drawing a box around them doesn't change the fact that it's increased the complexity of the circuit by a factor of twelve! Of course, you also need several external resistors and capacitors, and something to invert the output, all *in addition* to the 555 integrated circuit.

All of the 555 circuits I've seen (including Mr. Stone's) had a considerable imbalance in the positive-negative duty cycle. Far from the 5% imbalance mentioned by Mr. Stone, most of these ran in the 40/60 or 30/70 range. Shortly after my original article was published, I received a number of letters from people who, unlike either Mr. Stone or myself, actually *were* doctors (MDs and PhDs) and they expressed concern over using anything other than a balanced waveform due to metallic ion migration from the electrodes. The concerns were primarily over the use of aluminum, copper or nickel (stainless steel) as

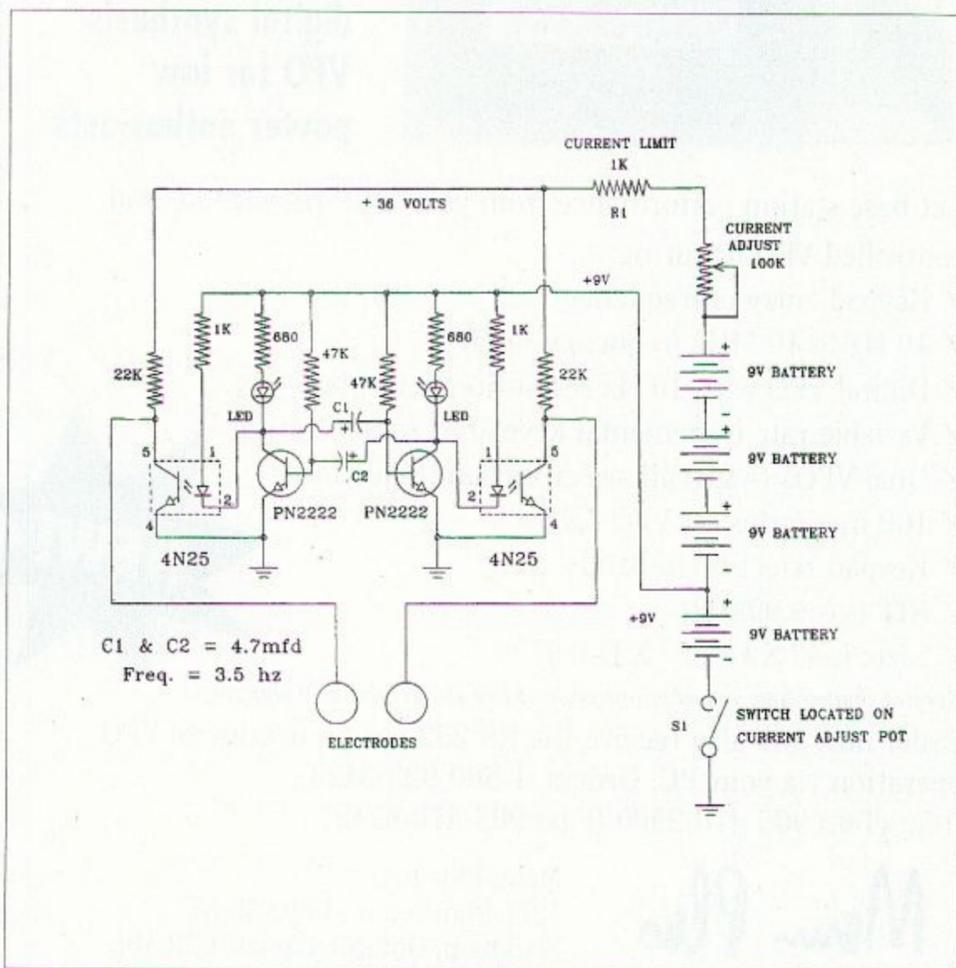


Fig. 1. Schematic.

BIOELECTRIFIER (TM) COMPONENT LAYOUT

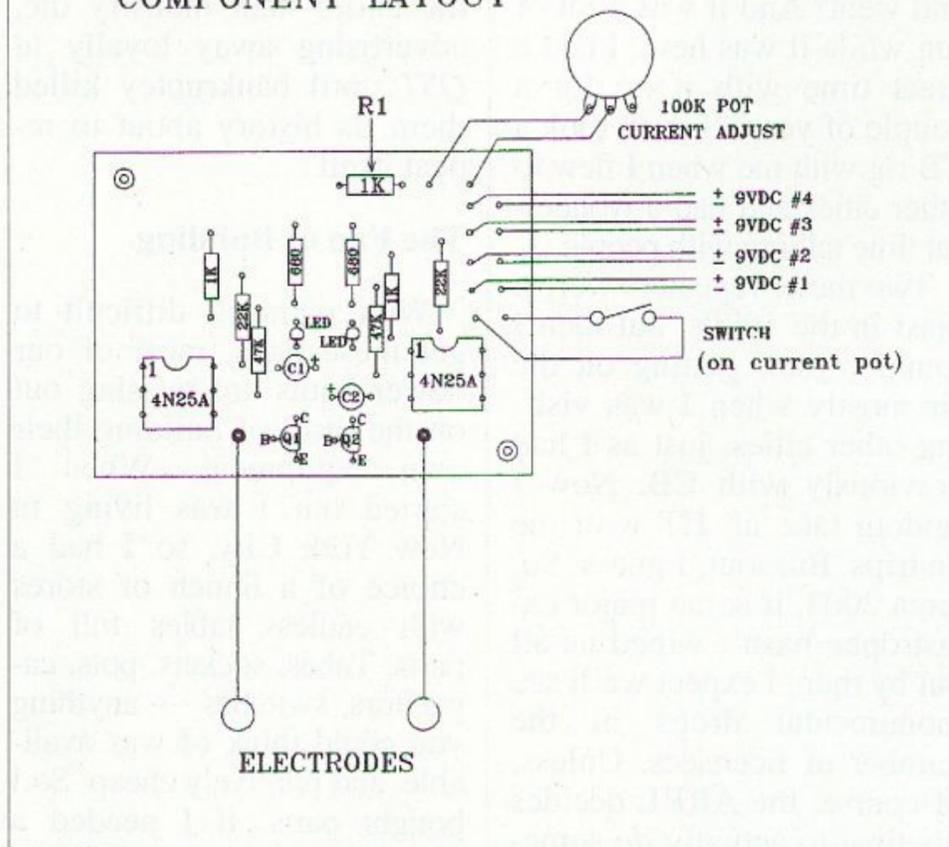


Fig. 2. Component layout.

electrodes, and several recommended the use of silver as a safer alternative. Quite a few readers also sent me information from Dr. Robert O. Becker's book, *The Body Electric*, in which he cautions about hydrogen gas bubbles at even very tiny current levels. Since then, I've made sure that my Bioelectrifier devices had a symmetrical output waveform, and I use .999 fine silver for electrodes. Due to the very small current, there is probably no real danger, but it is a valid precaution, and as such I pass the information along to anyone who sends me a design with an in-

herent imbalance. I'm not "contradicting myself" as Mr. Stone asserts—I'm trying to share the data I've received over the past three years.

Actually, it is possible to achieve a symmetrical output with a 555 timer by adding an external discharge transistor, but oddly, none of the circuits I've seen use this trick.

As to Mr. Stone's comments that the multivibrator has imbalance as a characteristic, I took one of my devices at random and connected the output to my digital storage scope. Freezing the display and carefully positioning the cursors, the positive half of the

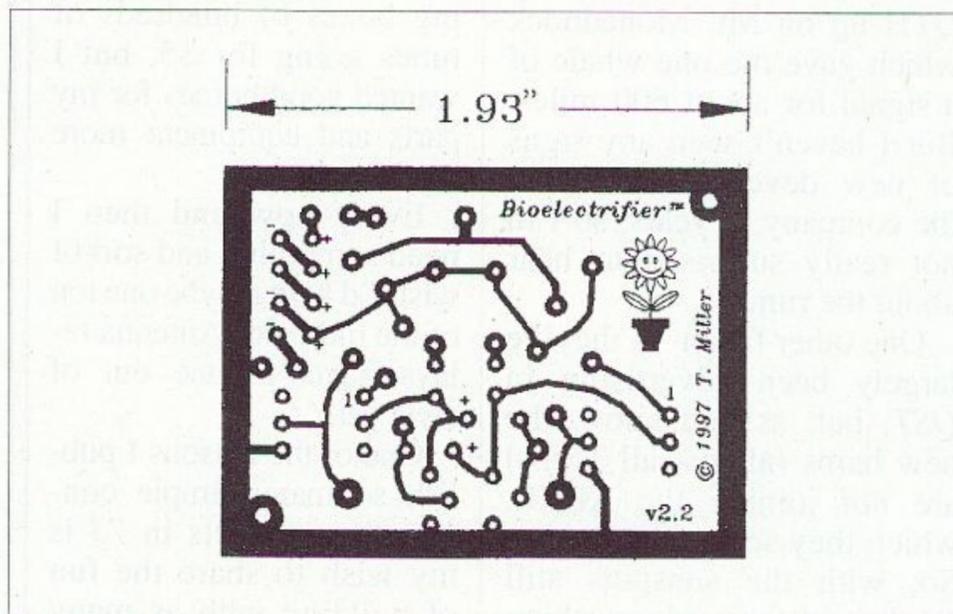


Fig. 3. Circuit board, actual size.

waveform measured exactly 148.0 milliseconds. The negative half also measured exactly 148.0 milliseconds. Hmm ... not much imbalance there. By proper selection of values, symmetry is not hard to come by; today's precision laser-trimmed 1/8-watt resistors cost a whopping 1.4 cents each.

As Mr. Stone points out, silver won't kill you. In fact, the chemistry handbooks (Merck's, CRC, etc.) list skin discoloration as the only "toxic" symptom. However, this does *not* mean that silver has no other effect on the body, or that there is no long-term, low-level toxicity. (Remember that mercury amalgam fillings in your teeth are supposed to be OK, too!) For example, *Lectures on Homeopathic Materia Medica* by J.T. Kent lists *seven and a half pages* of symptoms related to low-level exposure to silver, including effects on the nerves and cartilage, increased tendency toward emotional outbursts, and mental excitability. Silver may be safer than copper, aluminum or nickel, but there is evidence that it can become a low-level irritant in the body. This is further reason to strive for a balanced output waveform, even when silver electrodes are used.

While the original circuit for the Bioelectrifier worked well and illustrated the process of designing a prototype circuit to fit a set of parameters, the output waveform had a small "spike" that tended to cause skin irritation if the current pot was advanced too far. To correct this, I chose values for the multivibrator components to slightly round the very top corner of the rising wave edge. I felt it was important to leave the vertical rise and fall alone, since it's possible that some of the device's effectiveness may be due to harmonic generation. This is easy to do with a transistor oscillator, but very difficult when using an integrated circuit, whether the 555 timer or Mr. Stone's latest circuit using the 4047. Simply putting a .1 μ F

capacitor across the output does not do the same thing—in fact, I could see no difference at all on the scope at 3.5 Hz. If the capacitor value was increased to the point where rounding occurred, it distorted the rest of the waveform as well. This is one reason for using the two-transistor multivibrator, as well as optocoupler output to prevent loading of the circuit.

It would be possible to eliminate the external LEDs charging the multivibrator capacitors through the LEDs in the optocouplers. This would cut the current drain in half, although you would have to select new R/C values to keep the wave shaping.

There's really little point in doing this, however, since the batteries last from four months to a year in normal use, and the LEDs provide a useful function, letting you know that the device is on and operating.

I've received many, many letters from "junior rocket scientists" with ideas for strange devices, and I always advise caution. One lady, for example, wondered if it would be all right to connect her electrodes through dropping resistors to an AC line cord ... after all, she assured me, the cord was UL®- and CSA-approved, and therefore should be safe! (I told her that the certification meant that, when she electrocuted herself, she wouldn't burn her house down.) If I think that there's a possibility of harm in something a reader wants to do, I'll do my best to get that information across. What they do with that information is, ultimately, up to them. If Mr. Stone wants to guarantee that something is safe, and in so doing take the responsibility for the actions of others, then of course he may do so. As for me, I'd rather be just a bit conservative (at least on paper!).

For those who would like to build the latest version of the Bioelectrifier, I'm including the current schematic and circuit board pattern. This information, and much more, is available on

the Internet at [www.bioelectrifier.com] or my personal home page, [www.infocom.com/~thomil/].

You can also reach me via E-mail [thomil@infocom.com] or FAX (765) 962-3509, with comments or questions.

Steve Katz WB2WIK/6, author of "Techno-Trouble for Know-It-Alls" (April), and "Techno-Trouble II," in this issue, passes along some correspondence:

Jay Underdown WØPS to Steve Katz WB2WIK/6. Read your article in the April 73 and found a few glitches.

#4—For plane earth above 30 MHz increasing antenna height will increase signals by a known amount. Doubling the height will cause a 6 dB increase in signal level. I have enclosed a graph (*which we did not print—ed.*) from Bullington from his paper "Radio Propagation at Frequencies Above 30 mc/s," *Proceedings of the IRE*, Vol. 35, October 1947.

#5—Your explanation is in error if a "low noise" preamp is used. The effective sensitivity of a receiver is controlled by its noise temperature. The noise temperature is controlled primarily by the first active device in the receiver. A "low noise" preamp, by being the first active device, will increase the signal to noise ratio even if it *is* in the shack. This assumes that the noise temperature of the preamp is lower than that of the receiver itself. Borrow a SINAD distortion meter and test it for yourself.

#7—Your explanation is in error. When the voltage doubles, the current drops to 1/4.

$$\left(P = \frac{E^2}{R} \right)$$

I have some other problems with your article, but they are minor. Overall you did a good job of putting some radio myths to bed.

Steve Katz WB2WIK/6 replies to Jay Underwood WØPS. Thanks so much for your letter of April 8 re: "Techno-Trouble for Know-It-Alls," my recent article in *73 Magazine*.

I appreciate your input, but stick to my guns on all three issues:

#4—Your data is 51 years old and seriously flawed, I think, due to a variety of factors including (1) that real earth (reflecting plane) height varies considerably from location to location and there is no known constant; (2) we proved this data is not at all "independent of frequency" as alleged, in field studies performed while I was with AT&T Bell Telephone Laboratories, Holmdel, in our 1974-1975 empirical trials, which are well documented; (3) it expresses "plane earth loss between half-wave dipoles" and did not consider varying plane resistivities/reflectivities; (4) the chart does not consider vagaries in F-layer height and reflectivity; and (5) here at my own home station I have dipoles for 40 m installed at 35 and 70 feet (a 2:1 ratio), both east-west facing but located about 250 feet ($\approx 1.8 \lambda$) apart at opposite ends of my lot and signals from distances >1000 mi average >>6 dB stronger on the higher dipole. During the 1996 November SS, for example, I spent a great deal of time taking average readings on about 100 signals from the eastern US, varying in distance from 2300 to 2900 miles, and the average enhancement from the higher dipole was 11.2 dB once S-meter readings were converted to reality by the use of my transfer standard, an HP 8640B. I'll admit, however, that on many "local" signals (0-500 miles), the lower dipole performed about as well, and frequently better, than the higher dipole. Based on Bullington's chart, this would never be the case.

#5—I fully understand what you are saying, and it is all true;

Continued on page 78

KØOV Tapped as US ARDF Coordinator

73's "Homing In" columnist Joe Moell KØOV has been appointed the first Amateur Radio Direction Finding (ARDF) coordinator for the US. At its last meeting, the ARRL board of directors authorized creation of this volunteer position to promote international-style foxhunting activities, especially as a means to involve more youth in the hobby. The appointment was made by the League's executive secretary, Dave Sumner K1ZZ.

ARDF coordinators have been appointed by the national societies of over 30 International Amateur Radio Union (IARU) countries. In this hemisphere, Canada is the only other country with an appointed ARDF coordinator at this time. Canada's ARDF coordinator is Perry Creighton VE7WWP.

ARDF coordinators have formed multi-nation ARDF Working Group committees in Europe and Asia that host international ARDF championship competitions. The next such event will be the ARDF World Championships in Hungary this fall. One goal of foxhunting enthusiasts in the US and Canada is to hold an IARU Region 2 championship foxhunt in 1999. For the latest ARDF information, read "Homing In" each month in 73 *Amateur Radio Today* magazine and visit the "Homing In" Web site [<http://members.aol.com/homingin/>].

Anti-Mobile Law Stopped In Its Tracks

Some good news for hams living in Wisconsin—the threat of a new state law that would ban the mobile in motion use of two-way radio equipment has ended—at least for now.

Smoke Signals newsletter editor Jim Romelfanger K9ZZ states that Wisconsin Assembly Bill 754 is basically a dead issue. Romelfanger says that he spoke with one of its sponsors and learned that it has not even had a hearing, let alone been reported out of committee. Jim says that with only a few days left to this year's Wisconsin Assembly session, that there is no way for AB 754 to become Wisconsin state law.

AB 754 was primarily aimed at curbing automobile accidents caused by inattentive cellular telephone users. Unfortunately for hams, the wording of the measure encompassed all forms of mobile radio communications. Its backers are

expected to try to pass it again in the next Assembly session. In the meantime, hams have a chance to build a solid opposition to it, or at least demand an exemption for licensed radio amateurs.

Two Hams Assigned to John Glenn Flight

Two hams—US astronaut Scott Parazynski KC5RSY, and European Space Agency astronaut Pedro Duque KC5RGG, of Spain—will be among an international crew this fall when US Senator John Glenn gets his second chance at space travel. The STS-95 mission will mark the third shuttle flight for Parazynski, a medical doctor who trained for a stay aboard *Mir* but had to be re-assigned after it was determined he was too tall to fit the Russian space suits worn aboard the *Soyuz*.

It's still not known at this time if the Shuttle Amateur Radio EXperiment (SAREX) payload will be aboard STS-95, which is scheduled to go up in October. The launch date for the only scheduled SAREX mission, STS-93, has slipped from August to December. The STS-95 flight that will carry the United States' newest and oldest astronaut into space has been under consideration for several months as a possible SAREX flight. Nothing has been confirmed yet, however. Crew members now are looking at possible secondary payloads for the mission. Glenn, who will be 77 when he goes into space again, has begun his astronaut training. He has undergone extensive medical tests. This week, he spent time in a centrifuge for the first time in decades.

Other members of the STS-95 crew include Japanese astronaut and cardiologist Chiaki Mukai, and Americans Steve Lindsey and Steve Robinson. Commanding STS-95 will be shuttle veteran Curt Brown.

From the *ARRL Letter*, via *Tuned Circuit*, March 1998.

Ham Radio History

4,000,000,000 BC: Earth is a swirling ball of flames. Propagation is extremely poor.

1,000,000,000 BC: First dry land appears. It is divided up into grid squares.

500,000,000 BC: Second patch of dry land appears. First DXpedition; DXCC credit disallowed because of questionable licensing agreement.

400,000,000 BC: Flowering plants and

grasses evolve. Rotary beam invented, but sales stall for lack of suitable mounting structures.

300,000,000 BC: First tree appears and is immediately cut down, stripped of branches, placed in a concrete base and called a telephone pole. Beam sales pick up.

200,000,000 BC: More beams sold. Installer falls from top of pole. Safety belt is invented.

100,000,000 BC: First mountain appears. The repeater is invented.

50,000,000 BC: CQ is adopted.

4,000,000 BC: Humans replace swine as dominant species. The name ham operator hangs on, however.

3,000,000 BC: Dugout canoe invented. Maritime Mobile Net formed on 14.313 MHz.

2,000,000 BC – 800 AD: Nothing much happens for a long time.

900 AD: Chinese invent gunpowder. BY1AA is first "Big Gun" DXer.

1790 AD: Ben Franklin invents longwire receiving antenna.

1961 AD: Second repeater erected. First repeater group refuses to change frequency. First repeater coordinator appointed.

1998 AD: Amateur radio humor sinks to a new low.

From *ARRL Letter*, Vol. 16, #49, via January's *RF-Carrier*, newsletter of The Dayton Amateur Radio Association, Mike Priest KB8JUA, editor.

100-Year-Old Hobby Takes on New Life

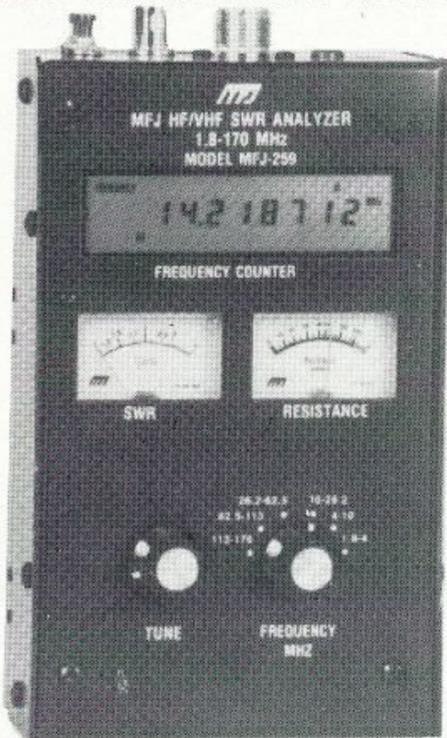
For the past century, the hobby of amateur radio has challenged the technically inclined with its promise of instantaneous global communications. The world's radio amateurs, known as hams, have contributed to virtually every breakthrough enjoyed by the telecommunications industry, including the development of the Internet. Ironically, the widespread availability of low-cost digital communications (including cellular telephone, E-mail, and the Web) has in recent years slowed the growth in ham radio's ranks. Now the amateur radio community is revitalizing itself by applying its members' talents in search of other life forms.

"As our society becomes technologically mature, the role of ham radio has to change," observes Dr. H. Paul Shuch, a lifelong radio ham and the Executive Director of the nonprofit SETI (Search for Extra-Terrestrial Intelligence) League. "Searching for life in space requires the kind of radio skills which hams possess, and cannot be conducted by simply logging on-line. It involves the design and construction of antennas, receivers, and signal analysis hardware and software—which is what ham radio is all about." With over 700 members in 40 countries on six continents, and a plan in place to grow to 5000 stations in its global radio astronomy network, The SETI League is "the ultimate ham club," according to

Continued on page 79

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A Pentium-Style Positive and Negative PS

Reading about new technology is great, but using it is even better!

Sam Ulbing N4UAU
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Suppose you saw this ad in the paper: "For sale: IBM PC with DOS 2.0 and 640K memory."

Would you get excited? Probably not, because if you are like most hams, you already have a Pentium™ computer with 32 megs of memory, a gazillion-byte hard drive, and, of course, Windows 95™. Do you really need all that awesome computing power? I know I don't, but hey, it's the way of the future and I don't want to become obsolete! Pentiums, laptops, cell phones and GPS all exist because of rapidly advancing electronic technology that provides better chips every day.

So tell me, why would anyone get excited about a ham project that uses 1970s technology? Yawn. "Bor-ing, obsolete." Yet many ham projects do use these "outmoded" parts. Why? I think there are a number of reasons. Technological changes happen so fast that it's a full-time job keeping up with them, and ham radio is a hobby, not a job. The best new parts are not readily available to the amateur user, or they are expensive to buy in small quanti-

ties. Does this mean that ham radio is going to go the way of the dodo and become extinct?

I, for one, hope not—and I try to fight obsolescence in my ham shack by building projects that use some of the new technology. I spend a lot of time reading technical literature, locating new ICs, and figuring out ways to apply them to ham radio. Some ICs require a bit of technical skill to use, and I am having fun learning. Others do not require much knowledge at all, since the technology is already built into the IC. As my knowledge and skill working with these new products increases, I hope to be able to build more sophisticated projects.

If you, too, are interested in learning more, the simple devices in this article are ideal as starter projects that use the latest in technology, as well as offer a good opportunity to gain skills and knowledge. I find that I learn best by actually building and using instead of just reading, and here's how I added some "Pentium-style" technology to my shack.

Need and solution

I needed a power supply that could source up to one amp positive current at +5 V and 150 milliamps at -5 V. The currents are different because part of my project needed only positive voltage. My solution is a power supply that uses a switching DC-DC converter and a surface-mount switched capacitor voltage inverter. I did not choose this solution because of the technology—I chose it because without the new technology I could not have made the device at all.

A positive five-volt power supply

There are many ways to make a five-volt power supply. If you have AC, you can use a transformer to get an AC voltage near your desired DC voltage, and then use a diode and capacitor to rectify it. Finally, you would use a voltage regulator to prevent the voltage from varying with the load. One such power supply is presented in the January 1997 issue of 73 ("A Positive and Negative Power Supply," J. Frank

Brumbaugh). Such power supplies have been in use for a long time. They are generally efficient and not too costly, as long as you can find a transformer with the right output voltage. On the negative side, they can be bulky and they require an AC input which is not conducive to portability.

I run most of my shack from a 12-volt battery for several reasons: most of my projects are low-voltage DC projects; if the power goes off I can still operate; and I am able to take any of the projects with me on my boat and know they will still work. So when I needed five volts, I wanted to get it from my 12-volt battery rather than use an AC source. I have made many five-volt power supplies from 12-volt sources before, using linear regulators from the 1970s like the LM7805. They are small, cheap, and readily available, and some versions can supply up to one amp. But when I hooked up my circuit and turned on my load, the regulator got hot very quickly.

This is a limitation with a linear regulator because it is nothing more than a resistor. Granted, it is a fancy resistor because it changes its value as the load changes to maintain a constant output voltage, but like any resistor it is subject to Ohm's law:

$$\text{Power} = \text{Current} \times \text{Voltage.}$$

When I connected mine to the 12-volt battery and put on the half-amp load, the drop across the "resistor" was $12 - 5 = 7$ volts and the power (heat) dissipated in the regulator was $7 \times 0.5 = 3.5$ watts. That's a lot of heat and might offer the basis for a nice 12-volt-powered hot dog cooker, but I didn't think it would do as an electronic circuit

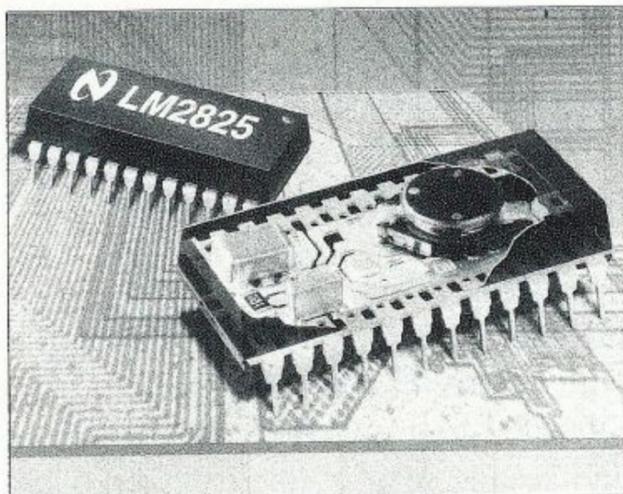


Photo A. The LM2825 switching regulator. Photo courtesy of National Semiconductor.

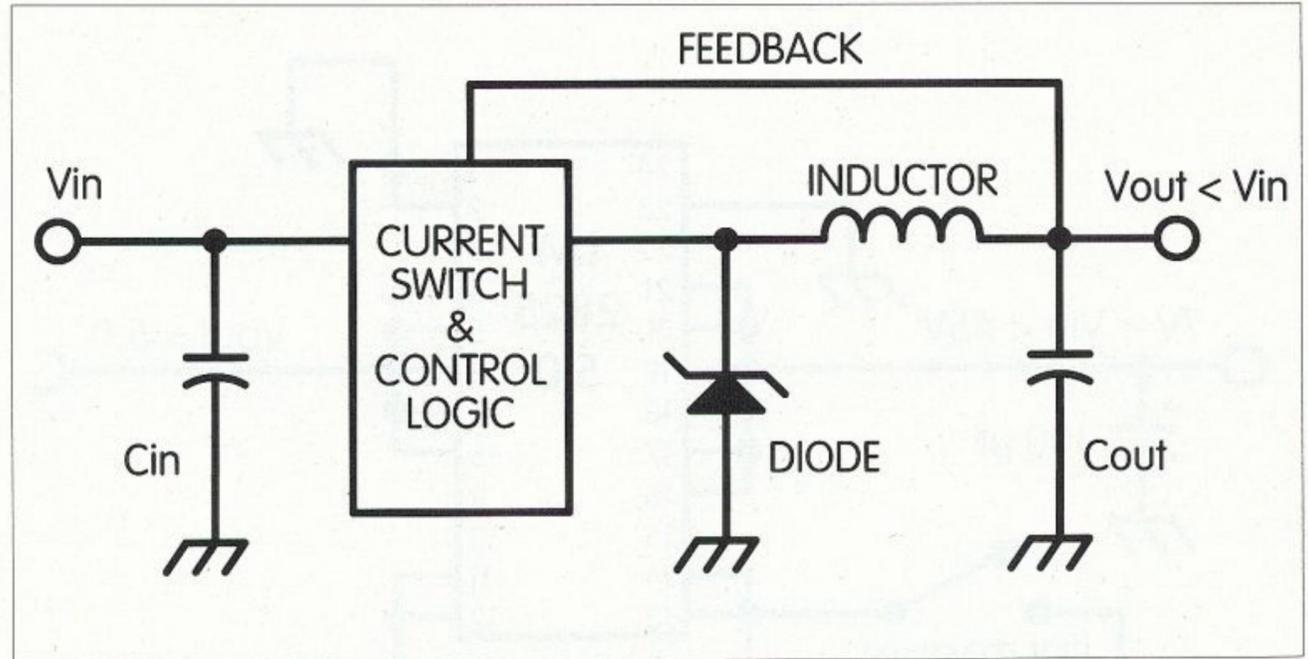


Fig. 1. Basic "buck" regulator.

without a large heat sink. I wanted a better solution.

The November 1996 issue of 73 had an article, "Switching Power Supplies," by Dave Miller, which discussed the basics of switching regulators. As he noted, these new devices have several advantages: They are efficient, can handle more power, and can decrease or increase DC voltage. Dave discussed how these devices work by using an inductor to cause a voltage change. A change in current through an inductor will cause it to generate a voltage opposing the current change. By switching the current through the inductor on and off very rapidly (changing it rapidly), it is possible to get a higher or lower output voltage. A diode and capacitor are then used to rectify the new voltage.

The principle is simple, but as a 1987 Linear Technologies Applications Note commented, "Unfortunately, switching regulators are also one of the most difficult linear circuits to design. Mysterious modes; sudden, seemingly inexplicable failures; peculiar regulation characteristics; and just plain explosions are common occurrences." Obviously, this was not something an amateur would want to try!

By 1996, I found that the technology had advanced when I read a National Semiconductor ad about their Simple Switchers™, which they claimed made building regulators easier for novices. With some effort I finally was able to locate all the parts to build a neat DC voltage booster. Since then, National

has continued to improve this line of regulators.

Recently they introduced the LM2825, a switching regulator that is likely to become the 78xx of the next century (Photo A). This regulator is so easy to use, you would think it is "only" another linear regulator—in fact, it is a sophisticated buck-mode switcher (a "buck" regulator reduces voltage and a "boost" regulator increases it). As of the end of 1997, the LM2825 family had five different voltage versions (3.3, 5.0, 12.0, and two adjustable versions). The adjustable versions work like the LM317-type regulators.

The circuit and operation

Fig. 1 shows the circuit for a buck-type regulator, and Photo B shows my five-volt regulator using the LM2825. "Hey," you say, "there's just one IC. Where are the inductor, diode, and capacitor?" Well, they're actually built right onto the chip.

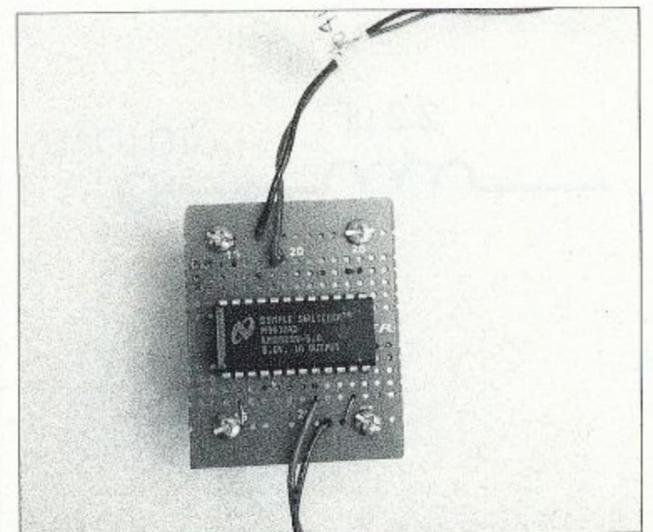


Photo B. A "Pentium-style" buck regulator. Photo by author.

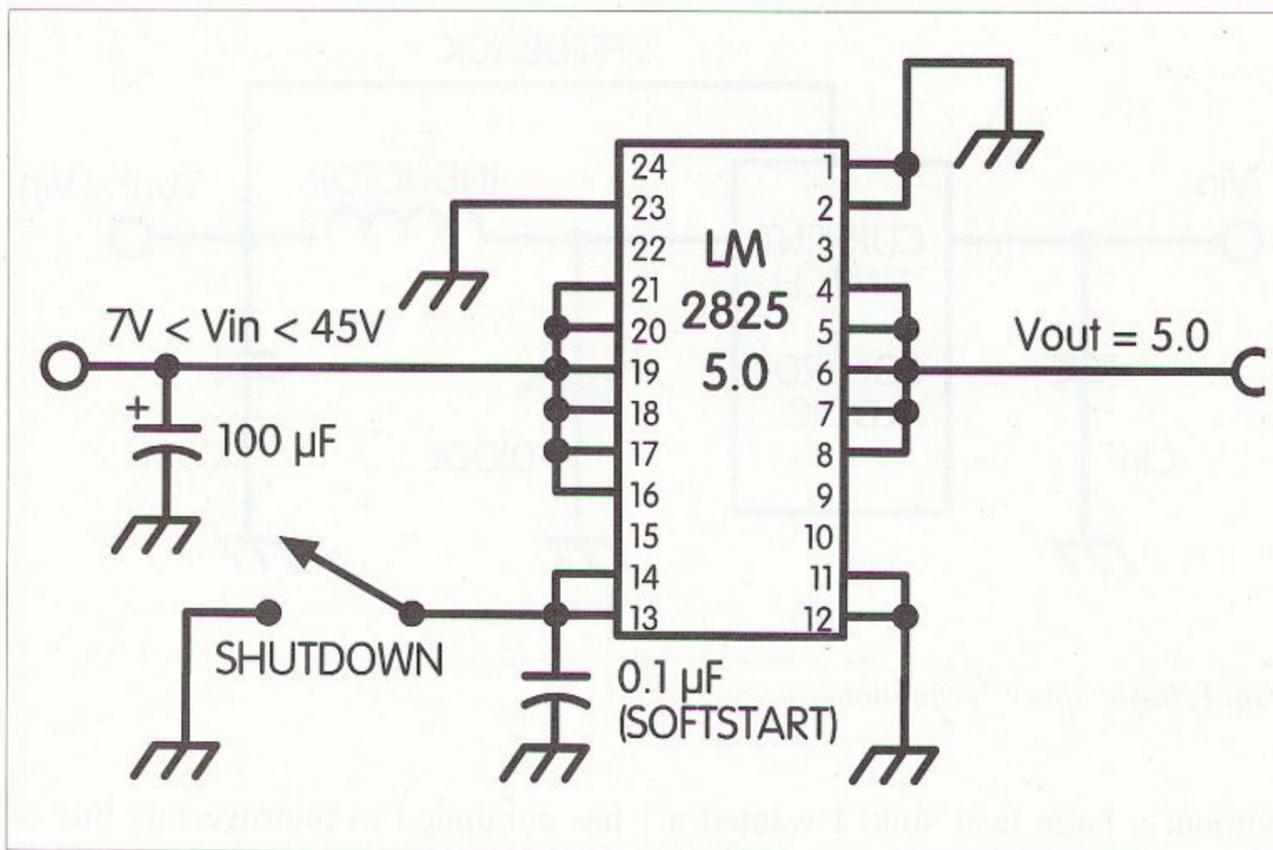


Fig. 2. LM2825-5.0 buck-type regulator with optional capacitors.

I soldered the chip to a PC board, and added two optional capacitors, and hooked up my load. Twelve volts in, five volts out, and the chip doesn't even get warm. My 7805-based power supply is now collecting dust.

National claims awesome reliability: 20,000,000 hours mean time between failure (which they note is 2,283 years). Remember when parts used to fail every few years? The regulator is environmentally friendly since it is 80% efficient and thus conserves energy. Compare this to the LM7805, which is only 42% efficient with a 12-volt input (unless you use the other 58% to cook those hot dogs!). Both are internally protected for power dissipation, but obviously the switcher will be able to convert a lot more power before it overheats. If you use the regulator in a portable circuit, particularly one that

has a computer control, you might appreciate the fact that the regulator has a shutdown mode that draws only 65 μ A.

Fig. 2 shows my regulator with the two optional capacitors. C_{in} is only required if the main bypass capacitor is more than six inches away from the IC. A low-ESR (effective series resistance) aluminum capacitor is recommended to prevent switching transients from appearing at the input. The current rating of the capacitor should be at least half the DC load current, and the voltage rating 1.25 times the maximum input voltage. The Panasonic series HFQ or Nichicon PL series are suggested, but I used a 100- μ F HFS series I had and it worked well. While it is possible to use tantalum capacitors, they are not recommended with a low-impedance power source (like a car battery) due to the high inrush current which can cause shorts in tantalum capacitors. Also, ceramic capacitors can cause ringing at the V_{in} pin.

C_{ss} is an optional soft-start capacitor. When a switching regulator first starts, there is a large current surge. If your power supply has a fairly high output impedance, you could have start-up problems due to voltage drops. C_{ss} reduces the start-up current demand by ramping up the current with a series of pulses of increasing width. This ramp-up also reduces the start-up surge current on the load. For input voltages

above 12 volts and higher temperatures, this capacitor may be required for proper operation, so I thought it was a good idea to put one in anyway. A 0.1- to 1- μ F tantalum or ceramic capacitor is recommended for this purpose.

Because they operate by pulsing the current (this chip runs at 150 kHz), switching regulators tend to be noisier than linear regulators. I have not noticed a noise problem when using mine but if you do, it can be reduced by adding a low-pass filter as shown in Fig. 3.

Although you might not guess it from this project, switching regulators are still complex systems to design. If you want to build a boost-mode switcher with discrete parts, check out "My All Purpose Voltage Booster," *QST*, July 1997.

A negative five-volt regulator

Now that I had my five-volt source, I thought I was all set. To supply the -5 V from the +5 V I could use a 1970s switched-capacitor voltage converter like the ICL7660. I had used these for several earlier projects, but when I checked the data sheet I found that this chip has a high output impedance (60 ohms or more). With no load, I could get -5 V but with a 20-milliamp load the output would only be -4 V—and I needed eight times that current. Foiled again.

Once again, I started looking for new and improved products. Maxim had a couple of improved versions of the 7660, but these didn't provide enough current. Then, last spring, National Semiconductor announced their LM2662, a switched-capacitor converter with 3.5 ohms of output resistance. With my 150 mA load I would get about -4.5 V, which would work.

As I was looking for an inverter, I noted that many of the newer and better ones were only available in surface-mount packages. Such was the case with the LM2662, which comes only in a surface-mount SO-8 package. Fortunately, I developed some SMT skills with a previous project ("SMALL, a Surface Mount Amplifier that is Little and Loud," *QST*, June 1996). I welcomed the chance to improve my skills, because I know that the inside

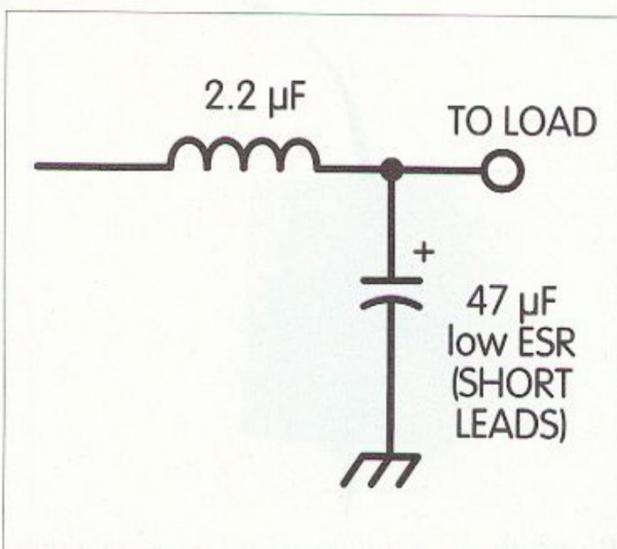


Fig. 3. Optional noise filter.

of my Pentium computer is almost entirely SMT. It doesn't take a rocket scientist to know that in the future more and more ICs will be available as SMT only. (Readers new to SMT may want to peruse Dave Miller NZ9E's "Surface Mount Devices," 73, October 1997.—ed.)

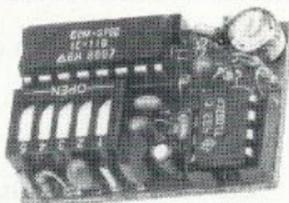
Photos C and D show my +5 V to -5 V inverter next to a dime. I put the capacitors on the back side of a double-sided piece of copperclad to keep the size smaller, and because it made the board easier to fabricate. Note that just as with older technology, the capacitors are bigger than the IC. But the two 100 μ F 16 V SMT capacitors together are still smaller than a dime. The whole project could be built on an even smaller piece of circuit board if I ever get skilled enough. (It's like CW; I keep working at it and slowly I get better.)

The circuit and operation

Fig. 4 shows the circuit for my inverter, and Fig. 5 shows how it works. This is a very simple circuit: just two capacitors and one IC. In fact, it is the same circuit used with the ICL7660, and its operation is the same. The IC consists of four large CMOS switches, S1-S4, that are switched in sequence by an internal oscillator. During the first time interval, S1 and S3 are closed and S2 and S4 are open, and the +5 V input charges C1 with the pin 2 side being positive and pin 4 at ground. At time interval two, S1 and S3 are open and S2 and S4 are closed. There is still 5 V across C1, with the pin 2 side being positive, but pin 4 is no longer at ground potential. The 5-V charge across C1 is transferred to C2, and since C2's positive side is connected to ground, the other side must be 5 volts lower than ground, or -5 volts.

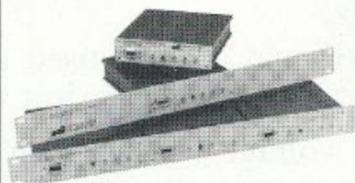
The reason this switch can handle more current and still be smaller is because technology has created better switching circuits. The LM2662 has about two ohms of effective internal resistance, while the ICL7660 has about 50 ohms. The output resistance is also affected by the ESR of the external capacitors, so it is important to use low-ESR ones. The ESR of C1 is

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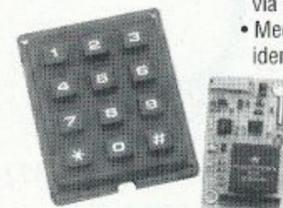
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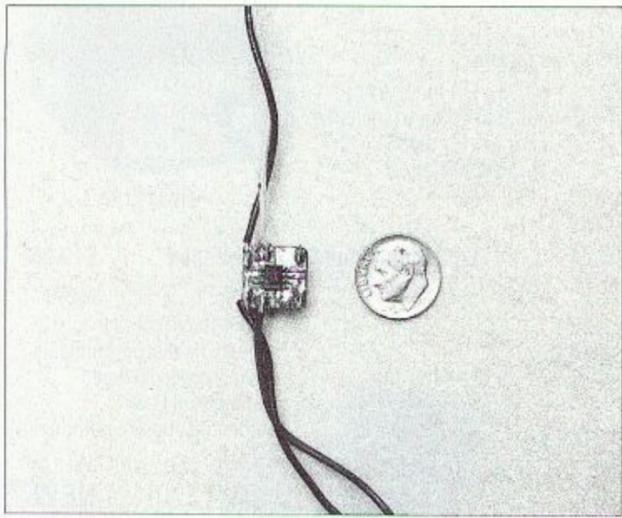


Photo C. Author's LM2662 SMT unit is smaller than a dime. Photo by author.

four times as important as that of C2. Larger capacitance values for C1 will also reduce the output resistance, while larger values of C2 reduce the output ripple. I did a series of tests and discovered that the input source resistance is also important, although the data sheet makes no mention of this fact. When I put a one-ohm resistor in the input line to measure input current, the output resistance increased. A standard 100- μ F (or larger) electrolytic capacitor at pin 8 noticeably reduced the resistance.

The LM2662 has features that let the user optimize the circuit for his particular application. Pin 1 controls the frequency of the internal oscillator. The normal frequency is 20 kHz, which minimizes the chip's quiescent current. If size is important, pin 1 can be set high, increasing the frequency to 150 kHz and allowing the use of smaller capacitors at a slight decrease in efficiency. When conversion efficiency is most important (such as for a

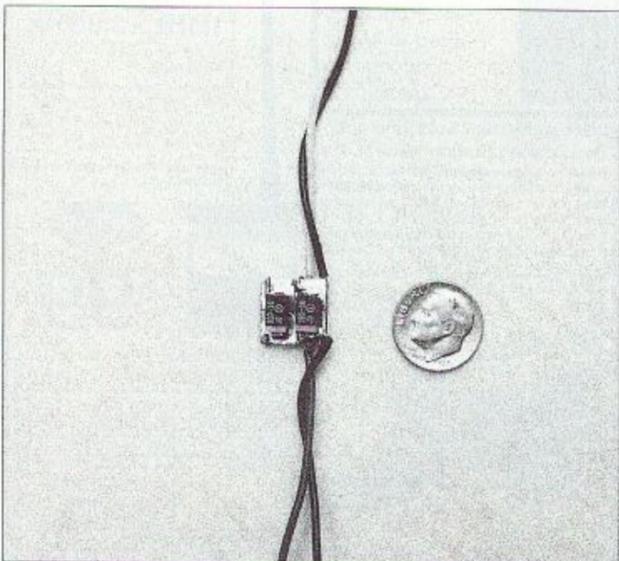


Photo D. Reverse side of LM2662 inverter card shows two low-ESR 100- μ F SMT caps. Photo by author.

portable laptop design), an external oscillator can be used. The data sheet shows that different loads have different ideal frequencies. For instance, a 2-mA load is most efficient at 1 kHz, a 20-mA load at 10 kHz, and a 160-mA load at 40 kHz.

The LM2662 can also be used as a voltage doubler with a 2.5- to 5.5-volt input or as a voltage "halver" for inputs from 1.5 to 11 volts. These circuits are discussed in the National Semiconductor data sheet for this product.

Building the inverter

The challenge to the amateur builder is how to build something this small. The way I have found best for me is far from perfect, but I have built quite a few projects this way and it works if you are careful. I think it is easier to make an SMT board than a DIP board, because there are no holes to drill and no messy chemicals if you use my approach! I would appreciate any input from readers who have also done SMT.

I started by sketching a layout for my PC board. I did not worry about drawing it to scale but made it large enough to see what was happening. Normally, I'm used to thinking in terms of connections between parts,

because for schematics we draw lines from point to point to represent the wires. I found in laying out my PC board that it was more useful to think in terms of the spaces between the lines. This is because I was starting with a copperclad board, and really did not care how wide the traces were. All I wanted was to ensure that they did not touch. I would be cutting out copper material to separate the traces, not adding material to make traces.

Fig. 6 shows my final layout. I chose to use double-sided board, both because it would make the project smaller and because it was easier to fabricate the circuit this way. A consideration in the layout was that the spots where wires were attached needed to be relatively quite wide. To connect the capacitors to the pins on the IC, I could have drilled small holes through the board, but I felt it was easier to run the traces such that I could wrap small jumper wires around the edge of the board (see Fig. 6, a, b, c, and d).

The side with the IC was the more difficult side to make, since the IC had eight pins, each spaced 0.05-inch apart—so the cuts needed to be narrow as well as precisely located. I tried a number of methods, but found that the

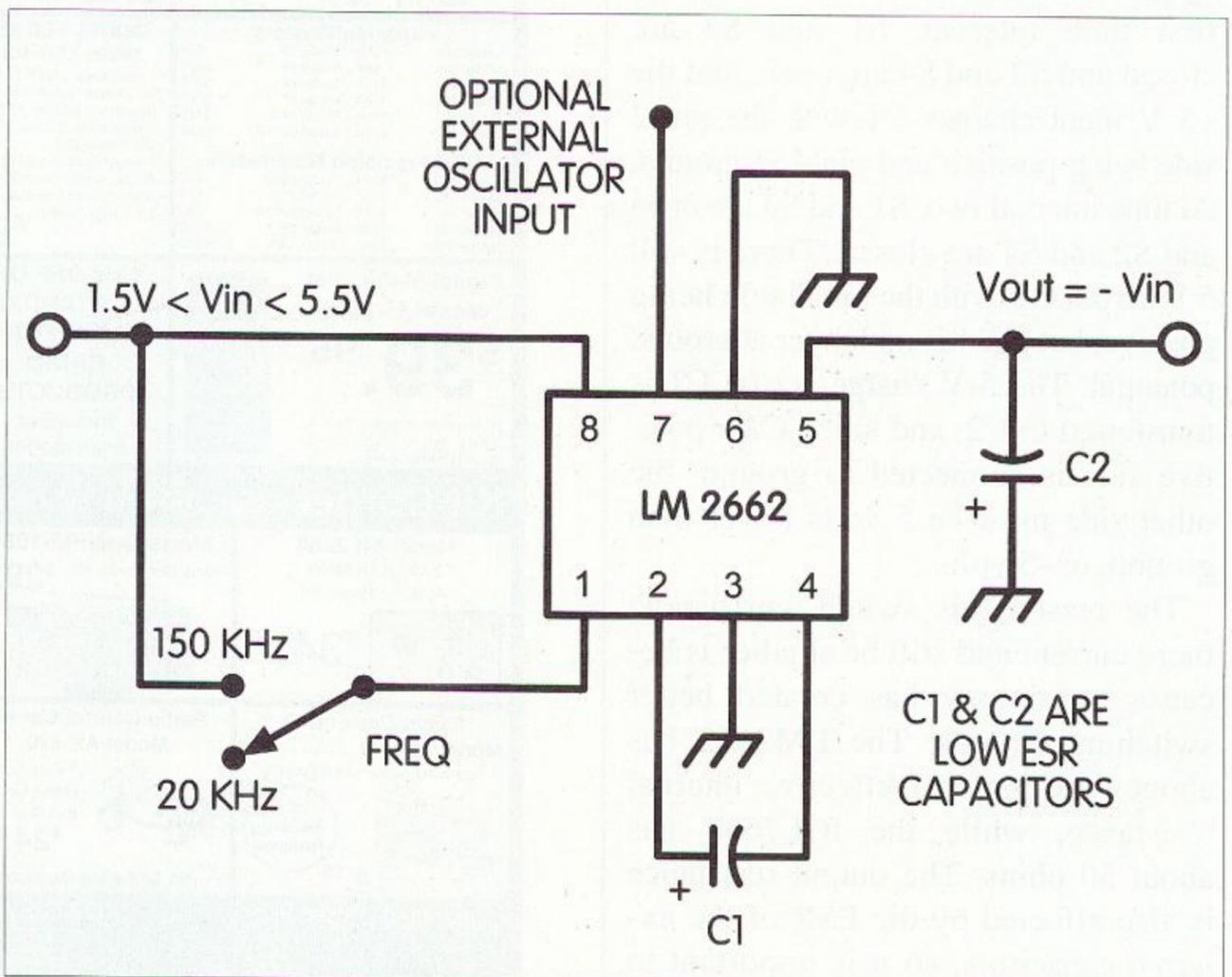


Fig. 4. Switched capacitor inverter using the LM2662.

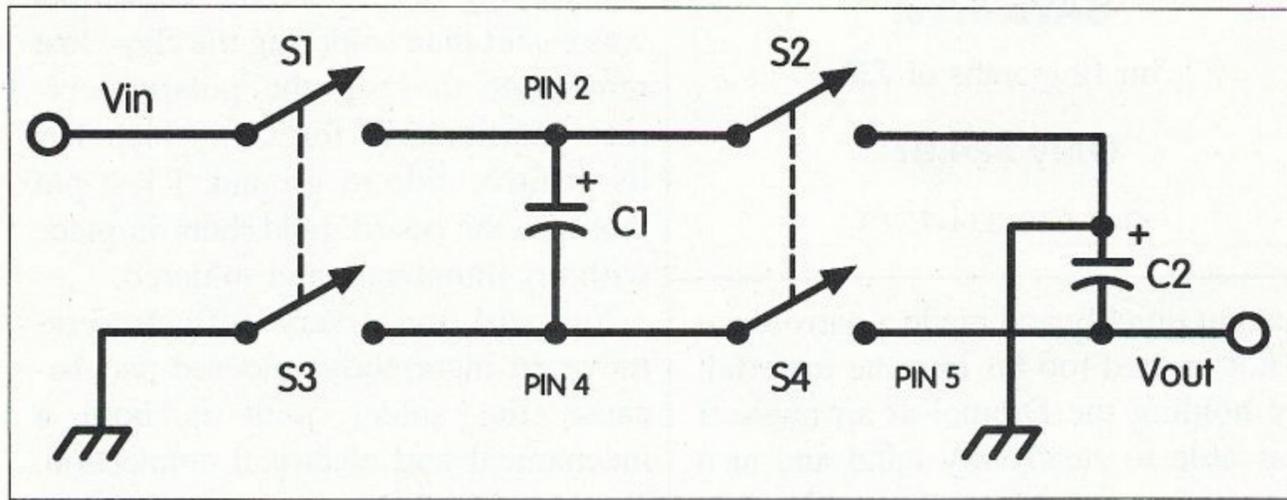


Fig. 5. Internal switch configuration.

brute force way worked best for me (I do not have a shop full of precision machines). I taped the chip to the copper and used a fine sharp-pointed tool to scratch the location of the cuts on the PC board. I did this freehand. I then removed the chip and used my

Dremel™ tool to cut the material where the traces were. I also did this freehand. It was much easier than I thought it would be to keep a reasonably straight line.

With an earlier project I used a fine cutting bit (#108). It had a sharp edge

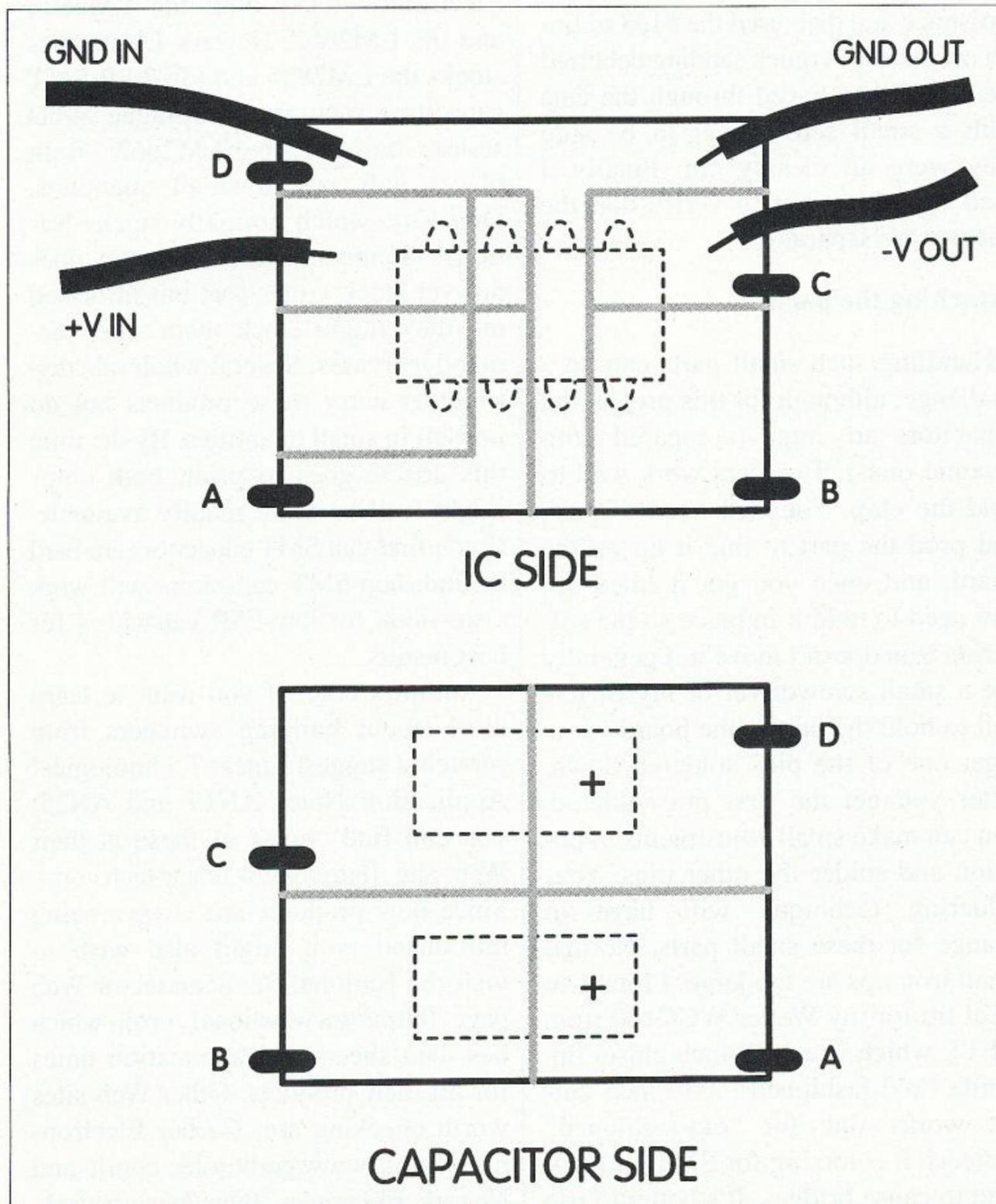


Fig. 6. Layout used for LM2662. Gray lines indicate areas with copper foil removed. A-D are wire jumpers to opposite side of board.

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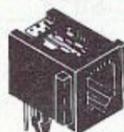
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that cut quickly and made a narrow cut if not pushed too far into the material. By holding the Dremel at an angle, I was able to steady my hand and also get the best angle for the cutting bit. Perhaps I have refined my technique, because this time I used a very fine cutoff wheel with the Dremel. I found that an ultrathin (7/8-inch by .009-inch) wheel made a very narrow cut, as well as made it easier to cut a straight line than when using the other bit. Be very careful not to cut too deeply into the material. When making intersecting cuts such as the center line, cut on the IC side. I stopped well before the crosstrace and then used the #108 to finish off the cut. A quick sanding deburred the cuts. I then traced through the cuts with a small screwdriver to be sure they were all cleanly cut. Finally, I used my ohmmeter to verify that the traces were separate.

Attaching the parts

Handling such small parts can be a challenge, although for this project the capacitors are huge (compared with ceramic ones). Tweezers work well to hold the chip. You will need to push and prod the part to line it up on the board, and once you get it lined up, you need to hold it in place so the soldering iron doesn't move it. I generally use a small screwdriver or my fingernail to hold the part to the board while I get one of the pins soldered down. After you get the first pin soldered, you can make small adjustments in position and solder the other pins. Your soldering technique will have to change for these small parts. Normal small iron tips are too large. I found an ideal tip for my Weller WCC100 iron, # ETJ, which is a 1/32-inch chisel tip. While "old-fashioned" .030-inch solder works fine for "old-fashioned" projects, it is too big for SMT and will tend to cause bridges. It's better to use .020-inch-diameter solder.

Soldering the tantalum capacitors was easier than soldering the chip. Just remember to keep the polarity correct—particularly for C2, which has its positive side to ground. I just put them on the board, held them in place with my thumbnail, and soldered.

You will find it very difficult to remove an incorrectly soldered part because the solder joint is both a mechanical and electrical connection. Even using solder wick, enough solder remains between the board and the part that the part will stay stuck to the board. If you use a knife to pry up the heated end, you are apt to tear the other pins. Clearly, the best procedure is to do it right the first time!

Locating the parts

Because these parts are so new, they are not yet widely available. Gerber Electronics stocks both the LM2825 and the LM2662. Newark Electronics stocks the LM2825 and low ESR SMT capacitors such as the Sprague 595D series, but not the LM2662. Both places will sell in small quantities. Digi-Key, which normally stocks National Semiconductor products, does not yet stock either part but informed me they might stock them when demand increases. Several wholesale distributors carry these products but do not sell in small quantities. By the time this article goes to print, both chips might well be more readily available. If you find that SMT capacitors are hard to find, non-SMT capacitors will work also—look for low-ESR capacitors for best results.

Author's note: If you want to learn more about building switchers from scratch, I suggest Linear Technologies' Application Notes AN19 and AN25; you can find copies of these at their Web site [<http://www.linear-tech.com>]. Since new products are always being introduced, you might also wish to visit the National Semiconductor Web page [<http://www.national.com>], which has data sheets and application notes for all their products. Other Web sites worth checking are: Gerber Electronics, [<http://www.gerberelec.com>]; and Newark Electronics, [<http://www.newark.com>].

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The Fun Radio

...or, wasn't this what attracted you to the hobby in the first place?

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With modern electronic components to help you, step into the past and enjoy the technology of yesteryear. Most people feel that current technology is better than that of the past—and rightly so—but one can enjoy the older technology and maybe even learn something interesting in the process. The Fun Radio combines both old and new technology in one simple project, and many circuit options are available for the experimenter. You can switch options around, according to your needs and component availability.

Fig. 1 is a diagram of an Armstrong Regenerative Detector/Receiver, capable of tuning from below 100 kHz up to about 18 MHz. (Table 1 shows many of the services within this range of frequencies.) There were a great many oscillator circuit designs developed between 1910 and 1930, each more popular than the last. Many of those designs are still used today, but the oscillator developed by Armstrong has consistently been the most popular for use as a regenerative receiver.

In operation, the circuit performs in a "reflex" mode, where it functions simultaneously at both RF and audio

frequencies. In the RF mode, the circuit is allowed to oscillate by providing feedback from the collector to base of Q1 through the tickler coil. Feedback is shifted 180° and is fed back through the tuning winding. Full oscillation occurs when the collector of Q1 is driven from saturation to cutoff.

However, when the circuit used as a detector, the amount of feedback is reduced/controlled by the user to achieve the desired detection results.

In detection mode, an incoming signal is mixed with the RF feedback, and if the feedback amount is critically adjusted, the collector current of Q1 will

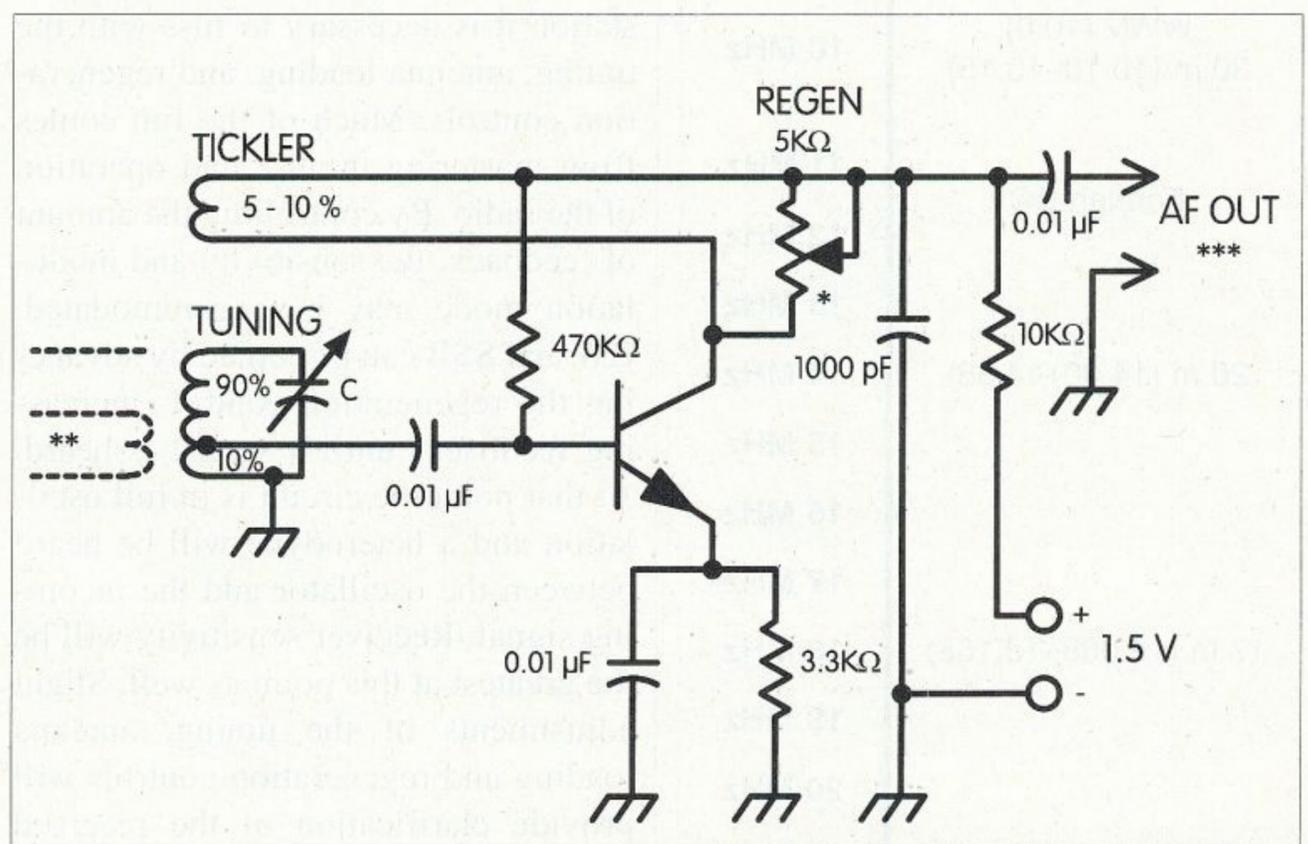


Fig. 1. The Fun Radio. Q1 can be most any NPN transistor, such as 2N2222, 2N4401, 2N3904, 2N918. Key to symbols: % = Percent of total number of turns selected for the tuning coil. * = See Fig. 3 for regeneration control options. ** = See Fig. 2 for antenna options. *** = See Figs. 4 and 5 for audio amplifier options.

follow the amplitude variations of the received signal's modulation envelope, which is audio. The detected audio is then coupled to the audio amplifier.

Fig. 2 shows three antenna input options. Fig. 2a is suitable for antenna lengths under 30 feet where direct coupling to the tuning circuit is achieved through a trimmer capacitor which can be adjusted for maximum signal coupling and for minimum loading on the

Low Power Beacons	100 kHz
Weather	200 kHz
	400 kHz
AM BC Band	500 kHz
	1 MHz
160 m (1.8-2.0)	2 MHz
80-75 m (3.5-4.0)	3 MHz
	4 MHz
WWV (5.0)	5 MHz
	6 MHz
40 m (7.0-7.3)	7 MHz
	8 MHz
Foreign BC	9 MHz
	10 MHz
WWV (10.0)	11 MHz
30 m (10.10-10.15)	12 MHz
	13 MHz
Foreign BC	14 MHz
	15 MHz
	16 MHz
	17 MHz
17 m (18.068-18.168)	18 MHz
	19 MHz
	20 MHz
15 m (21.00-21.45)	21 MHz

Table 1. Frequency spectrum from 100 kHz to 21 MHz showing ham bands and other services.

circuit. For an antenna wire longer than 30 feet, a coupling coil may be used as shown in Fig. 2b. The coil is wrapped around the ground end of the tuning coil where the number of turns required must be determined experimentally, but typically five to 15 turns is normal. Should the coupling be too tight and excessive loading occurs, the addition of a series trimmer capacitor, as shown in Fig. 2c, will reduce and provide control of the loading. Most any trimmer capacitor value, such as 3-30 pF, 7-45 pF, or 10-100 pF will work well in this application. Antenna loading on the tuning coil must be kept as light as possible in order to allow the circuit to regenerate properly.

Sensitivity over the operating range will rival that of a modern superheterodyne receiver. In fact, the sensitivity is controllable. An interesting thing about the Fun Radio is that it will demodulate CW, AM and SSB. It would perhaps demodulate FM, as well, if FM were used on the bands covered by the radio. On the down side, the receiver's bandwidth is quite wide, which can be troublesome when listening in the ham bands. However, the bandwidth is not as critical when listening to CW.

Operation

For proper operation and tuning a station it is necessary to fuss with the tuning, antenna loading, and regeneration controls. Much of the fun comes from mastering the use and operation of the radio. By controlling the amount of feedback, the sensitivity and modulation mode may be accommodated. CW and SSB can be copied by advancing the regeneration control (increasing feedback) until a squeal is heard. At that point the circuit is in full oscillation and a heterodyne will be heard between the oscillator and the incoming signal. Receiver sensitivity will be the greatest at this point as well. Slight adjustments of the tuning, antenna loading and regeneration controls will provide clarification of the received signal. To demodulate AM, decrease the regeneration to just below the point of oscillation, or until the audio is clear of a squeal.

Builder's choice

Circuit regeneration techniques are open for experimenter choices as shown in Fig. 3. Fig. 3a uses a shunting potentiometer across the tickler winding, which is the most commonly used method. The pot wiper and pot shaft should be connected to the decoupling capacitor side of the tickler coil, or some hand capacity effects may be noted during operation. Typically,

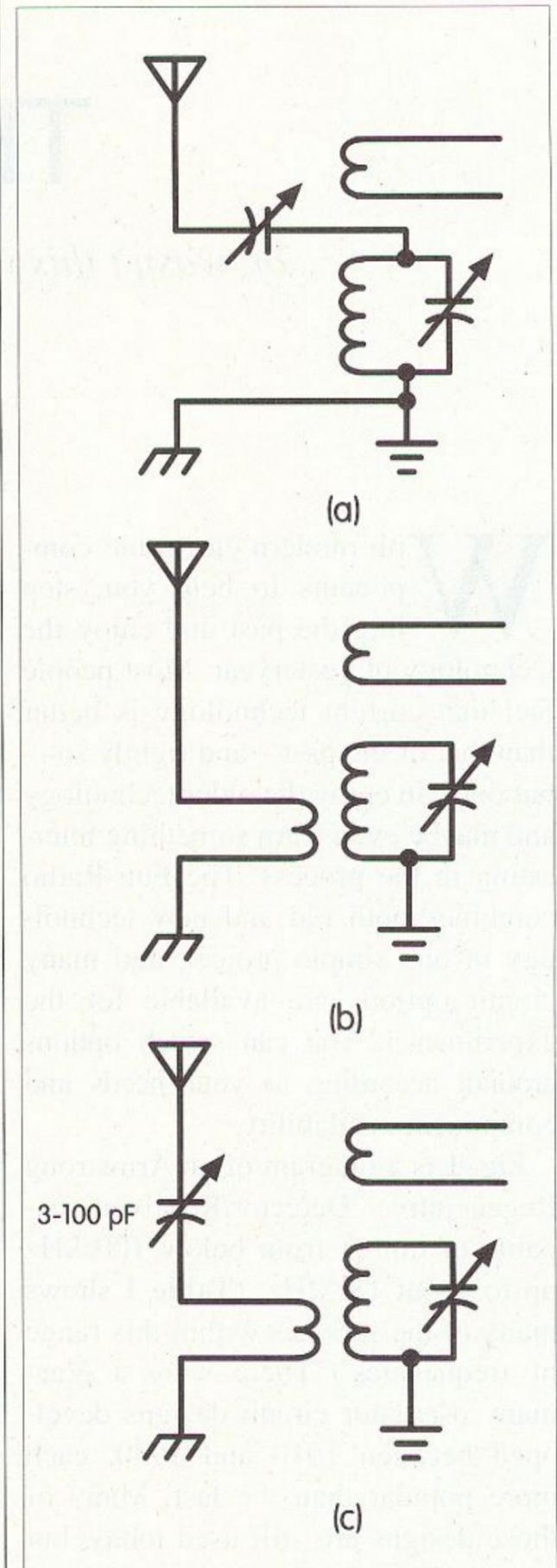


Fig. 2. Antenna circuit options. 2a is preferable for relatively short antenna lengths (under 30 feet); 2b is preferred for long antenna lengths (greater than 20 feet); and the addition of a series capacitor, 2c, provides an antenna loading control.

hand capacity effects are only noted when the radio is operated in the frequency range above about 10 MHz. Circuit options **3b** and **3c** were devised to eliminate the hand capacity effect, and as alternative methods of regeneration control. In **3b**, capacitor C_T functions as a variable reactor whose value is adjusted to create exactly the desired amount of desired regeneration. The capacitance value of C_T is typically in the range of 365 pF (maximum). The higher the adjusted capacity value, the more regeneration will be achieved. Circuit **3c** shows how the transistor collector current can be adjusted in order to control the regeneration. The higher the current, to a point, the greater the amount of regeneration that takes place.

After constructing the coils, it is necessary to phase the tickler coil in order to create feedback. The tickler

coil ends may require reversing, if a squeal is not noted after adjusting the regeneration control. A regeneration squeal *should* occur after the ends of the tickler coil have been reversed. With the radio operating, the regeneration control is adjusted to provide sufficient feedback until a rush or a squeal is heard. The squeal will be

most evident when a station is being tuned and the feedback is too high. When tuning a station, the amount of feedback may be reduced and then fussed with to obtain the recovery of modulation. Tuning an SSB station is the most fun, because of the critical adjustments required to obtain just the correct amount of frequency offset between

C = 200 pF max. (1-1/2-inch coil diameter)		
F	L	No. Turns
250 kHz–800 kHz	2000 μH	380–425
800 kHz–2.5 MHz	200 μH	125
2.5 MHz–6.5 MHz	30 μH	40–50
6.5 MHz–18 MHz	3.5 μH	12–18
C = 365 pF max. (1-1/2-inch coil diameter)		
F	L	No. Turns
100 kHz–400 kHz	5000 μH	450
400 kHz–2 MHz	350 μH	150–175
2 MHz–6 MHz	20 μH	35
6 MHz–18 MHz	2.5 μH	10–15

Table 2. Coil chart values based upon frequency band and variable capacitor value (200 pF and 365 pF max. capacitance).

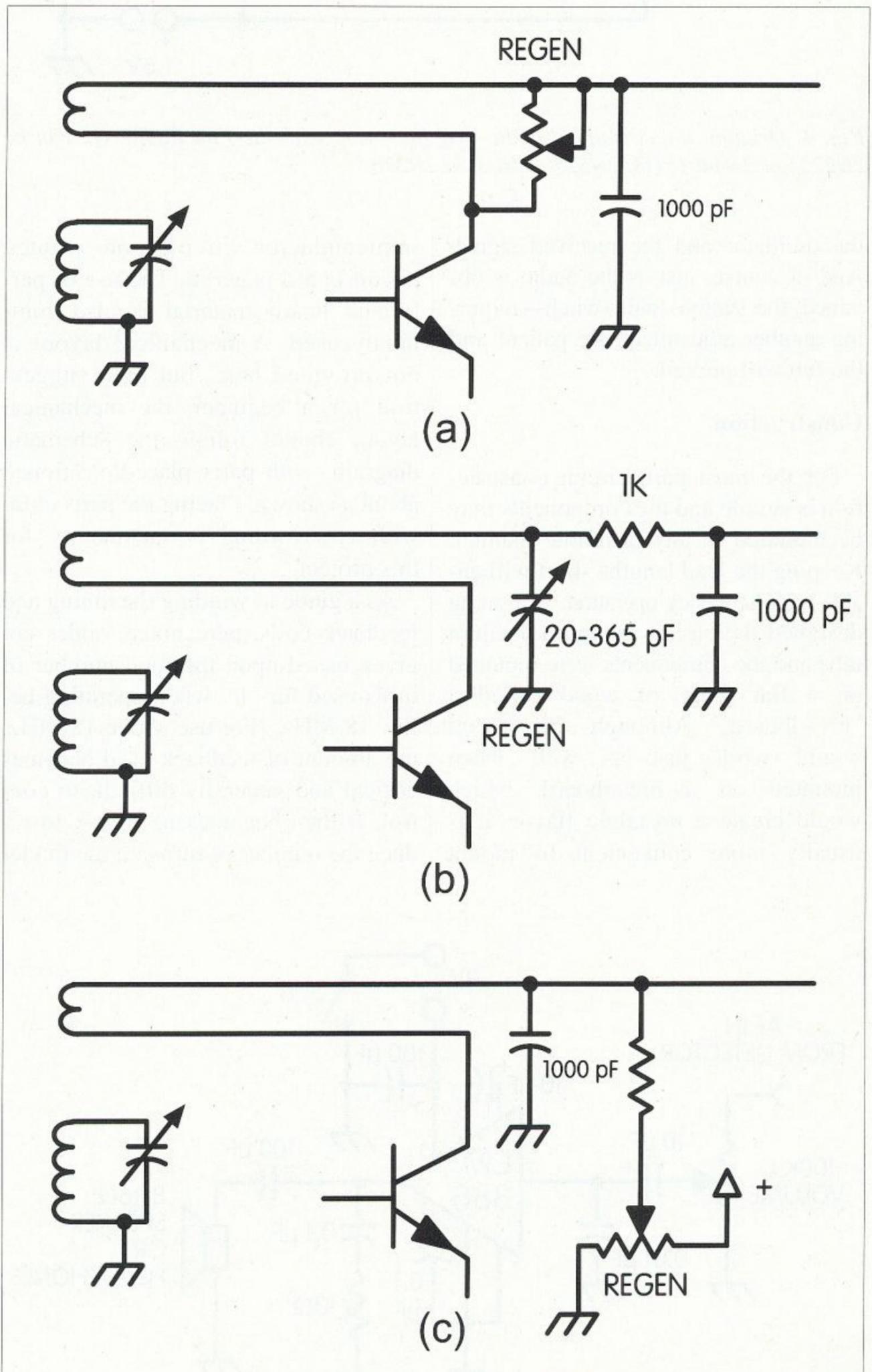


Fig. 3. Methods used for controlling the amount of regeneration. **3a** shows a variable shunt; **3b** shows a reactance control using a variable capacitor; **3c** shows regeneration being controlled by a change in collector current.

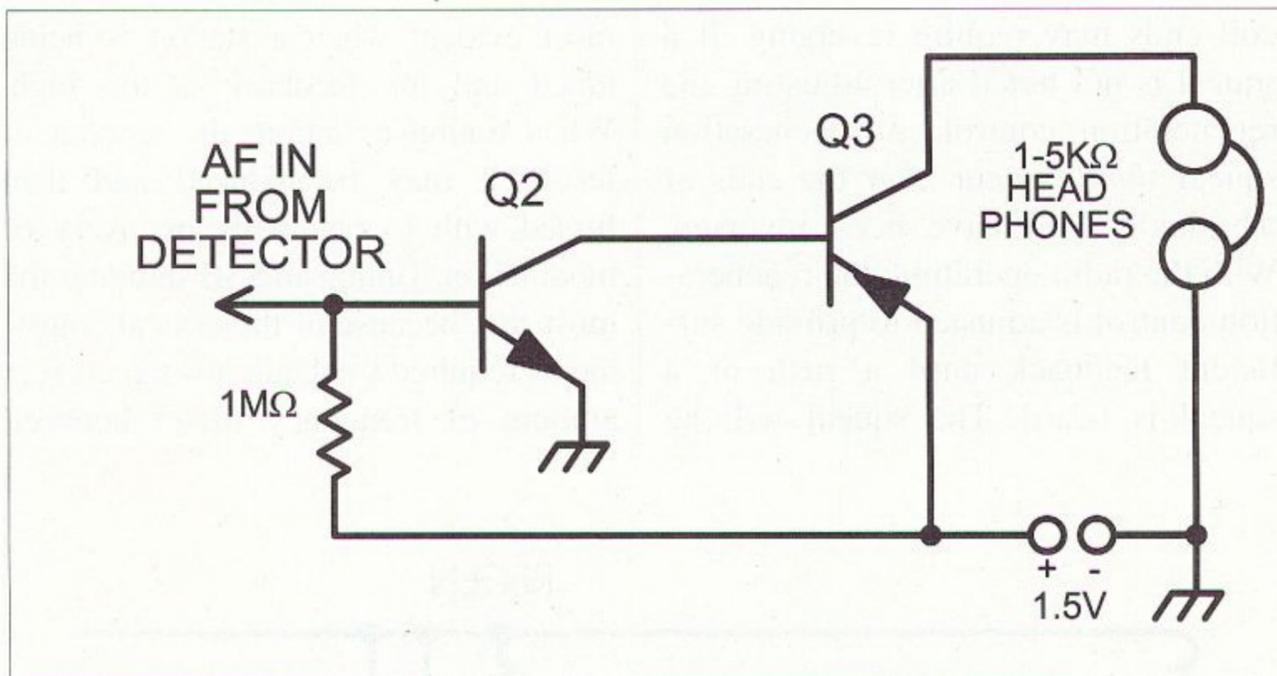


Fig. 4. Original direct-coupled audio amplifier used with the Fun Radio. Q2 can be 2N2222 or 2N4401; Q3: 2N525, 2N404, or 2N270.

the oscillator and the received signal. And of course, just as the audio is obtained, the stations will switch—requiring another adjustment. Be patient and the fun will prevail.

Construction

For the most part, circuit construction is simple and the components may be mounted in any desirable manner. Keeping the lead lengths short will enable high-frequency operation. Armstrong designed the circuit around a vacuum tube and the components were mounted on a flat piece of wood called a “breadboard.” Although the circuit would work just as well when mounted on a breadboard, which would create a nostalgic flavor, it is usually more convenient to mount

semiconductor circuits on printed circuit board material. The use of perforated board material is also commonly used. A mechanical layout is not provided here, but as a suggestion for a beginner, the mechanical layout should follow the schematic diagram, with parts placed/positioned about as shown. Placing the parts close without crowding is satisfactory for this project.

As a guide to winding the tuning and feedback coils, percentage values are given based upon the total number of turns used for “L” when operating below 18 MHz. (For use above 18 MHz, the amount of feedback used becomes critical and generally difficult to control. It then becomes necessary to reduce the number of turns on the tickler

winding to improve control of the feedback.) If desired, the coils may be fixed for a single band of frequencies or may be made plug-in-style for multiple bands. The number of turns required for a specific band may be determined by trial, formula, charts, or from **Table 2**, and are selected to resonate with variable capacitor “C.” The typical “C” value used in the Fun Radio is 365 pF, but any value from about 200–500 pF will work satisfactorily. Should a dual-section tuning capacitor be used, the two sections may be connected in parallel when operating on the lower frequency bands. The values shown in **Table 2** are divided into two sections and assume a coil diameter of one and one-half inches for use with either a 200 pF or 365 pF tuning capacitor. Coils may be wound using any wire size from #24 down to #46, laid down in a single-layer “close-wound” manner. A cardboard toilet paper or paper towel tube is approximately one and one-half inches in diameter, and is a common coil form used in the Fun Radio. Coating the tube with either varnish or plastic spray prior to coil winding is a good idea, to reduce the possibility of moisture absorption. Also, ferrite loopsticks work very well in the Fun Radio. Because of the iron permeability, fewer coil turns are required to cover the same frequency bands.

Audio output

Many options are available for audio output from the detector. The original design of the Fun Radio used a silicon NPN transistor, driving a germanium PNP transistor, as shown in **Fig. 4**, because it provided an adequate audio amplitude for driving a set of high impedance (1–5 kΩ) headphones from a 1.5 V source. If the Fun Radio is to be used to drive a speaker, it will be necessary to add a power amplifier IC, as shown in **Fig. 5**, which operates from a separate battery, say 9 V. However, the detector circuit will continue to operate from a 1.5 V source. The use of an LM386 is perhaps the easiest amplifier to implement, as it will drive a small

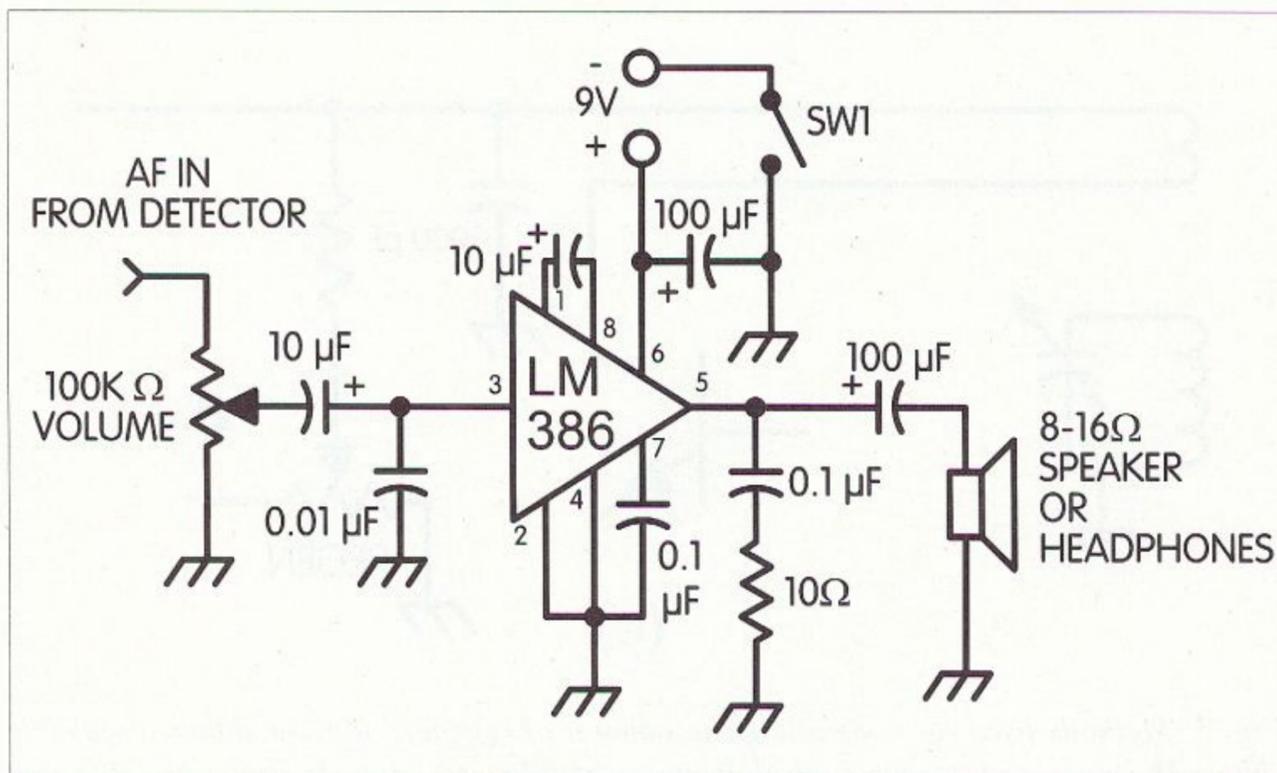


Fig. 5. Audio amplifier option to drive either a small speaker or low-impedance headphones.

Meet the Marvelous MicroVert

A 20-inch vertical for 20 meters?

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Is this the world's smallest vertical antenna? Well, I'll admit that the MicroVert's claim to this title has not been well researched. There might be a smaller 20-meter vertical antenna out there, but I'll be very surprised if there is! The MicroVert measures in at an astonishing 20 inches tall and yet manages to cover the entire 20-meter band with an SWR no higher than 1.5:1. Amazing? Maybe. Interesting? Absolutely! Imagine the response you will get from other stations as you describe your antenna, all 20 inches of it!

Why the MicroVert?

Like many hams, I live in a deed-restricted housing development where antennas are not welcome. The solution to this situation is to employ antennas that do not attract the unwanted attention of "The Powers That Be" who enforce these restrictions. With this regrettable situation in mind, my interest in antennas has been focused lately on finding solutions for myself, and others like me, who live with these restrictions. The MicroVert represents one of these solutions (see **Photo A**).

If you are attempting to develop a radiator whose primary objective is

stealth, size is an obvious starting point. Large antennas are difficult to conceal. Very small antennas are far easier to conceal, especially when they don't resemble antennas at all. The primary design objective for the MicroVert was "as small as possible." The result of this effort covers all of 20 meters with an SWR that will make almost any modern solid-state transceiver happy, and is so small that it can be truly classified as a "stealth" antenna.

A lesson remembered

In 1962, I built my first transmitter out of salvaged parts from a discarded TV set. I assembled a single tube and a pi-network output on an old radio chassis. With power applied and a few quick twists of the load and plate capacitors, the current dipped and I was on 40 meters CW. I made many fine contacts with this rather crude and unattractive piece of equipment. I was, however, soon to find my household operating privileges severely restricted. My little one-tube transmitter created a rather substantial amount of TVI. The solution was to rebuild the transmitter into a fully enclosed metal cabinet, which prevented the RF energy present

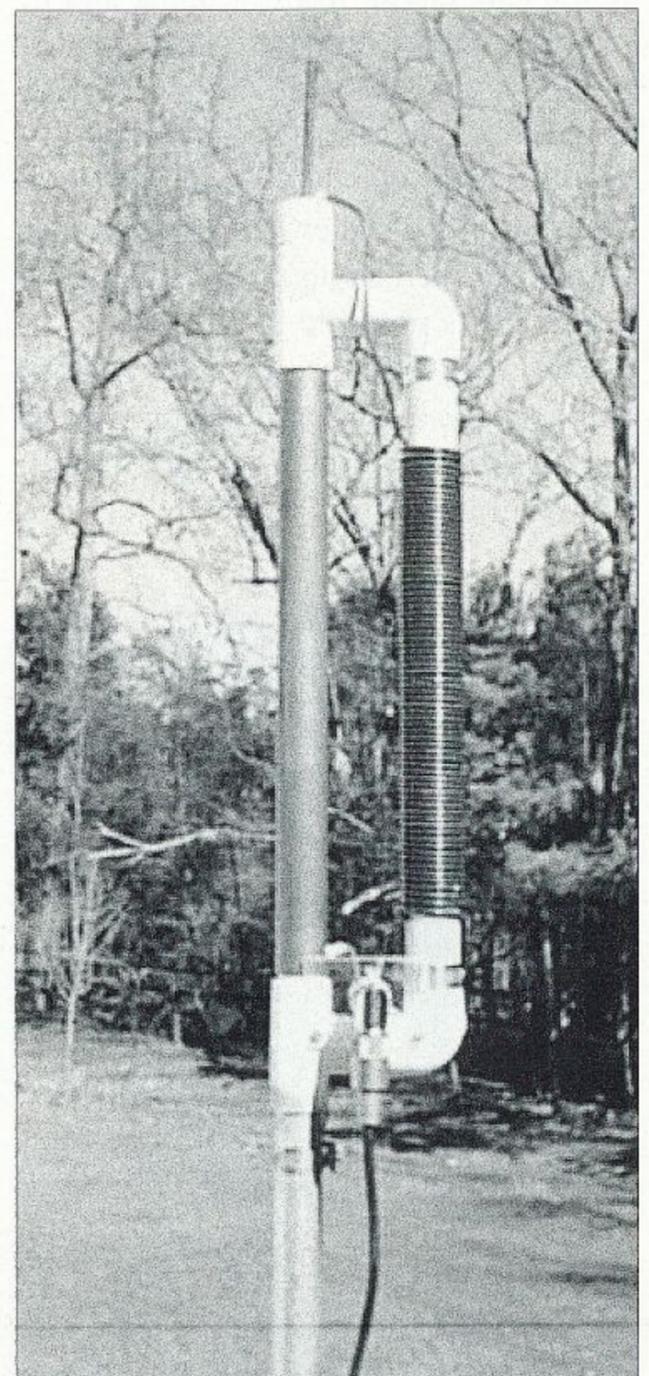


Photo A. The MicroVert is a little package with a big delivery.

Parts List

Qty.	Description
2	CPVC 3/4" Tee
2	CPVC 3/4" 90° elbow
1	CPVC 3/4" end cap
1	3" x 4" piece of Plexiglas™
1	10" x 3/4" section copper mending pipe
1	12" fine-threaded brass rod
4	fine-threaded brass nuts
1	3/4" diameter nylon bushing
23 ft.	#12 solid copper insulated electrical wire
1	SO-239
1	6' x 3/4" aluminum tube

Table 1. Construction materials for the MicroVert antenna.

in the tank circuit from escaping and interfering with my mother's soap operas.

The lesson was learned and remembered. The MicroVert is simply the recreation of the tunable output circuit of that little 40-meter transmitter, enhanced in such a way that it radiates as much RF as possible.

The MicroVert is, in fact, nothing more than a series-resonant circuit with a Q low enough to cover all of the 20-meter band.

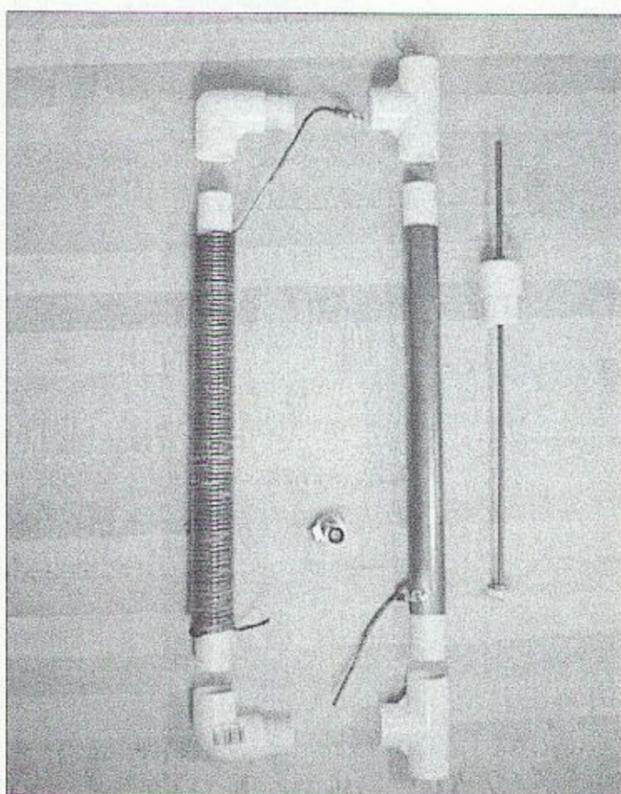


Photo B. MicroVert parts are easy to find and assemble.

Building a MicroVert

The MicroVert is easy to build. All of the parts you need can be obtained from your local home improvement center. **Table 1** provides a parts list for your shopping convenience (see also **Photo B**).

The plastic pipe used is chlorinated polyvinyl chloride (CPVC), which is normally used in place of copper pipes for household plumbing. I chose this material because its dimensions were ideal for this project. It is not the best material for this use because its insulating properties leave a little to be desired, but it is readily available and easy to work with, and mates perfectly with the copper pipe that forms part of the tubular capacitor providing the "C" in the series LC circuit. In my final version of the MicroVert, I substituted a section of Fiberglass™ tubing for the CPVC coil form. This change greatly improved power-handling capability and is a recommended upgrade for those moving beyond the experimenting stage.

I found the nylon bushing in the specialty hardware section. This particular item is meant to be used on furniture as a washer placed beneath a large screw head to protect the wood. A suitable replacement can be made from any sort of plastic material.

The MicroVert consists of two main components:

1) An inductor, made up of common solid 12-gauge electrical wire wrapped on a 12-inch section of 3/4-inch CPVC pipe; and

2) A capacitor, made up of a 10-inch piece of copper pipe held in place over another 12-inch piece of CPVC, with a threaded brass rod mounted in such a way that it can be threaded into and out of the copper pipe—raising and lowering the "C" value respectively.

Let's take a tour of the MicroVert, starting and ending with the feedpoint—your coax connection.

The feedpoint

A small rectangular piece of acrylic plastic or Plexiglas™ supports the SO-239 coax connector. I recommend using the type of SO-239 that is held in

place with a single large nut and washer, rather than the more common type that requires at least two additional small screw holes to be drilled. Either will work, but the plastic is brittle, and the fewer holes that need to be drilled, the better. The washer supplied with the nut-mounted SO-239 has a convenient solder tab, which simplifies attaching the jumper (described below). The plastic rectangle is then attached to the bottom of the antenna with self-tapping screws or is simply glued to the assembly.

The inductor

The center of the SO-239 is connected to the bottom of the inductor. The inductor, consisting of 20 feet, nine inches of solid 12-gauge insulated wire, occupies 10 inches of the 12-inch CPVC pipe used as the coil form. The remaining area of the pipe is used to slip into the two elbows that hold the inductor in place. The top of the inductor is connected with a jumper wire to the threaded brass rod. The jumper wire has a large plated lug soldered to it, which facilitates a good electrical connection to the threaded brass rod.

Winding 20 feet of 12-gauge solid copper wire onto a one-inch diameter form is a challenge. The method I used was to drill two 3/16-inch holes one inch in from each end of the form. I clamped one end of the coiled wire into a bench vise and unrolled the wire onto my garage floor as I backed away from the vise. With the wire fully unrolled, I threaded the loose end of the wire through one of the holes in the form, leaving about six inches free. Pulling the wire tight, I then walked toward the vise, simultaneously pulling the wire taut and rolling it slowly onto the form. When the wire was fully wound on the CPVC pipe, I took a firm grip on the wire at the top of the form to keep it tightly wound and then worked the free end through the remaining hole.

The capacitor

The capacitor consists of two parts: a 10-inch copper pipe and a 12-inch threaded brass rod. The threaded brass

rod is held in place by two brass nuts supported by brass washers. The lower nut is glued into the inner surface of a three-quarter-inch CPVC end cap along with a washer placed underneath it against the cap's surface. With the rod threaded into the fixed nut, another nut is threaded down to compress two additional washers that secure the jumper wire from the inductor.

On the tip of the brass rod that extends into the copper pipe is a three-quarter-inch nylon bushing held in place with two brass nuts. The nylon bushing provides a reasonably tight fit inside the CPVC pipe, providing precise alignment of the brass rod. The 10-inch section of copper pipe provides the surface area for the capacitor. A substantial portion of the capacitance required for the "C" component is actually derived from the pipe's close proximity to the inductor. The spacing between these two components is critical and should not be altered without due consideration.

The copper pipe used is a special type available in most plumbing departments. It is normally used for splicing two sections of regular copper pipe together. As such, its inner diameter is just large enough to slip over the ends of the pipes to be joined. Since the CPVC pipe is exactly the same outer diameter as the copper pipe, the larger joiner pipe fits over it perfectly as well. The copper pipe is cut to a length of 10 inches, positioned directly opposite the inductor, and secured in place with a self-tapping sheet metal screw positioned half an inch from the bottom.

The sheet metal screw is also used to provide a connection point for a short jumper wire that goes from the bottom of the copper pipe to the shield side of the SO-239. The jumper is made of the same 12-gauge wire as the inductor and has a good-quality plated lug soldered to it. The area of the pipe in contact with the lug is burnished with steel wool or light sandpaper to improve the connection quality. As a final assembly step, consider soldering the jumper's lug directly to the copper pipe.

While two elbows support the inductor's coil form, the capacitor's section of pipe is supported with two

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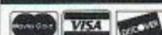


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Ts. The top T is used to mount the threaded rod. A one and one-half-inch piece of pipe is used to join the end cap to the top of the T. The rod is inserted into the capacitor and held in place with just the friction grip of the various pieces.

Combining the "L" and "C"

The capacitor and inductor sections are held together to form a rigid "O" with two one and one-half-inch sections of CPVC pipe. These are used to connect between the Ts of the capacitor and the elbows of the inductor. The pieces all fit together very tightly and it is unlikely that any further steps are needed to hold the MicroVert together. If desired, however, you may elect to use the special solvent glue normally used to bond CPVC on the connection points to make your MicroVert even stronger.

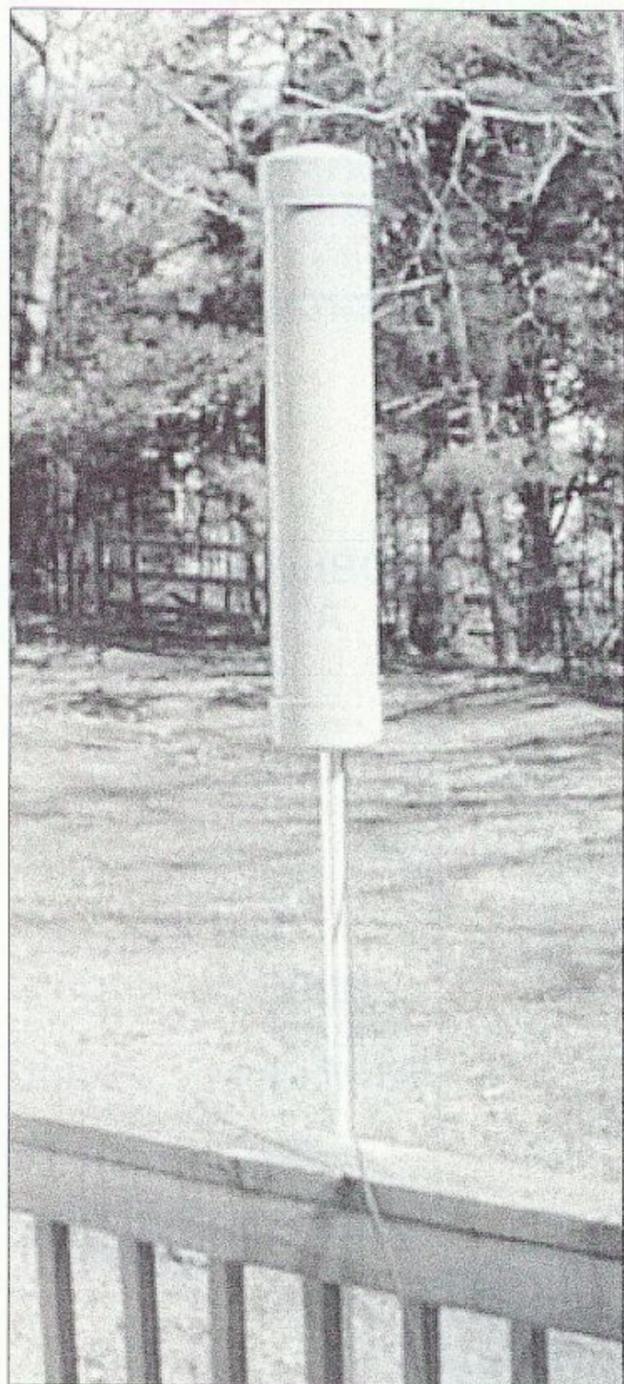


Photo C. "Oh, that's just our new ... uh ... birdfeeder ... yeah, birdfeeder."

A counterpoise

I found that by using a short counterpoise, the MicroVert tuned more easily and was more stable. In my final configuration, the MicroVert is mounted on an eight-foot length of three-quarter-inch aluminum mill tube. By placing a jumper between the shield side of the SO-239 and the aluminum tube, I obtained just enough counterpoise to make the MicroVert happy. I used some scrap 14-gauge stranded electrical wire to make the jumper. I soldered one end to the shield side of the SO-239 and the other end to a lug, which I then clamped against the mast with a stainless steel hose clamp.

As an alternative, you can employ one or more lengths of wire as a counterpoise. I have not experimented with more elaborate counterpoise systems and therefore cannot provide any insight into how this would affect the performance of the MicroVert. However, I would be interested in hearing from anyone who tries this.

Tuning the MicroVert

Tuneup is easy. Move the threaded rod to the top of its travel. Check the MicroVert's SWR. (I used an MFJ-209 antenna analyzer, a rather indispensable tool if you spend a lot of time fooling with antennas.) The resonant point should be above the 20-meter band. Thread the brass rod in three or four turns at a time until minimum SWR occurs at 14.175. You should then observe an SWR no higher than 1.5:1 at the band edges.

Operating with the MicroVert

After completing the first MicroVert and determining that it did indeed resonate in the 20-meter band, I was eager to get it mounted outside and give it a try. I lashed the six-foot mast to the deck railing and ran the coax back to the ham shack. The MicroVert was about 12 feet above the ground. I found a couple of gentlemen having an easygoing chat and decided to break in and ask for a signal report. I received a 5/5 and 5/7. They were somewhat incredulous when I described my antenna. After chatting about it for a few

minutes, another station broke in to ask a question about the MicroVert. For the next 15 minutes I was kept busy handling a mini-pileup as one station after another wanted to know more about the 20-inch vertical I was using. Success like this is very gratifying.

Additional notes

Some CPVC material appears to be less than perfect as an insulating material. As a result, the section of CPVC pipe used for the inductor can alter the resonance when subjected to 100 watts of carrier for more than a few seconds. I have found that the CPVC material will perform adequately under normal SSB operation of 100 watts or less. As mentioned earlier, after substituting a section of Fiberglas tubing of suitable diameter for the inductor's coil form, this instability appears to have been greatly reduced.

The MicroVert appears to be affected by moisture. During a rainstorm, I noted that the SWR increased. To protect the MicroVert from the weather, I made a rain cover out of four-inch PVC irrigation pipe. I used about 24 inches of pipe and two end caps to create an attractive cover for the MicroVert. The pipe was a nice shade of green and, when mounted in the back yard, looked more like a birdhouse or birdfeeder than a radio antenna (see **Photo C**).

One very important requirement for success with the MicroVert is a quality earth ground on your transceiver. A good ground is an essential element in any good station setup, but without one, the MicroVert will be very unstable and is not likely to load properly.

Conclusions

The MicroVert does work. How well it works compared with other antennas is another matter. The MicroVert should be considered a specialized application—if you have room for a full-size 20-meter dipole, then that is your best option. But if you, like so many hams, are severely limited by space and/or deed restrictions, the MicroVert might be the difference between getting

Home-Brew This Power Cube

First step in rebuilding your vintage RF deck.

Ronald Lumachi W2CQM
73 Bay 26th Street
Brooklyn NY 11214-3905
[W2CQM@juno.com]

If you'd like to see a subtle trend developing in the ham radio community, take a look at the number of classified advertisements being placed by hams who are looking to buy *broken* HF amplifiers. Contrary to what you might think, these guys, prowling with predatory stealth in the quest for these long-forgotten junkers, are not going off the deep end. Nor, by any stretch of the imagination, have they lost their grip on reality.

They are, in fact, part of a growing number of astute home-brewers who have independently concluded that the shortage of linear amplifier components will only get worse and that they had better search out a new source of supply. They recognized that this older category of gear, languishing in garages and attics, is a veritable storehouse of components. And, with a little work, some replacement parts, and a few circuit updates, many of these older units have the potential to be powerhouse amplifiers equal to the best on the market.

This equipment, currently relegated to junk pile inventories, has been crossed off and for the most part forgotten by those who are either comfortable with

the more modern store-bought amps or who are simply not interested in any construction projects. Consequently, as long as the current owners consider the vintage gear obsolete and of minimal value, bargains will continue to surface for those horsetrader sharpies making their quiet deals.

Look closely at this developing phenomenon and it's easy to understand how these renaissance builders arrived at the conclusion that *old is good* (and, more often than not, better than new). For example, after deciding on a home-brew building project, they find that sticker shock sets in immediately after pricing parts from the ever-decreasing number of quality catalog retailers. Furthermore, many wannabe builders have become disappointed with the results of fruitless experiences at hamfests, trying to scrounge for amplifier components.

Almost by default, they have concluded that the older rigs are an untapped resource. If they were parted out and sold, the worth of their components would substantially exceed the market value of the unit itself. Fortunately for the traders, this value is not (as yet) fully appreciated by current owners.

It is clear to "renaissance builders" that the chassis and cabinet is a gold mine in its own right. To prove the point, price out a new enclosure and see what I mean! Additionally, the deck and power supply are replete with many high quality components (see **Photo A**). They have the potential for quick and easy updating to the standards



Photo A. Take a look at a classic example of a 10–160 m linear amplifier loaded with components but cast aside because of that little \$1000 replacement fellow in the foreground. The small footprint of the Dentron MLA2500 lends itself to re-tubing, however. Plans for this unit include the removal of the tank circuit and capacitors (for another day and time) and setting up the unit for a monoband six-meter amplifier using a single 3CX800A7.

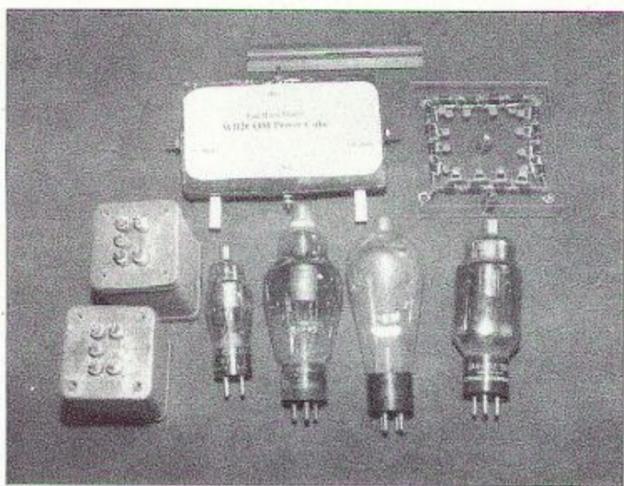


Photo B. Some old, glow-in-the-dark, gas-filled rectifier friends contrast with the solid state bridge replacement rectifier. Either of the upper power cubes replaces four of the rectifier tubes (816, 866, 866, 3B28) and a slew of filament transformers. What a great trade-off when updating a vintage rig.

of the newer, more modern, but very expensive equipment.

With those revelations taken to the next logical step, what followed is simply history. Advertisements began to appear in the classified sections of ham radio publications to search out likely candidates for amp rebuilding. Postings were made to those Internet groups and packet bulletin boards whose subscribers were most likely to have these items collecting dust. "Wants" were made known on all the horsetraders and swap nets that proliferate on the ham bands (see the article "Horsetrading on the Ham Bands" in the June edition of *73 Magazine*, 1997). If you need more conclusive evidence of the frenzied feeding of

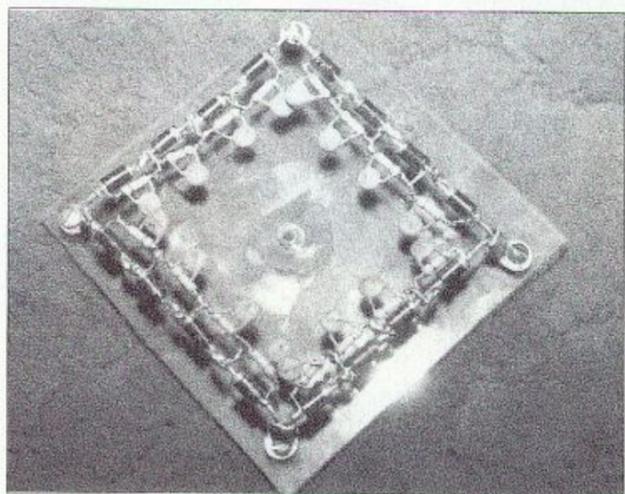


Photo C. A close-up of the full-wave bridge circuit. Diode orientation is critical. Pay particular attention to the banding. Each corner is terminated in a solder lug and through-bolted to the Plexiglas. Note the capacitor/resistor transient suppressors soldered across each diode.

these amplifier-builder folks, check out Old Tom's (KAØHYZ) morning group, The Old Gear and Amplifier Builders Net, on 7.275 kHz Saturdays at 0930 EST. Their weekly wheeling and dealing goes on for several hours.

For the prudent amateur newly aware of the trend, the question naturally arises, "How can you explain so much equipment being overlooked by so many knowledgeable hams?" The answer is simple. Take a look at the basic characteristics of these vintage units—and you can see why they were relegated to the back burner. At first glance, the dated and bloated low-output, heat-generating, glow-in-the-dark tubes have long ago been upstaged by more modern, compact, high-energy ceramic replacements.

The four-tube full-wave bridge rectifier, with its bulbous mercury- and gas-filled 816s, 866s, and 3B28s (see **Photo B**), along with its supporting array of multiple-filament transformers (hard-wired together with a rat's nest of complex point-to-point wiring), has long since passed into oblivion. The low-output HV center-tapped transformer, huffing and puffing along to squeak out 1800 VDC at 400–500 mA, is way out of its class in stark comparison to the Peter Dahl Hypersils pushing the envelope at mach speeds.

For these reasons (and others), many hams stuck these circa 1960–1980 boat anchor relics under the bench or buried them in the attic to collect dust. Out came the catalogs and checkbooks and the guys moved on to the more modern and exotic pieces of gear with all their bells and whistles. In the regular course of amateur radio events, that would normally be the end of the story, except that an ever-growing group of equipment sharpies have taken a more critical look at those old buckets of bolts. That small army of hams, excited about the idea of building up a custom high-quality legal-limit-plus amplifier, at dirt cheap prices, has developed a completely different mindset for that gear. They looked beyond the obvious and assessed the quality of the chassis and cabinet. They realized that with some trashing of the old, and the reshuffling of what remains, both the

parts procurement process and the project are well underway with the purchase of a vintage amplifier.

With the addition of some newer components to that old relic, an amplifier, like the phoenix, will rise from the ashes and stand alongside the big boys, with a brand-new lease on life. What a deal! But don't go away, there's more! Like the cat that ate the canary, the new breed of builder looks with satisfaction at the quality of the jeweled and dampened meter movements, the heavy silver-plated tank circuits, the mil-spec bandswitches, and the relays. He assesses the myriad of unglamorous but essential capacitors, power supply components, and hardware, and realizes that ferreting out these remnants from the scrap heap is far from being absurd or pointless.

What's particularly interesting in this whole deal is that the more modern, but critical, parts needed for updating are not too difficult to locate. Heavy-duty solid state diodes (more on that in a minute), vacuum plate and tuning capacitors, new technology transformers, and rapid switching vacuum relays are around in ample supply at "reasonable" prices.

Two obvious questions arise

"Where do I begin the search?" "Should I buy the deck or the components first?" Probably the safest thing to do is to first locate an old linear as a base with which to begin the project. Hit the hamfest circuit with your new eagle-eye perspective. Let your fingers do the walking on the Internet or packet bulletin boards. Don't hesitate to list your wants. Place a couple of paid advertisements in the ham magazines and the biweekly mailing services. Be patient but persevere!

I've found that the RF deck of the B&W LPA-1 (pair of 813s) and a long array of SB series (200, 210, 220, 1000) Heath packages are good choices at realistic prices. A friend suggested the Johnson Viking Thunderbolt if one could be found. Even the Dentron MLA2500 (no one wants these clunkers because of their outrageously high cost for replacement finals) is a good choice

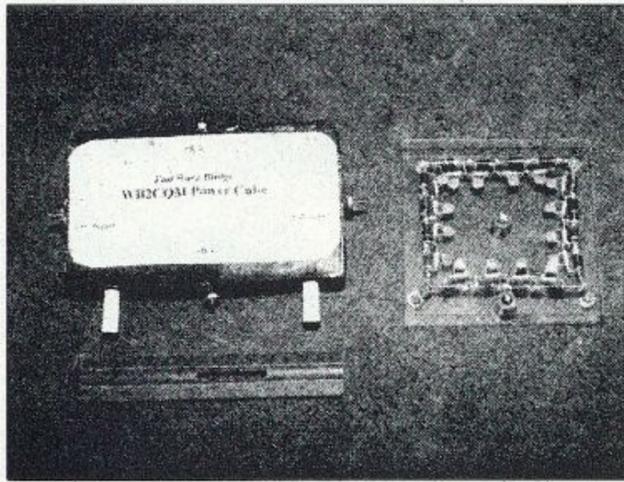


Photo D. Two renderings of the full-wave bridge power cubes. The fully resin-encapsulated unit on the left is fitted with nut/bolt attachment points. The two porcelain standoffs on the B-side are chassis-mounting assistants. The unit to the right has the bridge components sandwiched between two sheets of clear Plexiglas. The two standoffs pictured at the middle and bottom of the plastic sheets provide the necessary spacing. A small "L" bracket is all that is needed for mounting.

if compactness is a requirement and you're planning to change the tube lineup.

In my case, I recently swapped a two-meter HT and some accessories for that Dentron model. I plan a dedicated six-meter linear built around an Eimac 3CX800A7 spare I had on the shelf. If 160 m is a consideration, that whittles down the amplifier choices considerably. This low band frequency has come into favor only recently and generally is not found on the older rigs. However, keep in mind that there's always the possibility of adding that band with some modifications to the output circuit. More on that later, especially if you're able to locate a B&W deck with the integral coil/switch 850A tank circuit installed.

As another possibility: Keep an eye peeled for a smoked Henry 2K (the one with the pair of 3-400s) floor model. This vintage rig is particularly interesting because it exhibits a classic beauty coupled with an air of quality not duplicated in today's modern gear. In addition, there's plenty of space in the base for any and all super power supply updates and ample room in the RF deck component for a multiple tube installation. I recently purchased a 2K-3 in pristine condition that I plan to revamp with a pair of 8877s. The

problem is that I must gather the fortitude to trash the unit. Admittedly, it's easier said than done!

Begin with the rectifier bridge circuit

All projects begin with the first step, so let's take a look at updating the old rectifier circuit with a full-wave bridge power cube (see Photos C and D). Traditionally, this component has been the least glamorous and most taken for granted part of a linear amp project, although it is often critical and more often than not the unsung hero of the whole undertaking.

With that in mind, let's give it some serious consideration. The main solid-state rectifier component, rated at 1000 VDC at one amp, is available from a variety of retail sources at about 15 cents each when purchased in bulk. Keep in mind that only a handful of these diodes will be replacing four tubes and an array of transformers. Think of all the space and efficiency you're gaining.

It's a good idea to buy at least double the number of diodes you'll need in order to select those with similar front-to-back electrical characteristics. Use your diode scale on the digital multimeter to sort them by value. You'll find that manufacturing tolerances have been tightened up so plus/minus deviations may vary only slightly. With that in mind, you may decide not to install the resistor/capacitor combination bridged across each diode to smooth out any transients.

However, my advice is to install them as an extra measure of insurance against a Murphy's Law breakdown. If our experiences are similar, things that can go wrong will go awry at the least opportune time. Besides, each capacitor/resistor combo will set you back only 25 cents. If you go the whole route with 16 diodes coupled to 16 transient suppressors, the total cost will be less than \$7.00. There's not much more to say about which direction to take!

The building of the bridge is rather straightforward. Each of the four legs is assembled separately. Lay out a string of four diodes so that the bands and arrows are oriented and pointing

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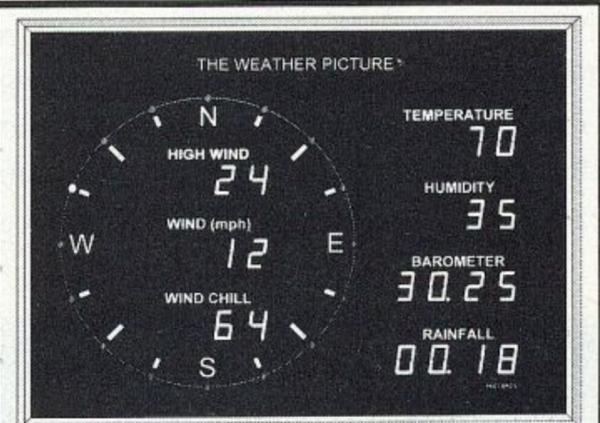


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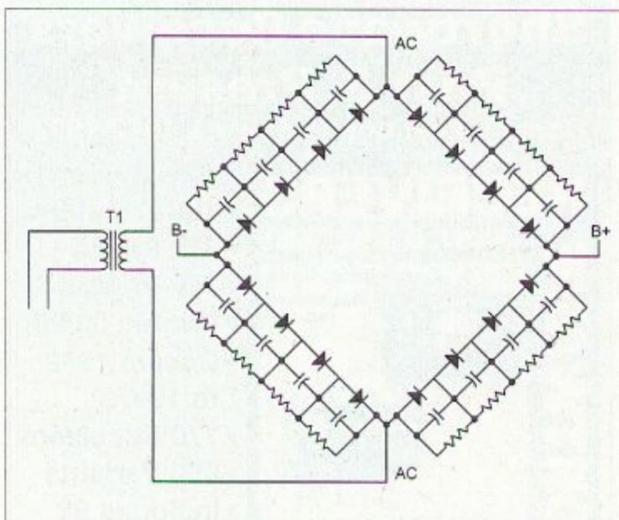


Fig. 1. Schematic. Resistors are 390 k, 1/2 W. Diodes are 1 A, 1000 PRV. Capacitors are 0.01 μ F 1000V. 3 A diodes #1N5408 are available at slightly higher prices.

in the same direction. Before series-soldering one component in the string to another, a provision for mechanically linking each diode makes good sense. Small hooks can be formed in each of the shortened leads and crimped to secure the bond. If you prefer, only the crimp end cut from a solder lug may be used to make the bond prior to soldering (see **Photo C**).

Parallel the lead of a 390 k 1/2 W resistor across a 0.01 μ F disc capacitor (1000 VDC). Series-connect four resistor/capacitor combinations and place them across each diode in the string. Give each lead a twist around the mechanical bond of the diodes, clip off any excess, and solder the assembly in place.

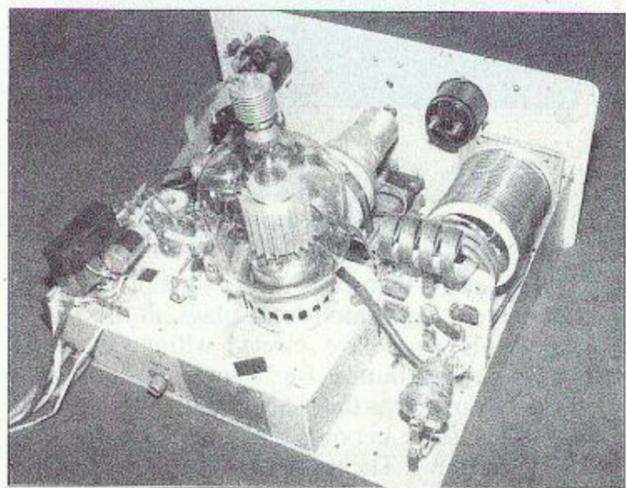


Photo E. The rear view of a partially refurbished B&W LPA-1 RF deck. Holes in the original (raised) chassis have been blocked and a 4-1000A mounted in the place of two 813s. Note the rebuilt B&W 850A tank circuit to the right boasting the addition of 160 m. A vacuum variable is sitting in front of the tube and the antenna tuning capacitor is positioned below. Immediately to the left of the tube is a vacuum relay. Small transformer at left powers the 26 VDC relays used throughout.

In the next step, pay strict attention to the polarity of the diodes with respect to the other components. Following the standard full-wave bridge schematic (see **Fig. 1**), connect up the four strings of diodes. Mark your plus (+) and minus (-) points with dabs of red and black paint, respectively. Mark the two AC input points with white paint. Use a mechanical bond before soldering at the four junction points.

It's a good idea to include some provision for tying the unit into the high-voltage circuit. You can use a bolt or a solder lug. The next choice to make is how best to package the bridge for both easy and safe handling. Of course, the component package can be simply wired into the circuit with no further considerations. The bridge may also be encapsulated in about 16 ounces of resin (available at a marine supply) or framed in a clear Plexiglas™ enclosure by using standoffs (see **Photo D**). The choice is yours, and at this point it's strictly a question of aesthetics. There's no performance advantage with either method.

One down, a couple more to go!

With the completion of the power supply cube, the rebuilding process is well underway. Keep alert for that new-generation transformer that will provide that extra kVA punch. Shop around for a pair of SPDT high-speed vacuum relays for the internal antenna switching. Select from an array of new-generation finals what best fits your budget. If you're fortunate, the original filament transformer in the vintage rig can do double duty for you in the new tube lineup, but don't make that a critical element in your choice of a final tube. Filament transformers in all voltages are readily available at moderate prices. If you want to get it right the first time, don't compromise. Take whatever time you need, but buy exactly the right component.

If you were able to locate a vintage amplifier with a 10-80 m B&W 850A as a tank circuit, the addition of 160 m is a relatively easy modification (see **Photo E**). Simply remove the 40-80 meter portion of the coil (#8 copper wire) and replace it with a four-inch

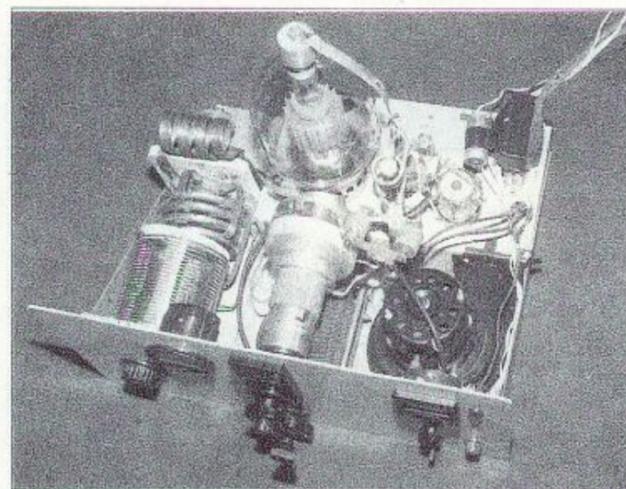


Photo F. Front/elevated view of the 4-1000A. The larger fan to the right provides cooling air to the pressurized chassis. A turns counter keep tabs on the plate tuning capacitor position. The meter to the right now reads relative RF power output. The newly installed meter to the left monitors grid current.

home-brew coil wound with 6 TPI #10 solid copper wire. The overall length of the coil is approximately three and three-quarters inches—it will shoehorn into the space of the old coil.

The 22 to 24 feet of coiled wire will net approximately 28 μ H, which is more than enough to tune the entire band. One or two of the original "L" brackets can be used to support the far

Continued on page 48

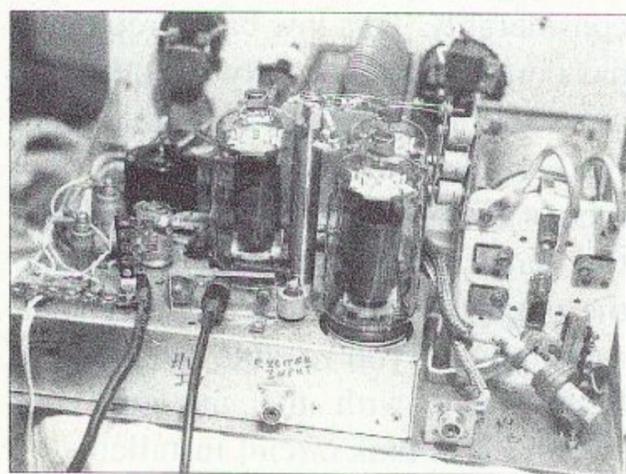


Photo G. View of a partially modified B&W LPA-1 with an additional 813 installed. Note the parts placement layout's similarity to that of the 4-1000A unit. In this installation, the tune and load capacitors along with the tank circuit have been maintained in their original position. This unit mounts the stock 10-80-meter coil along with the original fan. Two SPDT vacuum relays (one pictured to the left of the 813) have replaced the open frame relay. The other relay is installed within the chassis. A separate solid-state power supply delivers 3200 VDC at 600 mA and filament voltages via umbilicals to the deck.

Techno-Trouble II

All right, let's see how you do with these.

Steve Katz WB2WIK/6
21101 Celtic Street
Chatsworth CA 91311

In the April issue, we introduced "Techno-Trouble for Know-It-Alls." How did you do?

Here are fifty more semi-technical posers to further stretch that gray matter.

1. On 20 meters, an important attribute for any good receiver is noise figure. **T/F**

2. Reducing your transmission line loss by 3 dB results in a 6 dB station performance improvement. **T/F**

3. A well-optimized three-element yagi offers about 10 dBd gain. **T/F**

4. The "no ground radials required" verticals are ground-independent. **T/F**

5. Electrical and thermal conductivity are related. **T/F**

6. There is substantial evidence that vertically-polarized beam antennas require special feedline routing consideration for optimum performance. **T/F**

7. Aluminum is an ideal conductor for RF applications—that's why we make our antennas of aluminum! **T/F**

8. Doubling the wall thickness of an antenna support mast doubles its strength; the thicker, the better. **T/F**

9. Doubling the diameter of an antenna support mast cubes its strength. **T/F**

10. A very good boom material for VHF/UHF beam antennas would be bamboo. **T/F**

11. Teflon™ coaxial cables are best because they have the lowest loss. **T/F**

12. There is a direct correlation between velocity factor of propagation (VF) and coaxial cable attenuation. **T/F**

13. Nitrogen-filled coaxial cables have extremely low loss because nitrogen is the best RF dielectric material. **T/F**

14. DSP (digital signal processing) is better than using IF filters to improve receiver performance. **T/F**

15. When your VHF receiver loses sensitivity due to nearby strong signals that create terrible interference, this is a sure sign of "intermod." **T/F**

16. The best way to handle "intermod" from high-powered pagers and commercial repeaters on VHF is to use a "cavity" between your antenna and receiver. **T/F**

17. The range of Personal Communications Service two-way radios can be greatly extended by connecting them to large outdoor antenna systems. **T/F**

18. Cellular telephone service antennas are generally installed along high-

ways and in populated areas, not on mountaintops. **T/F**

19. It is possible for a VHF radio system or antenna to be "too high." **T/F**

20. A 160-meter dipole antenna lying on the ground is insufficient to make many contacts! **T/F**

21. The "through-the-glass" two-meter antennas work about the same as a whip mounted on the roof of the same vehicle. **T/F**

22. Ten watts output power on CW will produce about the same received signal to noise ratio (readability) at a distant location as 100 W output power on SSB, or 400 W output power on FM. **T/F**

23. Operating CW mobile is so crazy, almost nobody does it. **T/F**

24. CW is a "dead" mode, used mostly by die-hard geriatrics. **T/F**

25. The highest point in the "Lower 48" east of the Mississippi River is Mt. Washington, NH. **T/F**

26. The highest point in the "Lower 48" west of the Mississippi River is Mt. Whitney, CA. **T/F**

27. California has both the highest and lowest points in the contiguous United States, and those two points are only 100 miles apart. **T/F**

28. It would be nice if signals could be "bounced" off man-made "reflector clouds" in the sky; this is an interesting theory that bears investigation. **T/F**

29. Standard video signals can be transferred via the Internet using telephone modems. **T/F**

30. "Long path" signals on HF are weaker than "short path" signals. **T/F**

31. The North Pole would be a great place to operate HF, because it is a "short path" point to most of the Northern Hemisphere. **T/F**

32. Stacking identical beams provides 3 dB gain in the favored direction over one of the single antennas. **T/F**

33. 9913 is great coaxial cable to use for most VHF/UHF applications. **T/F**

34. LMR400 is great coaxial cable to use for most VHF/UHF applications. **T/F**

35. Type N, type C, and type BNC connectors were all developed at Bell Telephone Laboratories, 50 years ago. **T/F**

36. Bell Telephone Laboratories is now called Lucent Technologies. **T/F**

37. The inventor of the transistor was a ham. **T/F**

38. One of the co-inventors of the Touch-Tone™ telephone system was a ham. **T/F**

39. Hams helped prove the following things were possible: transoceanic communications; moonbounce; microwave parametric amplifiers. **T/F**

40. Nobody has ever worked DXCC (contacts with 100 countries, confirmed) on six meters. **T/F**

41. Being "line of sight" to a station of VHF is more important than just being in close proximity, regarding signal strength. **T/F**

42. Diction and enunciation, aided by excellent signal linearity, will be of more help in making a contact better on SSB than will signal strength. **T/F**

43. At 40+ years old, the Collins 75A4 receiver outperforms many modern receivers built in 1998 when it comes to the ability to copy weak signals adjacent to very strong ones. **T/F**

44. A good low-pass filter installed on your six-meter transmitter will be a great asset in eliminating or reducing TVI (television interference) on TV channel 2. **T/F**

45. Just show up at the ARRL club station, W1AW, and you can operate it to your heart's content. **T/F**

46. If you are "single op" contesting in the major HF contests, one way to help "win" is to call CQ on one band while making contacts on another band. **T/F**

47. If you want to win the November Sweepstakes (SS), change bands every few minutes, to optimize your contacts per hour rate. **T/F**

48. Six meters (50 MHz) doesn't "open" during the winter—it's a "summertime" band for making long-distance contacts. **T/F**

49. Lightning storms "open" the six-meter band because lightning ionizes the E-layer, creating opportunities for "skip" propagation. **T/F**

50. The "K" and "A" index are not critical indicators for 160-meter propagation. **T/F**

Easy ones, huh? Check your results. The answers appear below:

1. *False.* Atmospheric noise will override receiver-generated noise in all but the very worst receiving equipment.

2. *True.* 3 dB improvement on transmit, 3 dB on receive.

3. *False.* A yagi design using three optimally-spaced elements cannot provide more than 7 dBd gain.

4. *False.* Everything is ground-dependent. Why do the manufacturers provide tuning instructions for various heights above ground?

5. *True,* for conductors. *False,* for insulators! (Trick question.) For example, Beryllium oxide, an excellent insulator, has almost the same thermal conductivity as aluminum.

6. *True.* Big time!

7. *False.* Aluminum is a good conductor, but its oxide is a great insulator. And it is nonconforming with regard to thermal expansion properties, making it difficult to connect to, other than temporarily.

8. *False.* See #9.

9. *True!* Mast diameter is much more important than wall thickness. Of course, material used is important, too.

10. *True.* This natural material, cheap and lightweight, is very strong and an excellent RF dielectric material.

11. *False.* Teflon cables are great, but not because they have lower loss. Their loss is equivalent to conventional polyethylene dielectric cables, as is velocity factor. Teflon's main advantages are mechanical strength and thermal survivability.

12. *True.* But they are inversely proportional.

13. *False.* Nitrogen is used because it is reasonably inert, not terribly expensive, noncombustible, and readily available as a "dry" (not containing any water vapor or other conductive contaminants) element.

14. *False.* DSP is great but won't prevent your receiver from desensitizing or intermodulating signals within its IF passband. A combination of excellent IF filtering and DSP is preferred with current technology, at least until RF DSP (employed at the operating frequency) emerges.

15. *False.* This is desensitization. Intermodulation is a very different thing.

16. *False.* At least usually. Cavity filters are huge, expensive, critically-tuned, and don't allow you to change frequency without retuning. Notch filters, tuned to the offending pager or commercial repeater frequency, are far more effective—not to mention economical—for this application.

17. *True.* Unfortunately, this is illegal!

18. *True.* The cellular telephone service was designed to have very small "cells." Mountaintop sites violate this principle and actually hinder operation of the system.

19. *True.* Especially true if the system is installed above the tropospheric height (which varies constantly) at the time.

20. *False.* Contacts can be made successfully at these low frequencies with wire antennas literally lying on the ground; however, the resonant frequency of such an antenna will be very different from "free space." Higher antennas will, of course, work better.

21. *False.* Automobile window glass is not a good RF dielectric in the VHF spectrum. Roof-mounted antennas normally work much better.

22. *True.*

23. *False.* In fact, it's becoming

more popular all the time, and there are dozens of HF "mobile CW" nets which are quite active.

24. *False.* CW still represents approximately 37% of all HF activity.

25. *True.*

26. *True.*

27. *True.* Hard to believe, though, huh?

28. *True,* but this is a trick question. Actually, it's been done many times. NASA initiated such experimentation 30 years ago. The author was part of one such experiment, when an RF cloud was launched from Wallops Island, VA. It created a "band opening" on two meters from Maine to Florida for several days!

29. *False.* (Sob.) Analog telephone lines (POTS lines) cannot support video, as their bandwidth is too limited. ISDN (digital) lines get us about halfway there, but to support video that "doesn't blink," T1 appears the minimum network system. "Cable" modems should help a lot as they become popular.

30. *False.* Frequently, long-path signals are much stronger than short-path. Depends on propagation variables, local terrain, etc.

31. *False.* Operations from the North Pole, beginning with NP1 (K2BPP) about 20 years ago, have proven otherwise. It seems a horrible place from which to operate.

32. *False.* But this was a trick question, too. On microwaves, where ground reflections and propagation variables are minimized, 3 dB appears about correct. But at lower frequencies, this varies a great deal, from <3 dB to >3 dB, depending on the path. In the author's experience, at frequencies <54 MHz, the actual improvement is normally >3 dB, normalized over the period of an average contact.

33. *False.* In some applications (straight cable runs with no bends, no rotations, etc.), 9913 is a wonderful product. In most amateur home-station applications, its use is almost prohibited by the environment, which might require small-radius bends or repeated flexing that severely damages cables of this construction.

34. *False.* Like 9913 (see #33,

above), this cable is too inflexible for ordinary work. Worse, LMR400 has a copperclad aluminum center conductor, which, if scored through the thin copper cladding during connector installation, becomes too much of a variable for reliable operation. The author has literally burned through the copperclad aluminum center conductor by operating at 1000 W, at 144 MHz, for 15 minutes into a resistive "dummy" load. Not my idea of a good time.

35. *True.*

36. *True.*

37. *False.* The Nobel-prize winning team were not hams.

38. *True.* Bayman McWhan W2GAX (SK).

39. *True!* Cool, huh?

40. *False.* It's been done many times.

41. *False.* They are both important, but other things being equal, proximity rules.

42. *True.* Proven countless times by QRP operators who "eat the lunch" of high-powered stations with poor diction.

43. *True.* Reason is, all-analog design (no single-sideband phase noise to speak of), great IF filtering, and well optimized signal processing through the RF amplifier and mixers. A real classic.

44. *False.* (Sob, again.) Six meters (50-54 MHz) is so close to TV Channel 2 (immediately above six meters and directly adjacent to the band) that

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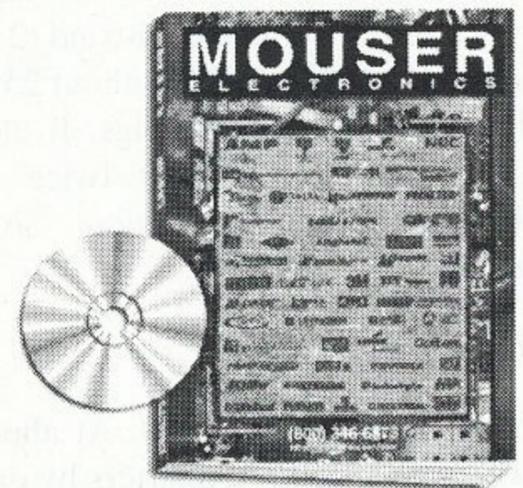
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Continued on page 48

Yaesu's VX-1R

Micro Dual-band HT

Pluses and minuses, big and little—er, tiny.

Michael Geier KB1UM
c/o 73 Magazine
70 Route 202 North
Peterborough NH 03458

A few years ago, Standard Radio Corporation shattered the HT size barrier with the C-108A and C-508A micro walkies. Being a lover of tiny gadgets, I bought a C-508A as soon as I could get my hands on one, vowing to let it go only if someone made a rig even smaller and/or with more power output.

Well, somebody has! Yaesu's new VX-1R is a full-featured dual-band (2 m and 440 MHz) HT which is about 25% smaller than the Standard rigs. It also puts out more RF—nearly twice as much—and has features galore. So I bought one.

Basics

This thing is really small. At about three by one-and-three-quarters by one inch (not counting the knob and antenna), it looks like a toy mock-up of an HT. It doesn't feel like a toy, though! Even though it only weighs approximately five ounces (with battery and antenna!), the case has a rock-solid, rugged quality. The fit and finish are immaculate. It's a real radio, all right.

The LCD is quite large and, in addition to the usual frequency and operating parameters, it displays alphanumeric labels for memory channels. There are seven backlit buttons on the front,

along with the LCD and speaker and microphone holes. The left side has the usual rubberized PTT, monitor, and power buttons, plus the DC input jack, which accepts voltages of up to seven volts. On top is the dial knob, the SMA antenna jack (the rig is way too small to accommodate a BNC jack), and a single proprietary jack which handles external mike and speaker functions (yes, they make an adapter cord). The back of the rig is sculpted and holds the belt clip. Unlike on many modern HTs, the back isn't made of metal, and it doesn't serve as a heat sink. The battery, a high-tech 3.6-volt, 700-mAh, lithium-ion unit, fits inside the radio. The dual-band rubber ducky antenna is longer than the rig itself, but still much smaller than those provided with bigger radios. The ducky is stiff and seems pretty rugged.

The rig comes complete with the antenna, belt clip, wrist strap, battery, and AC adapter. The adapter is bigger than the HT! Also included is a well-written manual and a full schematic.

Features

Yikes, where to begin? The transmitter puts out one-half watt when using the lithium-ion battery, and one watt

when using an external six-volt power source such as the included AC adapter or the optional car adapter. That's considerably more than the Standard, which provides 280 mW. That half watt reaches plenty of repeaters, at least here in Los Angeles.

This thing covers more bands than I've ever seen in an HT. For starters, it receives AM broadcast stations! It also covers the FM broadcast band, aircraft, two meters, VHF High public service, TV channels 7-13, the 220 ham band, UHF TV, 440 MHz ham, and the 800 MHz band (cellular blocked, of course). Essentially, coverage is continuous from 76 MHz to 999 MHz, except for cell. Narrow FM, wide FM and AM detection are available on a menu, plus the rig's automatic detector mode selection can be disabled, which is nice for exploring bands with multiple services using different modes.

CTCSS encode and decode are included, as is DCS (digital-coded squelch). In CTCSS mode, the rig can scan incoming audio for the correct subtone. The DCS system is much simpler than some others I've seen, and actually looks useful, at least for hamfests. Gone is all that confusing group code stuff; there's just a select-

able series of three-digit codes. Pick one, put a friend's rig on the same code, and you're all set.

As with other small HTs, there's no DTMF pad, so it's safe to assume the rig can't use the autopatch, right? Wrong! This one has eight DTMF memories, each capable of holding 15 numbers. In addition, you can send numbers manually, one by one, and the procedure is pretty easy, whether you're sending tones from memory or one tone at a time.

There are three new features I've never seen on an HT before. One, an emergency tone generator and transmitter, is designed to let you signal a listener if you're attacked while walking around. It also makes a loud (OK, relatively loud) noise from the radio's speaker. In essence, it's a personal alarm that can also send the alarm over the air. Frankly, it seems like a gimmick, although I can imagine ham families might use it to keep tabs on the safety of their kids (who must also be licensed hams, of course).

In a similar vein, there's a new Automatic Range Transponding System. This one requires that two radios have the same feature. It makes the rigs poll each other every fifteen seconds, warning when they get out of range. Sounds like a battery killer to me! On the other hand, it could be useful at hamfests or out in the wilderness.

The third new idea is great. Called "Smart Search," it's available on scanners, but I've never seen a ham HT incorporate it. It scans a range of frequencies and automatically stores active frequencies in a special set of memories. This is a very, very handy thing for the traveling ham, and I intend to give it a real workout on my upcoming trip to New England.

The battery

The battery in this radio deserves special mention. Following the lead of camcorder manufacturers, Yaesu chose to use a newfangled, high-capacity lithium-ion pack which pops inside the rig from the bottom. It looks kind of like an AA cell on steroids, and it provides 3.6 V at a whopping 700 mAh while weighing only about an ounce!

This battery lasts a long, long time. The manual lists typical battery life as 12-14 hours, based on a cycle of six seconds of TX, six seconds of RX, and 48 seconds squelched.

The best part is that you can charge it whenever you like. Gone are the warnings about battery memory and full discharge before charging. Used the rig a few hours today, but want to charge it up all the way for tomorrow? No problem! And, it only takes two hours to go from dead to a full charge!

Great as they are, lithium cells require special charging methods. Consequently, the battery can only be charged inside the radio, and only when the power switch is turned off. So, you can't use the rig at all while charging the pack. Oh well, at least the charging happens fast.

Of course, you can have more than one battery, and just pop in the next one when the first one dies, saving charging operations for later on. Another solution is the optional FBA-20 battery case, which holds one AA cell. Yes, one! It allows just 100 mW of transmit power, and the cell gets chewed up fast, but it'll see you through the end of a hamfest or other local event when the lithium cell is exhausted. How the heck do they run the radio on 1.5 V? They don't: A DC-DC converter in the rig doubles the voltage to about 3 V. Clever, huh?

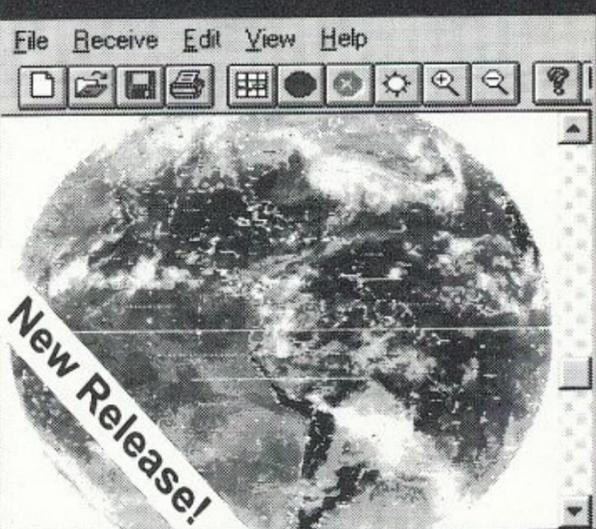
Memory organization

Although the ad literature claims 290 memories, that is, shall we say, a tad hyperbolic. There are two ways to configure the unit's memories. In Group 1 mode, there are 52 memories, each of which can store all the necessary ham data, including CTCSS frequencies and split RX/TX. In Group 2 mode, these are replaced by 142 "simplex" memories which can store repeater shifts, but not CTCSS frequencies. There are also 10 separate memories for the AM broadcast band, and there are 31 special memories which store the results of a Smart Search operation. Finally, there are 20 memories dedicated to 10 pairs of scan limits.

So, if you use Group 2 mode, you have 203 memories, according to my

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addition. Thus, I'm not sure where the 290 figure comes from. It doesn't matter, though, since virtually all hams will wind up using Group 1 mode, which is the default. For practical purposes, you can consider the rig to have 52 normal memories, plus 10 pairs of scan limits. It's plenty.

Like most of Yaesu's newer radios, this one lets you assign a six-character alphanumeric label to each memory. In other words, you can name them. Until you've tried this feature, you can't imagine how useful it is! Especially if you travel often and keep repeaters for different cities in memory, it's great to just see "Boston" or "Hllywd" instead of a frequency whose location you may not remember. If you want to check that frequency, though, it's easy to do.

Segregation

The rig's most unusual memory feature is its segregation by band. Let's say you store some two-meter repeater frequencies in memories 1, 4, and 5, and some 440-MHz frequencies in memories 2, 3, and 6. In order to access the two-meter memories, you must first go to the two-meter band, by way of the Band button. Then, you'll



Photo A. Yaesu's VX-1R combines remarkable (lack of) size with puzzling limitations.

see them. You *won't* see the memories which are storing the 440-MHz frequencies, or those from any other band; they appear to be nonexistent!

That deliberate design limitation has many ramifications. First, it means you can't scan memories containing different bands at the same time. So, if you want to listen for local calls, some of which are on two meters and some of which are on 440, you're out of luck; it's one band or the other at a time. That severely limits the usefulness of the VX-1R as a scanner, a purpose for which it otherwise would have been great. On my Standard, I can freely mix memories, and the rig transparently changes to whichever band is contained in the memory data as it scans. After all, if I want to scan my local repeaters for calls, do I care on which band they reside?

Second, it's impossible to set up crossband memories. There's no way to use the radio as a remote mike for your dual-band mobile while you're in the mall by setting up for transmit on one band and receive on the other. That, unfortunately, is a desirable use for small, low-powered radios like this one. I used to set my C-508A up crossband, using my base rig as its repeater, back when I lived in the country and couldn't hit any repeaters directly from an HT. It was great being able to walk around the property and get into distant repeaters via the base rig.

Finally, and most seriously, the inability to view memory contents without first going to the correct band makes memory entry awkward. When you go to store the VFO settings into memory, the rig lets you choose any memory number you want. If the memory is currently occupied, the memory number blinks. That's great, as it helps you avoid overwriting important memories. However, if you *do* wish to overwrite a memory, the first thing you're most likely to want to do is go check what you may be overwriting! Hmmm, which band is it on? You *can't see* what's in the memory unless you already know what band it's on! So, you wind up stepping through the bands, going through the memories,

one by one, until you figure out which band has the memory you want to check. Remember, we're talking eight bands here! It's insanely cumbersome.

Compounding the situation is the lack of ability to use the top-mounted knob to zip through memories. You must use the front-mounted buttons. If you hold them, though, they start the rig scanning, so you have to press them over and over again to find your desired memory channel. You may wind up pressing those buttons dozens of times before you find what you're looking for.

This serious limitation is entirely software-based. It wouldn't have cost one extra penny to make the rig able to access any memory at any time, like the Standard can. I can't imagine why Yaesu designed the radio this way.

Radio performance

While I don't have access to a service monitor, I think it's safe to say the radio meets its published specs. I can, however, offer my observations on real-world operating, and some comparisons to the Standard, which is the only other dual-bander in this size class.

The VX-1R's transmitter gets out well. The half watt goes noticeably farther than the Standard's 280 mW. Part of that is also due to the antenna, which is a bit longer than the Standard's. The transmit audio is clean and clear. Nice transmitter, no complaints.

The receiver is not bad, but it doesn't compare with the Standard's RX. In the ham bands, the sensitivity seems quite good, but even nearly full-scale signals which are clean on the Standard have lots of hiss on them on the VX-1R. You need a really strong signal for noise-free reception. Also, local signals from a computer, which don't much bother the Standard, sometimes trash the VX-1R's reception. In its favor, the Yaesu's selectivity is nice and narrow; you can really tell when you're tuned 5 kHz off.

Out of band, the sensitivity varies from quite decent in the high UHF range to awful in the high VHF range. The local NOAA weather station on

162.55 is full-scale and full-quieting on my FT-530, weak but listenable on the Standard, and barely audible on the VX-1R. Part of that is the antenna; putting the FT-530's much bigger rubber ducky on the VX-1R (using a BNC-to-SMA adapter) raises the NOAA signal level to about 1/3 scale and hissy sound quality. It's better, but it still doesn't compare with either of the other two radios' performance.

The audio amp is pretty robust, but the speaker is small and tinny, as one would expect from such a tiny rig. It puts out plenty of high frequencies, which really exacerbates the hiss problem. There's an easy fix, though, using my old "kaboom audio enhancer" trick. Simply cover over all but the top two rows of speaker holes with some thick tape (being careful not to cover the mike hole in the upper right corner of the grille). I like to use the write-protect tabs from the old five-and-a-quarter-inch computer floppies. This forms a baffle which cuts the highs down quite a bit and strengthens the lower frequencies, dramatically improving the sound without making it noticeably softer. After the mod, there's plenty of audio and it sounds pretty good.

Super coverage

As I mentioned, the VX-1R covers darned near everything! It's great when you're traveling. If you're sitting in the airport looking for something to do, and two meters and 440 aren't hopping, you can listen to the news on FM or AM. TV audio from channels 7-13 and the UHF TV band are there, too, and you can even listen to the 220 MHz ham band! Or, you can check out the airport tower to hear when your flight arrives—not, of course, while you're flying!

The AM band

The AM broadcast band is handled differently from all the other bands. There are 10 dedicated AM-band memories. On this band, the display does not show the tuned frequency! All you get is a series of bars across the screen, and the S-meter bar graph moves to the right as you tune across

the band. You have no idea at all where you are. Once you find a station and put it in memory, though, you can use the alpha label function to name it; the name, of course, can be its call letters or its frequency, if you can determine what that is (perhaps from a station announcement or by using another radio). AM reception using the rubber ducky is so weak it's barely usable, and there's no loopstick in the rig. In all fairness, where would they put one? If you hold the radio near some metal, or it's plugged into the AC adapter (which provides a nice grounding effect), you can hear a few stations. It certainly won't replace a \$10 pocket radio, but who really needs an HT to receive AM anyway?

Documentation

The booklet is generally excellent, and covers everything from expected battery life to use of each menu item. I found no errors, and the grammar is good, too. It's easy to read. The only omission is in regard to memory backup; there's no mention of whether the rig uses a backup battery or whether memories will eventually disappear with no power applied. I assume nonvolatile memory is used, but I have no way to know.

As I mentioned, the schematic is large and very readable. I can't imagine how any user could try to repair a radio of this size, but it's still nice to have the diagram.

Given the complexity of this rig, a wallet-sized "cheat sheet" would

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have been very welcome. Yaesu usually provides one with their rigs, and should consider adding one for the VX-1R.

The good stuff

You just can't beat the portability of this radio! It's small enough to take anywhere, and it has enough transmit power to reach at least a few repeaters anyplace you might be, unless, perhaps, you're way out in the country. The out-of-band coverage is truly remarkable, and having 220 MHz reception is great. The alpha naming of memories is something you won't want to live without once you've tried it. The lithium-ion battery is quite an improvement over NiCds, and the single AA-cell operation (with the optional battery holder) really extends the usefulness of the radio. Having DTMF available in such a tiny HT is a real treat. The AM detector is excel-

lent, providing very good fidelity for aircraft or BCB listening. It's the best one I've ever heard on a ham HT. And you can read the battery voltage at any time, even while transmitting. It's a function on the menu, and you can call it up with one button press if you leave the menu set at "Battery."

The not-so-good stuff

I've owned lots of Yaesu handhelds, from the venerable FT-208R up through the FT-530. I've always considered Yaesu to be at the forefront of HT technology, especially where the user interface was concerned. The command sequences were intuitive and the firmware worked great.

This radio, alas, is an exception. The menu system is similar to the Standard's, and is the only sensible way to control dozens of functions from so few buttons. In this one, though, there appears to be no logic behind the grouping of the functions. For instance, the repeater offset and direction are next to each other, as they should be, but are nowhere near the CTCSS frequency and status, so entering a new repeater may require your stepping through a bunch of unrelated functions, unless you always use the automatic repeater offset function to avoid having to leave the CTCSS section of the menu. Plus, some of the command sequences make sense, while others are so counter-intuitive that I can't remember them. I've had to refer to the manual more with this radio than with any other I've owned. The Standard has a much simpler interface, and I learned that rig in no time.

Also, there are some significant bugs in the VX-1R's operating system. I'd be remiss if I didn't mention some of the bigger ones here:

The most serious bug occurs when you try to change the contents of a "home" memory channel (every band has its own) before storing any other memories on that band. Instead of changing it, the rig steals a home channel from *another* band! You wind up with two home channels on one band, and the loss of one on another band. If you try to delete the new (false) home

channel, it just won't go away. It's happened to me several times. The first time, I spent about an hour trying to undo the mess. I finally found the cure: First, make sure the rig isn't displaying the false channel. Then, go back to the band from which it was stolen (you have to hunt around to find out which one) and try storing a frequency in its home channel again. The home channel will be stolen back and all will be well.

In the automatic squelch mode, which sets the squelch to the optimum point for most sensitive reception, scanning doesn't work properly. After the first time the rig pauses on a signal, the squelch doesn't close completely. The audio amp stays on, and the scan keeps pausing on each frequency through which it steps, regardless of whether or not there's a signal there. To reset the squelch, you have to either turn the rig off and back on, or change bands. Changing the squelch to a manual setting cures the bug.

Similarly, the emergency function doesn't turn off properly, either. Again, you have to turn the radio off and back on to get things back to normal. Oh, well, if you actually have to *use* that function, resetting your radio will be the last thing on your mind anyway!

The AM band's memories refuse to delete! Once you've stored an AM memory, you're stuck with it forever. You can change its contents, of course, but it's there to stay. Also, the detector mode setting reads "FM-N" (for "narrow"), not AM, and you can't change it. The good quality of the audio, however, makes it obvious that the detection is actually AM. (On other bands, the mode detection shown is correct.)

Conclusion

Despite some real shortcomings, the VX-1R is the *bee's knees!* The size alone makes it worth having for hamfests and travel. The rig needs a firmware overhaul, and I hope Yaesu will consider fixing the bugs and removing the memory segregation. With such corrections, this \$300-class micro HT would be truly great, both as a ham rig and a scanner. As it is, it's still cool, and I'm keeping mine! 73

Radio Bookshop

Phone 800-274-7373 or 603-924-0058, FAX 603-924-8613, or see order form on page 88 for ordering information.

Crystal Set Projects

This 160-page book has 15 projects you (or your junior op) can build. It doesn't take a well-stocked junk box to build these crystal radios. You can build 'em into match boxes, cigar boxes, or anything else that's handy. Some even tune the short wave bands! Published by The Xtal Set Society. Start having some fun! \$15.

Crystal Set Building

This book is packed with 168 pages of easy home crystal radio projects. Your batteries will never wear out with these radios. They might even make a great science fair project. These projects are reprinted from Volumes 6 and 7 of The Xtal Set Society Newsletter. They do have some tube sets and TRF's too. Great weekend projects. \$16.

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."

SPECIAL EVENTS

Listings are free of charge as space permits. Please send us your Special Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the September issue, we should receive it by June 30. Provide a clear, concise summary of the essential details about your Special Event.

JUNE 6

BANGOR, ME The Pine State ARC will sponsor the Bangor Hamfest 08:00-13:00 at Hermon High School. Take I-95 to Exit 44 (Cold Brook Rd.), north to US #2. Take US #2 one mile to the high school. From the village, take US #2 east one-half mile to the high school. Admission \$3.00; under 12 free. There will be VE exams for all classes; tailgaters; dealers; demonstrations; old keys; old radios; a working station; ARRL and section forums; and more. Campgrounds and many motels within five miles. The event will be held rain or shine. For more info, contact Roger W. Dole KA1TKS, RR #2 Box 730, Bangor ME 04401. Tel. (207) 848-3846.

CHARLOTTE, NC The 6th annual Charlotte ARC Hamfest and Computer Fair will be held Saturday, June 6th, at the Roll-A-Round Skating Center at 8830 East Harris Blvd. in Charlotte, 7:30 a.m.-12:30 p.m. There will be computer and radio dealers, as well as flea market tables and tailgating. Doors open for flea market unloading at 6 a.m. Admission is \$5 at the door; children 12 and under admitted free. Tailgating requires an admission ticket plus \$5 per parking space. Flea market tables (8' x 2') are \$10 each; chairs are \$2 each. Tables and chairs must be reserved in advance, as extra tables will be very limited the day of the show. Send pre-registration requests, with an SASE, to Charlotte ARC, P.O. Box 33582, Charlotte NC 28233-3582. Pre-registrations without SASE, or received after May 24th, will be held at the door. No one except children will be admitted into the indoor flea market area or tailgating area without a ticket. The selling or solicitation of pornographic-type material is prohibited

within the indoor or tailgating areas. For more info, send Internet E-mail to [w4cq@qsl.net]; or visit the home page at [http://www.qsl.net/w4cq/]. Talk-in is on the 147.06(-600) repeater. Radios which automatically program the offset will normally use +600, so please check this carefully.

TEANECK, NJ The Bergen ARA will hold its annual Fall Hamfest at Fairleigh Dickinson University. Buyer admission is \$5, with XYLS and harmonics free. Seller admission \$10. VE exams. Take Route 4 east/west to the River Rd. exit. Follow the signs into the hamfest area. Talk-in on 146.790 (-600). Contact Jim Joyce K2ZO at (201) 664-6725 before 10 p.m.

JUNE 7

BUTLER, PA The 44th Breezeshooters' Hamfest will be held Sunday, June 7th, 8 a.m.-4 p.m. on the Butler Farm Showgrounds, just north of Butler. Handicapped accessible. Admission \$5 per person, under 12 admitted free. Take PA Rt. 68 east from Interstate 79, or take US Rt. 68 west from PA Rt. 8. Talk-in on 147.96/.36. Tailgaters' spaces \$5 each. Indoor vending tables \$15 per table, rented in advance, first come, first served. Reservation deadline is May 15th. Send payment with an SASE to George Artnak N3FXW, 3350 Appel Rd., Bethel Park PA 15102, or call the Breezeshooters' Hotline at (412) 854-5593; or use E-mail to [geoart@usa.net]. Check out the Breezeshooters' Web site at [http://www.users.sgi.net/~wolfie/].

JUNCTION CITY, WI The Central Wisconsin Radio Amateurs, Ltd. (CWRA), cordially invites your participation at their 21st annual Swapfest and Auction, Sunday, June 7th, at the US Army Reserve Center. This is a new location and

offers Saturday evening setup and overnight security, as well as inside-the-building loading and unloading. Tables are \$4 each if requested prior to May 15th. After May 15th, tables will be \$7 plus admission. Admission tickets will be \$3, and free for children under 12. Doors open to the public at 8 a.m. (6:30 a.m. to vendors choosing Sunday morning setup), with shutdown by 1:30 p.m. We are encouraging tailgaters to sell their unsold goods at our auction at noon. Talk-in on 146.670 WB9QFW and 146.985 W9NN repeaters. Contact John Feltz W9JN, CWRA Swapfest Chairman, 973 East First St., Junction City WI 54443-9614. Tel. (715) 457-2506; E-mail [jfw9jn@tznet.com].

MEDINA, OH Join the M2M Group for the 1998 Medina County Hamfest, Sunday, June 7th, at the Medina County Fairgrounds Community Center, 735 Lafayette Rd., Medina OH. Vendor setup at 6:30 a.m. Open to the public 8 a.m.-3 p.m. General admission \$5; \$4 in advance. Inside vendors' tables \$10; \$9 in advance. Flea market spaces \$8; \$7 in advance. Reservation deadline is May 23rd. Enclose an SASE for return of tickets. Send advance payments to Medina Hamfest Committee, P.O. Box 452, Medina OH 44258. Please call (330) 725-0119 for info about VE exams; walk-ins welcome. Mobile check-in on 147.630/.030.

PRINCETON, IL The Starved Rock Radio Club Hamfest will be held at the Bureau County Fairgrounds in Princeton IL. Doors open at 6 a.m. Advance tickets are \$5 with 4 stubs before May 20th, and \$6 with a single stub at the gate. Camping and outdoor flea market area is free. 8' tables indoors are \$10 each. Talk-in is on 146.355/.955 PL 103.5. Contact Bruce Burton KU9A or Debbie Burton N9DRU, 1153 Union St., Marseilles IL 61341-1710. Phone (815) 795-2201; E-mail [brburton@mtco.com].

QUEENS, NY The Hall of Science ARC Hamfest will be held at the NY Hall of Science parking lot, Flushing Meadow Corona Park, 47-01 111th St., Queens NY. Doors open for vendor setup at 7:30 a.m. Buyers admitted at 9 a.m. Free parking. Buyers \$5,

sellers \$10 per space. Talk-in on 444.200 rptr., PL 136.5. Contact at night only: Stephen Greenbaum WB2KDG, (718) 898-5599; or E-mail [WB2KDG@bigfoot.com].

JUNE 13

DENNIS, MA The Cape Cod Tailgate Swapfest will be presented by the Barnstable ARC 8 a.m.-3 p.m. Setup is at 7 a.m. Take Exit 9 off the Mid-Cape Hwy. (Route 6), head south on Route 134, 0.3 mile to Theophilus Smith Rd. on the left. VE exams. Admission \$2.50 at 9 a.m. Early birds \$10 at 8 a.m. Sellers \$5 per space. Talk-in on 147.045 repeater. Contact Don Haaker WA1AIC, at (508) 760-1571. Rain date is June 20th.

FERGUS, ONTARIO, CANADA The 24th Central Ontario Amateur Radio Fleamarket will be held at the Fergus and District Community Center (just a few miles north of Guelph on Hwy. 6), beginning at 8 a.m. Setup at 6 a.m. Snack bar and rest rooms open at 6:30 a.m. General admission \$5, under 12 free. Tailgating \$5 per space; indoor tables \$10 per 8' space. On-site fully serviced campground lots available at \$13.75 per night. Talk-in on VE3ZMG at 145.21; VR3KSR at 146.97; or simplex 146.52. Make all checks payable to Central Ontario Amateur Radio Fleamarket and mail with SASE to Bill Smith VE3WHS, 32 McElderry Rd., Guelph Ontario N1G 4K6, Canada. Tel. (519) 821-6642. E-mail [flea market@kwarc.org]; or check the Web site at [www.kwarc.org/fleamarket].

PADUCAH, KY The Paducah ARA Hamfest will be held Saturday, June 13th at the Executive Inn Convention Center in downtown Paducah, 8 a.m.-3 p.m. VE exams at 1p.m. Plenty of free parking. Admission \$5, tables \$6 each, with one free ticket per vendor. Write to The Paducah Amateur Radio Assn., P.O. Box 1022, Paducah KY 42002-1022; or E-mail [KC4ENA@Apex.Net].

JUNE 14

BETHPAGE, NY The Long Island Mobile ARC will host their Long Island Hamfair, 9 a.m.-2 p.m. at Briarcliffe College, 1055 Stewart

Ave., in Bethpage. Amateur radio equip., computers, ARRL and LIMARC info, VHF tune-up clinic, and more. Talk-in on W2VL 146.85 rptr. VE exams for all classes. General admission \$6, children and sweethearts free. Vendors: all spaces \$15, each space admits one person. Free parking for buyers. For more info, call the LIMARC 24-hour infoline at (516) 520-9311 or check the Web page at [<http://www.limarc.org>].

ERLANGER, KY The Northern Kentucky ARC, Inc. (of Covington KY), will host their "Ham-O-Rama '98" June 14th, 8 a.m.–3 p.m. at the Erlanger Lions' Park. Take I-75 to Exit 184 (Route 236 East). Go one mile and turn right on Dixie Hwy. (US Routes 25 & 42). Go one mile to Sunset Avenue, turn right and go to the end of Sunset Ave. For more info or advance registration, contact *Robert Blocher N8JMV c/o NKARC, P.O. Box 1062, Covington KY 41012. Call evenings at (513) 797-7252. Or call Neal KC4FET, (606) 341-1213; or Ken KZ5KR, (606) 384-4002.* Indoor exhibit area for major vendors. Extensive outside flea market with setup at 6 a.m. Tickets \$4 in advance, \$5 at the gate; children under 13 admitted free. Flea market spaces \$2 each (bring your own table and chair). Indoor vendor space \$15 per table (provided). Registration deadline is June 1st. Send remittance with an SASE. Talk-in on 147.255(+) or 147.375(+) K4CO rptr.

GRANITE CITY, IL The Egyptian Radio Club annual Egyptian Fest—Hamfest, Computer Fair and Flea Market—will be held at the Granite City Campus of Belleville Area College, one-half mile south of I-270 on Illinois Route 203 S, 8 a.m.–1 p.m. Indoor dealer and exhibitor area. Talk-in on 146.79. Admission \$3, tables \$12. Tailgating, no additional charge. Contact *Egyptian Radio Club, P.O. Box 562, Granite City IL 62040, or call Bill Dusenbery N9OQK, (618) 398-1456.*

SUFFIELD, OH The Goodyear ARC of Akron OH, with the assistance of The Pioneer Amateur Radio Fellowship and The Silvercreek ARA, will hold its 31st annual hamfest, 8 a.m.–4 p.m., Sunday, June 14th, at Wingfoot Lake Park, near Suffield OH, 10

miles east of Akron OH. Entrance is from State Route 43, one mile south of 224. Admission is \$4 (\$3 before May 20th). One ticket admits ham, spouse and children. Make checks payable to *The Goodyear ARC* and mail with an SASE to *Ken Phillips K8CHE, 351 Hillman Rd., Akron OH 44312-2131. Tel. (330) 733-5795; E-mail [aa635@acorn.net].* VE exams at 10 a.m.—ask at the gate for the location. Walk-ins only. Bring license and copy, and photo ID. Flea market spaces \$5 each. Park rules: No pets, no guns, no pornographic materials.

WHEATON, IL The Six Meter Club of Chicago, Inc., will hold its 41st Annual ARRL-sponsored hamfest at the DuPage County Fairgrounds, 2015 Manchester Rd., north of Roosevelt Rd. (Rte. 38), east of County Farm Rd., Wheaton. Free parking. No extra charge for space in the outdoor flea market. Limited overnight RV parking with elec., \$10; advance reg. required. Sellers only at the east gate. General parking at the west gate. Gates open at 7 a.m. Indoor setup for pre-registrants at 7 a.m. Buildings open to the public at 8 a.m. VE exams 9 a.m.–noon; call the 24-hour info line at (708) 442-4961 to pre-register for testing. Advance tickets are available from *Joseph Gutwein WA9RIJ, 7109 Blackburn Ave., Downers Grove IL 60516-3925, or any club member.* Commercial tables, 8 ft. w/110V, main bldg., air cond., \$15 ea. Indoor flea market tables, 8 ft., no elec., \$10 ea. Advance tickets for everyone over age 12, \$5 ea. Send checks payable to *Six Meter Club of Chicago*, and SASE to *Six Meter Club of Chicago, at the address above, no later than May 30th.*

JUNE 19–21

RED DEER, ALBERTA, CANADA The Central Alberta Radio League will host its 28th annual Picnic and Hamfest at the Burbank Campsite located approx. eight km NE of Red Deer. Talk-in on 147.150 (+600) or 146.520 simplex. For info contact *Bob VE6BLD, 5540 54th Ave., Lacombe, Alberta, Canada T4L 1L6. Phone evenings, (403) 782-3438. Packet VE6BLD @ VE6RDR.AB.CA; E-mail [kingel@telusplanet.net].* The club home page is [<http://qsl.net/carl/>]; E-mail is [carl@qsl.net].

JUNE 20

BLUEFIELD, WV The Bluefield Hamfest will be on Saturday, June 20th, 8 a.m.–2 p.m. at the Brushfork Armory on US 52, one mile north of Bluefield WV. VE exams on site at 9 a.m.; walk-ins accepted. Hamfest admission \$5, children under 12 free. Table rentals \$5 each. Inside flea market and dealers. Handicapped access. This is western Virginia and southern West Virginia's oldest hamfest (41 years). Talk-in on 145.49 (BR549) repeater. For additional info, send SASE to *Bluefield Hamfest, Inc., 412 Ridgeway Dr., Bluefield VA 24605-1630; or E-mail [wa4k@sera.org].* Dealers contact *Bob Frazier WB8NRK at (304) 425-8465; or E-mail [cna00188@mail.wvnet.edu].* Internet address: [<http://www.inetone.net/erarc/hamfest/>].

MIDLAND, MI The 22nd annual hamfest of the Midland ARC will be held at the Midland County Fairgrounds. The show features amateur electronics and equip. (both new and used), VE exams, and more. Doors open to the public 8 a.m.–1 p.m. Admission \$4, advance reserved tables \$6 ea., trunk sale space \$5. Talk-in on 147.00(+). For more info contact *M.A.R.C. Hamfest, P.O. Box 1049, Midland MI 48641. Please SASE. Or call Jeff Weinberg at (517) 636-0643 (w); (517) 839-9371 (h), or E-mail [w8cq@bytethis.com].*

JUNE 21

CAMBRIDGE, MA Tailgate electronics, computer and amateur flea market, June 21st, 9 a.m.–2 p.m. Albany and Main Sts., Cambridge MA. Admission \$4. Free off-street parking for 1000 buyers. Fully handicapped accessible. Sellers \$10 per space at the gate, \$9 in advance; includes one admission, setup at 7 a.m. For space reservations or further info, call (617) 253-3776. Mail advance reservations before June 5th to *W1GSL, P.O. Box 397082 MIT BR., Cambridge MA 02139-7082.* Talk-in on 146.52 and 449.725/444.725 PL 2A W1XM rptr. Sponsored by the MIT Radio Society and the Harvard Wireless Club.

CROWN POINT, IN The annual "Dad's Day" Hamfest, sponsored by the Lake County ARC (of Merrillville IN) will be on June 21st at the Lake County Fairgrounds in Crown Point. Talk-in on 147.00, 146.52, and 442.075. There will be computers, and software and hardware vendors. Setup begins at 6 a.m. Doors open to the public at 8 a.m. Admission \$5 per person, tables \$6 each. Contact *Malcolm Lunsford W9MAL, 6721 Harrison Ct., Merrillville IN 46410-3323. Tel. (219) 769-3925; or E-mail [w9mal@cris.com].*

MONROE, MI The Monroe County Radio Communications Assn. will hold its annual "Monroe Hamfest" from 7:30 a.m.–1 p.m. at the Monroe County Fairgrounds, 2 miles west of Monroe on M-50. 8-ft. indoor tables \$10; trunk sales \$5 per 8-ft. space. Overnight camping \$15, free parking. Advance tickets \$4, \$5 at the door. Contact *Fred VanDaele KA8EBI, 4 Carl Dr., Monroe MI 48162. Tel. (313) 242-9487 after 5 p.m.* Talk-in on 146.72.

JULY 11

SALISBURY, NC The North Carolina Alligators Group will hold their Firecracker Hamfest July 11th, 8 a.m.–1 p.m. at the Salisbury Civic Center. From Interstate #85, West/East Innes St., turn left on South Boundary St. and the 'fest is on the left. Advance admission is \$3 with an SASE, or \$4 at the door. Always free to XYLs. The price of admission allows you to set up outside for the flea market. Tables in the air-conditioned center are \$5. Dealers can set up on from Friday 3 p.m.–9 p.m. and check into the center at 7 a.m. on Saturday. There will be an auction of goods at 1 p.m. VE exams by TEARC/VEC on site at 10 a.m., walk-in only, no pre-registration. Applicants must bring original license, photo-copy of present license, any CSCEs and a photo ID to the exam session. For further details, contact *Rae Everhart K4SWN, P.O. Box 41, Lexington NC 27293-0041. E-mail [RAEF@infoave.net].* Talk-in on 146.520 simplex. For hamfest info, contact *Walter (Alligator) Bastow N4KVF, 3045 High Rock Rd., Gold Hill NC 28071. Tel. (704) 279-3391.*

JUL 26

HONOLULU, HI In celebration of their third wedding anniversary, a grand Ham-Boree is being planned by Gordon Crowhurst G4ZPY and Brenda in the form of a big get-together of hams and their partners for an evening meal in Honolulu. They would like to put a face to a callsign, a face to a name, of their many friends and acquaintances all over the world. For those who are interested, there are a lot of nearby mountains for DXing on the Pacific Rim. For more info contact G4ZPY Paddle Keys International, 41 Mill Dam Lane, Burscough, Ormskirk, L40 7TG England. Tel./FAX (44) (0)1704-894299 anytime until 2300, but not between the hours of 1600-1830 local time. Everyone must make their own holiday arrangements themselves and pay for their evening meal. Please R.S.V.P. so that a suitable location may be arranged for the get-together.

AUG 8

HUNTINGTON, WV The Tri-State Amateur Radio Assn. (TARA) will hold their hamfest at the Huntington Memorial Fieldhouse at 2590 5th Ave. For more information call Bernie Mays at (304) 743-5459, or E-mail to [wb8zer@juno.com].

SPECIAL EVENT STATIONS

JUNE 6-7

BOWLING GREEN, KY The Western Kentucky DX Assn. will operate KB4ALC from 0001 UTC June 6th-2359 UTC June 7th, in celebration of the annual Corvette Homecoming in Bowling Green. Frequencies: 7280, 14280, 21380, and 28480. Stations contacted may request a certificate by sending a QSL to Kenneth E. Newman KB4ALC, 505 Emmett Dr., Bowling Green KY 42101 USA.

JUNE 20-21

ALBUQUERQUE, NM Special event station W5P will be on the air 1600-2400 UTC Sat. and Sun., using 2-40 meters QRO and QRP in the Novice, Tech, and General portions of the bands. Modes: CW, SSB, RTTY, and FM. Grid square

DM65. QSL with a #10 SASE to W5P, Jay Miller WA5WHN, P.O. Box 6552, Albuquerque NM 87197-6552, USA. E-mail [wa5whn@rt66.com] for more info about this special event station, or view [http://www.swcp.com/~n5zgt/]. Click on the W5P icon. A celebration of the NM Star Party will be held in Rio Rancho NM on June 25th, and the public is invited to attend.

JULY 1-5

OSHKOSH, WI Radio Amateurs of Wisconsin, in conjunction with the Wisconsin Sesquicentennial celebration and the 27th annual Sawdust Days Festival, will operate W9W 1700-0200 UTC, in the General portions of 10, 15, 20, and 40 meters, SSB and CW. Send a 9 x 12 SASE for the certificate to Mark Miller N9WT, 336 W. 8th Ave., Oshkosh WI 54901-5928 USA.

JULY 11

BETHEL, CT Rare VHF grid square FN40 will be activated to coincide with the July 1998 CQ VHF contest weekend. The Candlewood ARA in Danbury CT will set sail for grid FN40, located just off the eastern tip of Long Island NY, on July 11th, 1998. Operation will begin before the contest

period at 1300 UTC, and conclude at 2359 UTC, Saturday only. Contest class will be multi-operator class 2. Packet cluster spots will be through YCCC and Tri-State networks. The club call, W1QI, will operate simultaneously on the 50, 144, 220, and 432 MHz bands, using SSB primarily, with some CW and FM. Output will range from 50 to 150 watts to single yagis mounted on one or two small boats (sorry ... the cruise ships were all booked!). Plans and operating details will be posted as they develop on the CARA Web page at [http://www.danbury.org/org/cara/].

JULY 11-12

KALAMAZOO, MI The Southwest Michigan Amateur Radio Team (SMART) will sponsor a special event station starting July 11th at 1800Z-0200Z July 12th. The station will be located in Kalamazoo MI and will operate under the new club call K8KZO. All contacts will be in the phone bands on or around 3.904, 7.2704, 14.304, 28.304, and 147.04. This event is to celebrate the 40th anniversary of SMART. To obtain a certificate confirming the contact, send a QSL and a 9" x 12" SASE to SMART, P.O. Box 3175, Kalamazoo MI 49003-3175 USA.

NEVER SAY DIE

continued from page 5

kits you've built. You do know how to write, don't you?

The FCC and Politics

Maybe you've read where the FCC has been hassling Yaesu over the way their FT-50R dual-band HT can be modified to receive cellular telephone channels.

For many years the FCC championed the concept that the radio waves were open to everyone. The FCC used to actively fight any attempts at restricting the reception of frequencies. The police hated this because crooks could legally monitor their police channels. The FCC was unmoved.

Then came the cellular telephone industry. The multi-billion dollar cellular telephone industry. Their customers, after using telephone all their lives with the innocent expectancy of privacy, tended to get upset when they found that their telephones were no longer private. Actually, the

Continued on page 80

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One of the most enjoyable activities for hams is hamfests—those gatherings where hams get a chance to look for used and new equipment, parts, and radio paraphernalia. Looking at all the old rigs for sale, some at bargain prices and others at—well, you know—slightly more than the price of gold. But suppose you live in an area where there aren't a lot of hamfests, or you can't easily attend a hamfest because of work- or health-related problems. Then what do you do if you're looking for a used rig?

Where I live now, in upstate New York, the number of hamfests is considerably lower than I was used to in 4-land. In fact, unless I want to drive several hours, there is only one hamfest nearby each year. There are very good trader nets on the air and they're interesting to listen to, but unfortunately, listening to them takes a lot of time and they do operate on their own schedules.

So, what do you do when you are looking for a piece of equipment on a Thursday evening, say around 11:30 or any other time that is uniquely suited to *your* free time? I doubt if you'll find a hamfest to go to. Of course you

could look in the various printed publications for used equipment listings. But the pages get worn quickly and the listings are a couple of months stale (due to the lead time required to publish a magazine). So *now* what?

Cybershop

There are advantages to doing my looking by computer. Time is never a factor; I can "hamfest" at two o'clock in the morning on a Tuesday if I want to. The weather is no bother, either. The stuff is always there. Of course you won't find very many old dusty boxes filled with broken switches, odd connectors, meters, and other junk listed on the computer. Generally, only rigs and large items such as tuners, amplifiers, microphones, keys, power supplies, and the like are listed.

Some ham-related equipment is listed on packet. You may have seen the listings by the subject or address of 4SALE, FORSALE, or SALE. Some of the items will be available locally or regionally. I have also seen equipment for sale from all over the country. Packet radio is good, but it is only one place to look.

"All over the country" brings up a point about hamfesting on the computer. Items are listed from all over the country and, sometimes, from all over the world. This could provide some interesting shipping problems—depending on what the item is, how big or heavy it is, and where it is.

Now, if you are on line and have access to the Internet, you are going to see more radios and other ham-related equipment for sale (FS) and wanted to buy (WTB) than you could if you went to several hamfests or spent all week listening to the trader nets. In this article I am going to give you the "addresses" for a number of ham radio swap Web sites. Some are semi-commercial, a couple are completely commercial, and most are just places to make listings for one and all to see—without cost.

I'll also give you the names of a few discussion groups that are great for browsing when looking for a specific piece of equipment, or wanting to sell something. In most instances, you will be able to look at listings of items for sale or wanted, and can also add items you wish to sell or buy.

Buying, selling, and not getting burned

The warnings about buying and selling over the Internet are pretty much the same as you would expect when buying, selling, or trading anything from any individual. The source of the information may be slightly different, but it matters very little whether you are reading printed classified ads, listening to a trader net, looking at a Web site, or watching a discussion group. You are dealing with an individual who is mostly likely unknown to you. Fraud happens.

Payment and shipping terms should be mutually acceptable between the buyer and the seller. Typically this will mean money up front, COD (cash or collect on delivery), or payment upon receipt and inspection. For COD or payment upon receipt and inspection you will have to make advanced arrangements with your shipper—and there will be additional fees and delays. The most prominent delay occurs in getting the funds into the hands of the seller. Before using COD, check to see if the shipper (United Parcel Service, FedEx, US Postal Service) will be holding the funds for several days or weeks.

There are a few safeguards you may take when purchasing from a stranger. The best is to buy from someone who is nearby, perhaps within driving distance. That way you can see the piece of equipment for yourself and may even get an opportunity operate it. If you have to deal long distance, ask for a reference. Some hams do a lot of trading and are well known, which can be good or bad. When thinking about spending a couple of thousand dollars for a used rig or amplifier, I am *very* careful!

Some sellers are afraid of bad checks and want to hang on to their equipment until the check clears. This is understandable. To avoid this problem, use a Postal Money Order or bank cashier's check. Or, if you are afraid the item will not be shipped, have it sent to you COD. If you are selling, you are faced with the same problems—only you are on the other end of the stick.

We all want to protect ourselves from being burnt during a transaction. Most of the hams you will ever deal with will be honest and upright, but there are a few bad apples around. In the end, it comes down to *buyer beware*—and *seller beware*, too! One last recommendation is to use the US Postal Service for handling the financial end of the transaction. Using the mail to send the check and a note of understanding affords you some protection from fraud and access to postal investigators should the need arise. A note of understanding is just an informal note that tells the seller your name and address, the amount of funds included, and what you understand is included in the purchase.

Ready for shipping

The two most common forms of shipping are: the US Postal Service with a 50-pound weight limit on packages and the United Parcel Service (UPS) with a 150-pound limit. Overnight shipping services are available from both the Postal Service and UPS, as well as other carriers, such as FedEx, but costs are high.

If you are shipping something really heavy, like a Henry console amplifier, you must ship via motor freight. That too will be costly. Sometimes equipment can be broken down into lighter or smaller packages, such as a separate box for a power supply.

Equipment to be shipped must be packaged properly and insured. Although it is a little more expensive, I recommend having a commercial shipper pack radio equipment, unless the original shipping boxes are available and in good shape.

Protecting the investment

No matter how you ship the equipment, or have it shipped to you, be sure to insure the items being shipped. Insurance provides accountability on the part of the shipping company and will help in the case of damage or loss while in transit.

Get the shipping or tracking number for the package(s), if possible, and you may be able to watch the progress of

the shipment on the computer via a link with the shipper on the Internet. And, even with all this information, packages *do* get delayed or lost.

First contact

Your first contact with the seller of a piece of used equipment should include a simple rehash of what the gear is and the asking price. Then get into specifics about appearance, how well it is working, and why the owner is selling it. The last point is very important. Is the owner upgrading or getting rid of something that is marginal in operation or appearance? The seller may also be a part-time dealer having only a profit motive for sale. However, just because the seller is a dealer doesn't mean you won't get a fair deal. In fact, a dealer may be just the person you want to work with. Generally, your first contacts will be by E-mail—using the address provided in the listing.

Where to look

The following information includes the names and Internet addresses of many of the ham radio trading Web sites. The list is not meant to be exhaustive, as Web sites come and go.

The Ham Trader Home of the Radios & Electronics Classifieds is a feature-rich Web site operated by Island Link Solutions, Inc. It has a database searchable by category, make, or key word. Clickable E-mail addresses are usually included with telephone numbers. [www.hamtrader.com]

The Virtual Hamfest is a commercial Web site that charges a sales commission of 2% to the seller. Listings are in date order and some listings have pictures. The Web site can be set to E-mail new listings directly to you. Upcoming hamfests are also listed. Equipment is by category and listings have contact information—usually with a clickable E-mail address. [www.vhamfest.com]

Amateur Radio Classified Database, sponsored by Raymond Sarrio WB6SIV, can be accessed from his Web site's home page. It has a nice interface that allows the user to pick the category and make of interest—if desired. The

user can build a list for later viewing or may individually read each listing. Name, address, E-mail, and telephone numbers are given in the text of the listings for contact purposes. [www.sarrio.com]

QTH.COM Ham Radio's Classifieds, recently awarded the Best Cyber Ham Award, is Webmastered by Scott Neader KA9FOX. The database provides categorized listings with E-mail addresses for contact. [www.QTH.com/classifieds.shtml]

The Drake List Home Page, hosted by Thom LaCosta K3HRN, is a super Web site for the Drake enthusiast. The Web site supports classified listings, modification information, and much more. [www.min.net/%7Ethom/drakelist/index.html]

Contesting On-line RadioSwap is brought to you by Akorn Access, Inc., an Internet service provider and WWW host service located in the foothills of the North Georgia mountains in Alpharetta, GA. The system provides listing access by category, date, and/or caption. Names, callsigns, phone numbers and E-mail addresses are given for contact purposes. [205.217.100.14/RadioSwap/Search.HTM]

The RING! Ham Radio OnLine Trading Station, hosted by Ring! OnLine of White Lake, MI, provides accesses to its listings database by category. The Web site gives some excellent trading advice and the listings contain all the required contact information from name to E-mail. [www.Ring.com/trading/hamradio.htm]

The Ham Radio Trading Board is provided by CameraWeb of Malvern, PA. The Web site uses frames for selecting the items of interest. E-mail addresses are provided as a means of contacting the seller. [www.cameraweb.com/hr]

The ARRL Web site allows you to view the current *QST* ham ads from its home page. Appearance of the ads is similar to that seen in *QST*. Contact information is given, including some E-mail addresses. [www.arrl.org]

The Amateur Radio Swap List is a free service provided by KAC Website Design of Denver, CO. Listings are posted in date order, the most recent at

the top of the list. Contact information includes city and state and clickable E-mail addresses. [www.kacweb.com/swaps/radio]

Ham Radio/Electronics Ads provides listings in date order with E-mail and telephone numbers for contact purposes. [www.westes.com/ads]

Amateur Radio Trader, published by Trade-A-Plane Publishing, in Crossville, TN, is an on-line version of their printed product. Listings are by category, with phone numbers. [www.amradiotrader.com]

I have not included the [http://] portion of Web site addresses, as most new browsers add that for you automatically. When entering the Web site addresses, be sure to type them exactly as given. Upper and lower case does sometimes make a difference.

Some Web sites are slow to load up. Sometimes this is partially due to the large amount of graphics carried on the Web site. Generally, the less fancy the site, the quicker it loads.

Where else to look?

In addition to Web sites, there are several discussion groups that have items for sale and wanted listed on them. Discussion groups are also excellent places to ask questions or seek advice from other group readers. Depending upon the specific browser you are using, you can set them up by list selection or direct entry. Discussion groups of interest for trading are:

[alt.ham-radio.marketplace]

[rec.radio.swap]

[rec.radio.amateur.equipment]

Additional discussion groups may be found by pointing your browser to [www.QTH.net] and making selections from there.

About boat anchors

Had an itch to own a piece of history? Perhaps you know how much better the audio is from a tube-type rig. Or maybe you want a rig you can maintain yourself, without loads of expensive test equipment. Of course tube radios are also known to warm hearts and hands on a cold winter's night. In any case, the discussion group [rec.radio

amateur.boatanchors] is a great place to look or list your wants.

You may also want to check *The Radio Finder*, an absolutely superb Web site run by Abe Thurtell KC8AHW for his father, Joel Thurtell K8PSV of Plymouth, MI. Joel is a dealer buying, trading, and selling tube-type amateur and military radio equipment. The Radio Finder Web site is my personal favorite and is loaded with many fine pictures—don't drool on the keyboard! [www.radiofinder.com]

Postscript

Well, all these electronic things ... you know, computers and modems, and the Internet, are really great, and you can find tons of stuff to buy out there, but I still like going to *real* hamfests. They are loads of fun, even when you come home with your stomach churning, either from the overdone chicken—or the rig you *just* missed!

By the way, there are other discussion groups and Web sites out there just waiting for you to find them. All you have to do is a little searching. 73

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In Search of a Simple Phone Patch

But who needs one, anyway?

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Rancho Palos Verdes CA 90275
[rlandon@flash.net]

How often do you need a phone patch? If you're like me, you would say "almost never" or "once in a while." However, for those times when a contact asks if you could do a local phone patch, it would be nice to say, "Sure ... no problem." Unfortunately, the classic phone patch is not simple. It consists of audio circuitry, VU meters, VOX (Voice Operated Switching), multiple transformers, line impedance simulators, and connections to your transceiver's microphone, audio output, power, and, of course, the telephone line. All this complexity adds up to cost, messy interfaces to your equipment, and general inconvenience (especially if you want to use it with more than one transceiver). Also, in the off chance you wanted to purchase a patch, just try to find one in the ham catalogs or magazines. Again, if you are like me, all of these reasons are why you do not already have one in your shack—what started me on my quest for a simple phone patch.

Some things you don't need

I searched the literature, built many experimental patches, and drove my ham friends crazy with requests to

help me test them. After becoming familiar with the Plain Old Telephone System (POTS), balanced hybrid line transformers, IC op amps, VU meters, and various other interesting things, I finally concluded that there are a lot of nice but unneeded functions you can live without.

1) You don't need VOX. This decision eliminates fiddling with telephone line impedance simulators and hybrid transformers, setting delay timing, and the delicate adjustment of signal levels. Since you have to be there anyway to control the station, your hand on the transmit/receive switch can replace VOX.

2) You do not need an added electrical connection to your microphone. You need some sort of audio monitoring of the telephone so that you can control the transmit/receive switch. If you use a speaker to monitor the telephone, you can eliminate the electrical interface with your microphone by making sure it can hear the same thing that you are hearing. This eliminates a messy electromechanical interface in series with your microphone (and the problem of finding matching connectors).

3) In some cases, you don't need an added electrical connection into the phone line. Similar to the conclusion

in #2 above, you may be able to use acoustical coupling into your phone ... read on.

4) You don't need a VU meter. The VU meter is normally used to set signal levels to meet telephone company standards. However, if you just adjust your input signal levels to be approximately equal to the levels received from the telephone, it works just fine. The use of acoustic monitoring of both inputs and outputs to the telephone is the key to this simplification.

What will the phone patch look like if we throw out all these typical functions?

By eliminating all the typical phone patch functions listed above, you can have a phone patch that does not require *any* modifications to your current rig. If this sounds too good to be true, you're right: There *is* one small hitch. This ultimate in phone patch simplification requires that you have a modern speakerphone adjacent to your rig. The new speakerphones are surprisingly good, with no evidence of the feedback or delays that plagued the earlier models. Both the Lucent Technologies 822 and the GE 2-9315 have

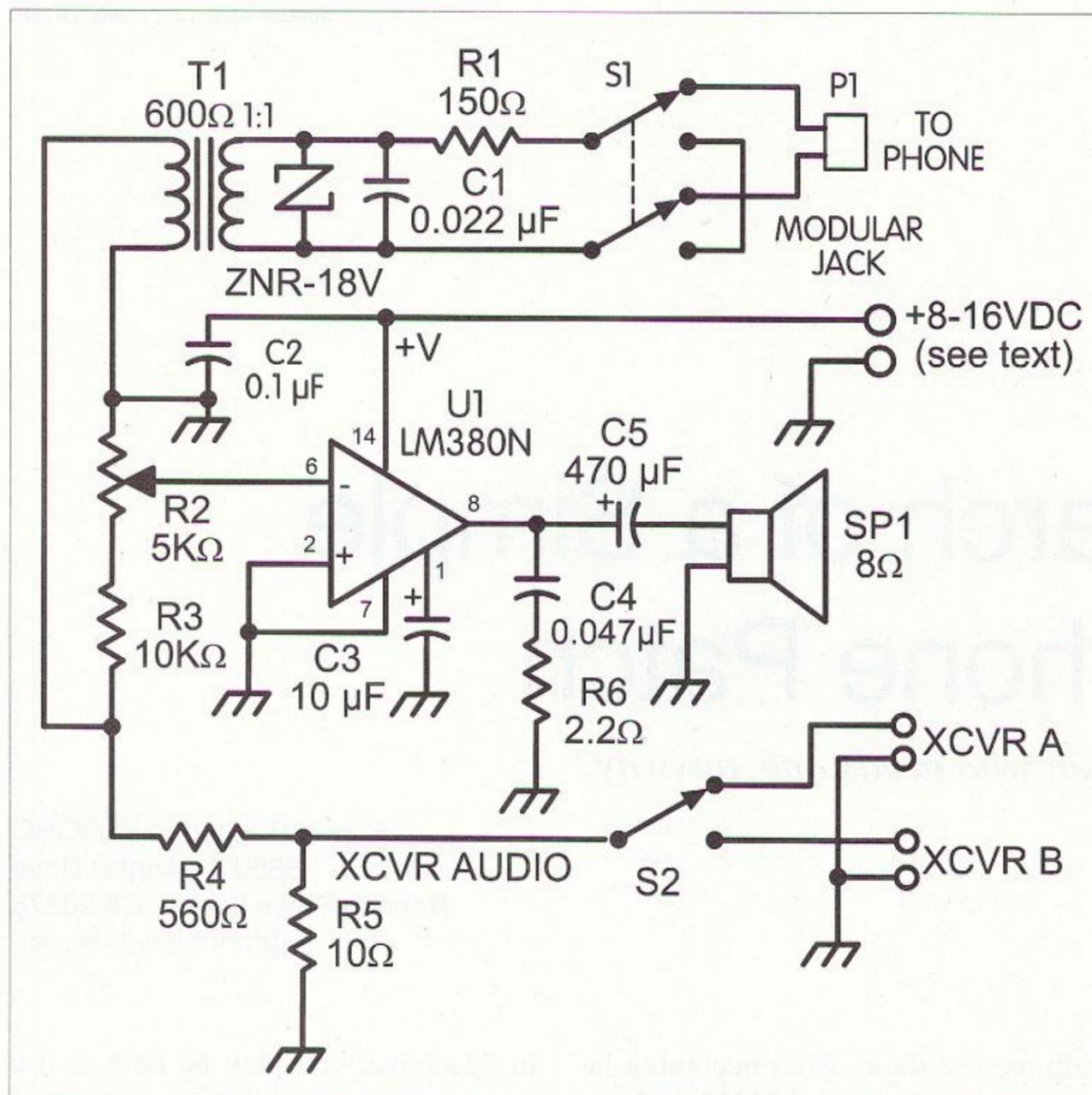


Fig. 1. Next time you get stuck on hold, listen to the music in comfort on the speaker of this combination telephone patch/telephone amplifier. Note: Ground pins 3, 4, 5, 10, 11, and 12 of U1 for heat sink.

been used quite successfully. The GE speakerphone cost \$24.99 in a local discount store. The use of the speakerphone for a patch is as straightforward as having a visitor in the shack talking with your radio contact. The only "complexity" is that your transceiver's speaker and microphone must be near your speakerphone and that the audio levels are adequate. The speakerphone equipment handles all of the interfacing with the phone system. Thus there is no concern about overdriving the phone system or with providing proper fault protection techniques.

Yes, but what if I don't want to fork over the money to buy a speakerphone?

If you say that you have a quite adequate telephone at your rig and do not want to purchase a speakerphone just for the occasional phone patch, all is not lost. You can build a very simple patch circuit that uses all of these sim-

plifications except for the one that requires the sophistication of a speakerphone (#3). Electing to forgo use of a speakerphone will, however, require that you provide an electrical connection to your transceiver's external speaker plug. Luckily, this connection is simple and problem-free.

The resulting patch circuit requires a speaker near your transceiver's microphone. In the example patch described below, a small but quite adequate extension speaker from Radio Shack™ was used. Even though this speaker is small, it had enough spare room in it to house the simple phone patch circuit. The patch circuit does not have to be packaged inside the speaker case. If you have an existing external speaker, it would probably be the best speaker to use. In that case, a small box can be used to house the circuit if you prefer not to modify the speaker housing.

Fig. 1 is the schematic of the simple patch circuit. Starting at the upper right of the schematic is the jack P1 to

Parts List	
C1	0.022 μF; *RS 272-1066
C2	0.1 μF; RS 272-109
C3	10 μF 35 V RS 272-1025; **DK P5134-ND
C4	0.047 μF; RS 272-1068
C5	470 μF 35 V RS 272-1030; DK P5141-ND
P1	Modular jack; DK A9082-ND
R1	150 Ω 1/4 W RS 271-312; RS 271-1312
R2	5 kΩ Pot; RS 271-1714
R3	10 kΩ 1/4 W RS 271-312; RS 271-1335
R4	560 Ω 1/4 W RS 271-312; RSU11344801
R5	10 Ω 1/4 W RS 271-312; RS 271-1301
R6	2.2 Ω 1/4 W; RS 271-312
S1	DPDT switch; RS 275-327
S2	SPDT switch; RS 275-327
SP1	8 Ω speaker; RS 21-549
T1	600 Ω 1:1 transformer RS 273-1374
U1	Audio amp; DK LM380N
Z1	ZNR-18 V O/V protector DK P7282-ND
	14 pin IC socket; RS 276-1999
	PC board 2" x 3"; RS 276-149
	* Radio Shack part number
	** Digi-Key part number

Table 1. Parts list for the simple telephone patch/telephone speaker amplifier circuit.

connect to your phone line. S1 is the switch that activates the patch and, when not in use, disconnects the phone line and shorts the input lines to maintain approximate impedance through transformer T1. When in use, the phone line couples through R1 to the line isolating 1:1 transformer T1. The value of R1 was selected to provide a total of 200 ohms DC resistance across the telephone line when switch S1 is closed. With the resistance of the particular

transformer used, this resulted in the choice of 150 ohms for R1.

The Z1 component is an overvoltage protector, while capacitor C1 filters out RF signals that may be picked up on the phone lines. The phone signal from the secondary of T1 is routed to gain reducing resistor R3 and the volume control R2. This volume control feeds the input of the audio amplifier U1. U1 drives speaker SP1 with power levels up to two watts, depending on the amplifier's heat sink. U1 runs on any voltage from +8 to over +16 volts. Thus you can run it on a nine-volt battery or use your rig's 12-volt source. You will find it is handy to run it directly from your 12-volt source so that the speaker is functional whenever your rig's power supply is on. C4 and R6 on the output of U1 are used to prevent high frequency oscillations.

In the bottom right of the schematic, two sources of transceiver audio are shown (A and B). This is done so that you can use the patch (for example) on either your VHF or HF transceiver. The selected audio signal goes to load resistor R5, which is then connected to the telephone line transformer secondary through 560-ohm resistor R4 to provide the approximate 600-ohm impedance desired.

Please note that the telephone output and telephone input both go to the same place—the secondary of the line isolation transformer. This is also the input to the audio amplifier and then to the speaker. This is how you know, if the speaker levels are similar for both the incoming telephone signal and the received radio signal, that the telephone signal levels are OK. The connectors for power and for transceiver speaker outputs are not shown, as they are unique to your particular power supply and transceiver(s). Be sure to ground U1 pins 3, 4, 5, 10, 11 and 12 and connect them to a heat sink if you want to run the full two watts from this amplifier.

Construction techniques are not critical. The example patch was easily wired up using the small Radio Shack perf-board shown in the equipment list.

Operating procedures

Normal: When the phone patch is off, the circuit operates as an amplified

speaker system for your rig. You can select either source A or source B. One side benefit of the circuit is that it can also be used to monitor the telephone (by temporarily turning the phone patch switch on). This can be handy if you get stuck on hold and would rather listen to the music via the speaker than juggle the telephone handset while waiting.

Gain adjustment: This will set the approximate gain level for the amplifier and allow setting an appropriate audio output volume level for the transceiver.

The steps are as follows:

1) Tune your transceiver to typical signal (e.g., WWV) using the phone patch speaker.

2) Turn the transceiver off.

3) Turn the patch switch on. You should hear a dial tone.

4) Adjust the gain level on the patch circuit so that the sound is adequate to drive your transceiver's microphone. This should be adjusted to be quite loud, as most normal phone connections will be quieter than the dial tone. If you wait long enough, the telephone system will inform you by voice that "the time allotted for you to dial has been exceeded ..." This makes a nice test of adequate speaker volume.

5) While the patch is still turned on, turn on your transceiver and check the volume level. Set the audio level to achieve an equivalent or slightly louder volume than the dial tone/voice message.

6) Turn off the patch. The typical gain levels for your patch have been established. This gain setting is not critical as long as the phone signal into the speaker is loud enough to drive your microphone. It is important to keep your transceiver's audio output level similar to the received telephone signal so as not to overdrive the telephone.

Using the phone patch

Using the patch is very straightforward. Dial the party your radio contact wishes to talk with and explain the procedure for a radio call. After discussing the procedures with the tele-

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Get Kids Involved—and Keep 'Em That Way!

Lessons from the "22 Crew."

Joseph J. Fairclough WB2JKJ
The Radio Club of JHS 22, NYC, Inc.
P.O. Box 1052
New York NY 10002

The Charlotte Hamfest '98 is now a memory, but the question most asked in Charlotte and at every other hamfest we have worked around the country (since 1980) keeps coming back ... over and over again. Here is the traditional scenario: A teacher sees our booth, reads the banner that shows our logo, makes the connection that we have a genuine school club display, and then immediately thinks of a million questions they had always wanted to ask but had never had anyone of whom to ask them.

A little history lesson first: The "22 Crew," our Radio Club of Junior High School 22, NYC, Inc., has been around since 1980. We started experimentally with 30 of New York's most educationally challenged—kids who would have been just as happy to shoot Spot (and maybe eat him) as to read about him (not to mention what they would have done to Dick and Jane)—a tough audience for a teacher. Being a ham, I thought it would be great to use radio as a theme to create interest and excitement in the classroom, to create sort of a ham radio theme park where we could still cover all the requirements

of the 7th- and 8th-grade Language Arts curriculum.

To make a very long story short, it worked. I wrote curriculum based on ham radio. We formed a nonprofit organization to fund the program forever and preclude accepting aid from any government agency. After all, if this thing were to work it should support itself, and through donations of equipment it does so to this day.

"Whatever the teacher has passion for will work—and work great."

The original "Dirty 30" of 1980 has turned into 430 "22 Crew" kids per week, in NYC alone, who go through the program we called "Education Through Communication" then and "EDUCOM" now. The "Crew" has become NYC's largest ham club and the nation's only full-time, nonprofit organization working to get ham radio into schools around the country as a teaching theme.

Now, back to the question. Teacher approaches, says the usual of how they

had heard of us, and then comes the biggie: "So, how do I get my students interested in ham radio?" And I give the answer, which really knocks them out: "I dunno!"

Well, we *do* know, but first we have to ask *you* some questions.

First, nobody has to get kids interested in ham radio—if it is presented right, they will *all* be interested. A teacher's enthusiasm is infectious and directly proportional to an idea's success. If you are so hot and turned on about gardening, use it. Stamp collecting, OK. Woodworking, fine—but if your thing is hamming, then listen up. The bottom line is: Whatever the teacher has passion for will work—and work great.

Assuming your thing is "working the world on a wire," the following may be of help:

- Get food. Candy, individual chips and pretzels, whatever, but make it kid food. Let 'em eat and work at the same time.

- Buy a broom. You may not know this, but the most important person for you now will be the custodian, not the principal. After the session, the room



Photo A. As you might expect, the "22 Crew" classroom is not exactly spacious. Photos by Mark Grossman K2CON.

will be a mess. You clean it; later, the kids will. But for now *you* do it, and don't leave a mess. When you want to get to the roof or the electric box you'll need the custodian in your corner. He is now the main man in your operation. Cultivate him. It will pay off immeasurably!

- Don't get technical. Explain the basics—but be funny. Don't hope to license the world. Don't license anybody. Your job is to make a better kid via ham radio. If you make more hams, that is only a plus. Ham radio is like milk: It is not for everybody, but there is something in it for every kid.

- Operate. Show your fancy two-meter HT, but don't think it will last for more than one period. HTs wear off fast, and you must ... repeat ... *must* head to HF.

- Make contacts when you get to HF. Makes no difference where. Don't seek out DX. Kids don't care about that for more than five seconds. It is the regular, who keeps coming back every Wednesday at 1 p.m. to see how Maria and Tony are doing, who can have the most impact. These are the folks who will make you a star. Some of our best contacts are in New Jersey, not Timbuktu.

- Plan events. Stay late, get in early. Spend your own money. Be a *mensch*

(ask me about that word). Let the kids call you by your first name or whatever they want. Some call me Joe, some call me Mr. Radio, some call me Mr. Joe—but whatever they call you, let them be comfortable.

- Be prepared to be hated by your friends and/or fellow teachers. When CBS and NBC and the papers and the school board and outsiders come to visit this marvelously innovative program, the folks in your building will get mighty jealous.



Photo B. Fifteen-year-old Anthony Ruiz makes a contact on 21.395, under the watchful eye of WB2JKJ.

Success is now in your hands. This program will pass or fail largely depending on your own involvement and excitement. Go nuts and put all of your energy 24 hours a day, eight days a week, into this thing. It will pay off big for you, but most importantly it will result in big rewards for the kids, and *that* is what we teachers are really all about.

Interested in being a classroom winner? A real ham-star? You can contact

Continued on page 48



Photo C. More of the "22 Crew" in action.

Radio Bookshop

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[Kangaroo Press, 1994, 8 x 11 inches, hardbound with dustcover, 176 pp., profusely illustrated]

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Get Kids Involved—and Keep 'Em That Way

continued from page 47

us for intense and personalized help at the address at top, or call us anytime at (516) 674-4072; FAX us at (516) 674-9600; or E-mail us at [crew@wb2jkj.org]. We'll be waiting! 73

Meet the Marvelous MicroVert

continued from page 24

on 20 meters and making plenty of contacts, or not operating at all.

The MicroVert may also appeal to the experimenter. It is, after all, an interesting concept. I would love to hear from people about their experiences with the MicroVert or from anyone who may have a suggestion or two for improving it.

Acknowledgement

I would like to gratefully acknowledge the support and assistance of Margie Bachman KF4UVK, whose constant encouragement has made so many things possible. 73

Home-Brew this Power Cube

continued from page 28

end of the coil. Reconnect the 40- and 80-meter switch positions at the fourth and ninth turns of the new coil (counting from the 20 meter junction point). Use the entire length of coil for the 160 m position. Don't forget to leave an extra 10 inches of wire to reach the additional switch position on the ceramic end plate.

Before hard-wiring, use a grid dip meter to double check the resonant frequencies for each band. Adjust the tap, if necessary, for a good dip with about 30 percent of the capacitor plates meshed. You may find the need for additional capacitance on the antenna tune side. A couple of Jennings

ceramic paralleled doorknobs toggled into the circuit solve that problem.

As you progress through the project, situations will undoubtedly arise that will require your attention. For example, the cooling fan may need replacement because of the higher heat-dissipating needs of the new tubes. The same is true for the stock HV plate parasitic choke (if you're anticipating drawing more current), as well as for any bypass capacitors if you've pumped up the plate voltage beyond the original ratings. The problems are not insurmountable—address them one at a time, and you'll find it's not an overly difficult task. Good luck, and I'll be seeing you on the bands! 73

Techno-Trouble II

continued from page 31

no conventional low-pass filter will do a darned thing.

45. *False.* But almost true. You must show up with your ham license, and show it to them. If the station is not being used otherwise and they are open, they'll let you operate within your license privileges.

46. *False.* Neat idea, but against the rules in almost all contests.

47. *False.* Against the rules. Read 'em and weep.

48. *False.* Six meter Es (sporadic-E propagation) peaks in June and December. In December 1997, the author worked from the Caribbean to New Zealand from his home station in California, with no special equipment or antennas.

49. *False,* but a slightly trick question. It has been suggested there is a link between the solar activity that causes lightning and that which causes sporadic-E propagation, but the link appears to be solar wind, rotation and other issues. There has never been proved a direct correlation between lightning and E-skip. The indirect correlation remains somewhat of a mystery.

50. *True.*

Continued on page 49

Techno-Trouble II

continued from page 48

So how'd you do this time, huh? These, like the first 50 questions appearing in April, are relatively easy, with a few twists just for fun. If anyone gets these 100% correct, I'll eat a bug. 73 ...

In Search of a Simple Phone Patch

continued from page 45

phone party, turn on the patch and then hang up your phone. Next, tell your radio contact that "your party is on the line." When the radio contact wants to listen and tells the telephone contact to go ahead (e.g., "over to you"), put your transceiver in transmit while making sure your microphone is near the speaker. When the telephone contact wants to listen, switch your transceiver back to receive. You can adjust the gain of the patch and/or your transceiver as necessary to maintain adequate levels. In case of difficulty, you can pick up the telephone at any time to discuss the situation. Make sure you turn the patch off when finished, as it acts like an off-the-hook telephone when on.

Note: If your telephone is too close to the speaker and/or the gain of your patch is too high, you will get feedback oscillation. The easiest fix to this issue is to make sure your speaker and telephone are several feet away from each other. (Conversely, if a speakerphone were being used, you would want it to be close to your speaker.)

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CARR'S CORNER

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What kind of knowledge?

Ham radio can be viewed from a number of perspectives. It is an operating hobby (ask any DXer). It is a rag-chewing hobby (look at any band!). It is also a technical hobby. Amateur radio technology is based firmly on scientific and engineering knowledge. Without scientific knowledge, we would not have transistors and power tetrodes, never mind yagi antennas and single sideband. All of those neat things came to us because someone, at some time, did a little science.

Science and engineering are intimately related, but are not the same thing. I remember a debate in a college physics class where the friendly argument was whether engineering was "physics lite" or science was engineering with attitude. I suspect it depends on your perspective. I upset a number of members of that class with the statement "all science is either physics or butterfly collecting." The only problem is that the room was full of chemistry majors. Sigh. The distinction I was making was that science tends to do things either as physicists do them, or as botanists do them, and not to imply that one was better than the other.

It's my turn to rant. Scientific knowledge is superior to other forms of knowledge. This claim does not mean that knowledge of engineering, chemistry, and physics is superior to knowledge of history or social issues. But rather, that knowledge that is obtained through a systematic, disciplined process—which we call the scientific method—is far superior to "knowledge" obtained through random guesses,

hunches, intuition, or any form of non-systematic approach. Much of what passes for "knowledge" in everyday life is not knowledge in a scientific sense. Even when empirically derived ("experience"), unorganized observations cannot rise to the level of scientific knowledge.

One view of science is that it is a filter that helps us sort things out. Our knowledge of the real nature of things is often distorted by any number of factors resulting in a lot of "noise" on the "signal" of knowledge. The purpose of scientific method is to provide a filter that removes as much of the noise as possible, leaving only the underlying knowledge. And while the process isn't perfect, it is far above the random ranting of those who use other methods or no method at all.

Science provides a framework for, and examples of, effectively handling problems in a systematic way, so the scientific method should be the mainstay in the armamentarium of all thinking people.

At least some variant of the scientific method is applicable to dealing with most issues that confront us today in business, in the professions, and in public life. The thoughtful executive may not think of herself as a scientist, but the reasoning processes are common to both fields.

In 1942, Robert K. Merton proposed some "norms" that are characteristic of science. These are detailed below.

Originality. A hallmark of scientific studies is that they are original. With the possible exception of studies that are intended to replicate the work of an earlier study, the purpose of

the scientific study is to somehow add something to the knowledge base. Studies that contribute neither something new, nor confirmation or refutation by replication of previous studies, are not true science.

Detachment. The only legitimate motive for scientific activity is the advancement of knowledge. One source goes so far as to question whether or not scientific research conducted for industrial or defense purposes qualifies as "detached" and thus "science." The argument is that when monetary or other motives (e.g., ideology) impinge on the scientific process, the goodness of the science involved deteriorates. It is in this area that some of the most sensational scandals have erupted. We disagree, and note that such factors are a caution, to be sure, but do not necessarily degrade the scientific objectivity of the researcher.

Universality. The claims of scientific studies should be verifiable by anyone, anywhere, provided (of course) that they are equipped with the right apparatus and follow the same procedure. No special sources of information are permitted. Claims are based solely on the intrinsic merits of the data. No extrinsic factors such as religious, social, ethnic, racial, or other prejudicial beliefs are permitted a place in the deliberation.

Skepticism. The scientific study proceeds from, and should be judged, on the basis of evidence alone. Nothing is accepted on faith; no one is trusted who has no data to support the claims being asserted.

Public accountability. Central to scientific goodness, the basic quality of scientific studies, is the matter of public accountability. The scientist places his or her data in the public square and lets the critical hordes attack it for all they are worth. It is the accountability of peer review that makes scientific studies less likely to be poorly done than "private" studies.

A frequent cause of scientific failure comes from uncritical

acceptance of a framework of ideology that causes leveling or sharpening of the data in order to support a pre-existing result. Whether incidentally or by design, this problem is very widespread today.

Decisions made by thoughtful 21st-century people should be based on data collected and analyzed according to the principles of science and reason, not on emotional trash. Today we are beset by junk science to support any and all issues. Indeed, it doesn't even seem to matter which side of the political spectrum the argument is on. What seems to be the predictor of whether or not people offer junk reason and junk science instead of reason is the intensity of their commitment to the issue.

We in ham radio see our share of those issues. Remember the scare over cancer and other illness induced by radio waves and other electromagnetic sources? The truth, as best we know it, turns out to be somewhere in between the "ain't no such problem" and the "the sky is falling in" positions.

Whether the issue is a quack medical device or treatment, a controversial public policy, or purely personal matters, we owe it to ourselves to use reason and scientific method to make our decisions.

Special event station

The Lake Area Radio Klub (Watertown SD), Huron ARC (Huron SD), Radio Research Club (Brookings SD), and Deuel County ARC (Clear Lake SD) will operate special event station KBØTAH from 1700Z July 4 through 2200Z July 5. Operation will be from "The Little House On The Prairie" (Laura Ingalls Wilder Pageant) on the following frequencies: 3.870, 7.250, 14.250, 21.350, 28.415, and 50.135. Certificate: SASE to LARK, Box 642, Watertown SD 57201-0642.

1998 US Air Force QSO Party

In response to an enormous number of requests following the Air Force 50th Anniversary

QSO Party in September 1997, the AF Anniversary QSO Party is now an annual event! It will be held on the third weekend of September 1998 from 0001 UTC on September 19th until 2359 UTC on September 20th. Full rules are at The Razorback Radio Club Web site: [http://ourworld.compuserve.com/homepages/k5xs].

The purpose of the annual event is gathering on the air as many active and former members of the Air Force as possible for a weekend of fellowship and in remembrance of all those who served.

Point identifiers will be used to identify participants' Air Force experience. The point values will be determined by subtracting the year the participant entered the Air Force from the year 1998. For example, people who joined in 1947 will have a point value of 51 (1998 - 1947 = 51) and will identify "/AF51" on CW or digital modes, and "Air Force fifty-one" on voice. People who joined in 1988 would have a point value of 10 (1998 - 1988 = 10) and would identify as "/AF10" or "Air Force ten." Participants without Air Force experience will identify as "/AF1" or "Air Force one."

Participants may use experience in any Air Force component (active, Air National Guard, or Air Force Reserve) to determine their point identifier. Members of the Air Force auxiliary, the Civil Air Patrol, may use point identifiers based on when they joined CAP as a cadet or senior member. Previous members of the USAF parent organization, the Army Air Corps, may use a point identifier of "AF51."

In 1997, the final score was determined by totaling all of the point identifiers for all of the stations worked. For 1998, they are adding a multiplier which will be determined by counting the number of different point identifiers worked and multiplying your score by that multiplier. For example, if you work four stations with point identifiers of

"AF8," "AF22," "AF8," and "AF4," you would determine your final score by first adding together all of the point identifiers (8 + 22 + 8 + 4 = 42) and then multiplying that number by three (since you worked three different point identifiers: AF8, AF22, and AF4), for a final total of 126 (42 x 3 = 126). (Note that you can count each identifier only once for the multiplier. So in this example, you can count "AF8" only once as a multiplier, even though you worked two "AF8" stations.) This new scoring scheme should encourage more "hunting" for even the smaller point identifiers, since it will be in the best interest of participants to work as many of the 51 different point identifiers (AF1 through AF51) as possible.

They will also be awarding point bonuses for working stations operating from the premises of Air Force installations worldwide. All stations (club or individual) operating within the boundaries of an Air Force base will identify the name of the base they are on. For example, K5TYP (the Mississippi winner for 1997) will identify "K5TYP, Air Force 51, Keesler Air Force Base." The Razorback Radio Club station on Hickam Air Force Base will identify "K5HOG, Air Force 24, Hickam Air Force Base." For each of those stations you work (even if more than one are on the same base), not only will you count their usual point identifiers (and use them to compute the multiplier above), but you will also earn a bonus of 100 points per station to be added to your final score. If you work four stations located on AF bases, you will add 400 points to your score.

To summarize how 1998 final scores will be computed, you will:

Step 1. Add the total of all point identifiers of all stations worked.

Step 2. Count the number of different point identifiers worked, and multiply your score in Step 1 by that number (maximum multiplier will be 51).

Step 3. Count the number of stations worked that were operating from Air Force installations, and add 100 points for each of those stations to determine your final score.

A score calculation worksheet is available for download at The Razorback Radio Club Web site.

Clubs may use as their club point identifier the point identifier of any bona fide club member.

Contest CQ calls to be given as "CQ AF" on CW and digital modes, and "CQ Air Force" on voice. Operation is allowed on any authorized frequency, but frequencies ending in "47" (to celebrate 1947, the year of the USAF's formation as a separate service) will be encouraged as meeting places (e.g., 3547, 3947, 7047, 7247, 14047, 14247, 21047, 21347, 28047, 28447). Exchanges should consist of callsign with point identifiers and signal reports (e.g.,

CW/digital: "K5HOG/AF24 de K5XH/AF1 599 K"; voice: "K5HOG Air Force Twenty-four this is K5XH Air Force 1, you are five by nine, over").

Log submissions for awards must include for each contact the callsign of the station worked, its point identifier, date, time, frequency, and mode. Each page must have point identifiers totaled at the bottom of that page. Each log submission must include on the final page the following:

1. The total of all point identifiers.
2. The multiplier claimed.
3. Bonus points claimed for working stations that are operating from the premises of a US Air Force installation anywhere in the world.
4. Total points claimed.
5. A declaration as to whether the station is competing as a

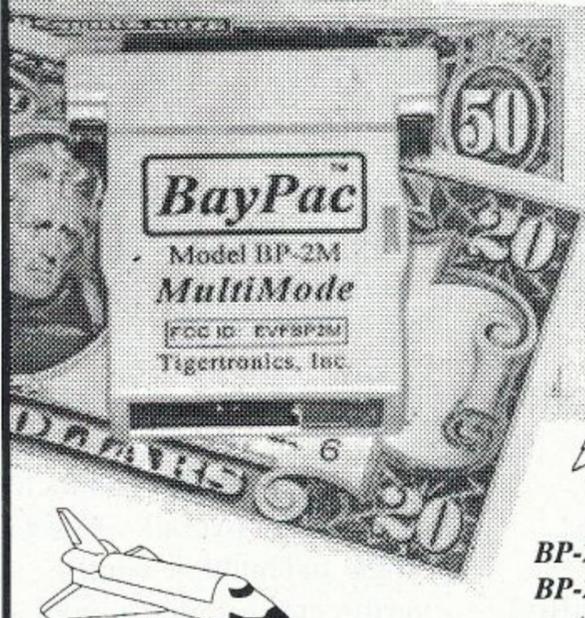
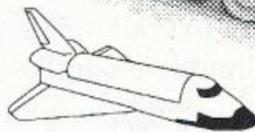
Continued on page 52

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Moderator's note: Roger and Ron Block of PolyPhaser Corporation have put together a well-written series of tips and suggestions on how we can effectively protect our ham radio stations from the effects of a lightning strike. Part 5 of that series appeared last month; part 6 follows.

Lightning protection— what your mother never told you!—Part 6

Special installations

Let's talk a little bit this month about high-rise installations. Our definition of a high-rise building, such as might be used for an amateur repeater installation, is different from that of a multilevel house, because the antennas on a high-rise are not on a ground-mounted tower. Because of this, the single-point grounding plan is an absolute must for any high-rise equipment room. Grounding both the antenna and the single-point system in the equipment room is usually pretty easy for buildings with structural steel framework ... just bond directly to the building steel.

Buildings that do not utilize steel construction aren't as simple. Some high-rise buildings have a fire riser which has a "home run" (direct drop) to the basement, where a supercharger pump is usually located. The riser may be used as a ground path if the pump's power is properly protected (three-phase), and a strap jumper is installed to take the strike energy past the pump's gasket (on both its input and output ports). If the riser is more than 50 feet away from the equipment, it may not be the best ground path to use. Check for other paths, such as existing building lightning rods with down-conductors, or large electrical conduits. Do not use drain pipes or vent stacks. If these first alternatives are not available (regardless of the path distance) and it is impossible to run a heavy strap down the side of the building, then the antenna cannot be earth grounded.

When a nongrounded antenna is hit by lightning, the energy will traverse the coax line to a single-point equipment ground location. This may be many meters away from earth ground; therefore, the inductive/resistive

voltage drop can be very large (hundreds of thousands of volts when dealing with lightning). The objective, then, is to allow equipment to "float" at high potential. The correct grounding plan achieves a single-point ground with no sneak paths. Sneak paths are loops that allow lightning current to flow into the equipment room with the objective of seeking out a "lesser" ground path.

Power safety grounds and concrete floors are the most common sources of sneak (lesser) paths. A power safety ground can be fixed by adding a distribution panel and protector at the single-point grounding location for small sites (a plug-in protector grounded on the single-point grounding panel). All I/Os must be protected at this single point. During a strike, distance equates with the voltage drop to earth; thus the entire room of equipment will be elevated above ground. Sharp corners on equipment cabinets can break down the air (ionize the air), causing current streamers to flow. These will be of very low current, unless an inadvertent sneak path is found by these streamers. Heater vents and electrical conduits, not grounded to the single-point system, can become such inadvertent paths (unless these vents and conduits are connected to critical equipment which cannot handle such surge currents at the lower floor equipment location). It is a good idea to ground (to the single point) all conductive objects within one meter of any single-point-earthed equipment in the room. Dealing with a floating equipment room requires a slightly different mindset, and careful inspection and layout should be paramount in its protection design. Tower-mounted equipment is similar to the above high-rise situation. The I/Os must be safeguarded and the protectors must be located and bonded together. Single-point grounding should be easy to accomplish if the equipment is mounted inside an approved metal enclosure.

That's it from Roger and Ron for this month, but the "Ham To Ham" column will continue this series on protecting your ham station from the destructive effects of a lightning strike—part 7 is coming up next month.

Look for the silver lining

From Mike Leahan N9PQK:

A clever tip on turning what's normally a problem into a solution: "I was in the final stages of construction of Ten-Tec's 2 m to 6 m transverter kit when I found myself in critical need of a signal generator to align the receiver section of the transverter. Not having a low-power six-meter signal source, I happened to remember my shack computer—you know, the computer that outputs birdies right on the frequency that you want it not to interfere on! If all clouds do have a silver lining, as the saying goes, maybe I could find one of those birdies on six meters to help me through this particular dilemma.

"Sure enough, there, right in the middle of the six-meter band, was a signal from my computer that was just the right strength to allow me to peak up the receiver section well enough to bring its sensitivity up to the point where I could then leave the final tweaking for a suitable off-the-air signal later on. The transmitter section tuned up nicely using a VHF SWR/power meter in-line into a dummy load and I used a VHF tunable receiver to check for out-of-band spurs, but the computer (with its plethora of harmonics) saved the day for initial receiver sensitivity alignment. It's a good suggestion to keep in mind the next time you need a signal source and haven't a generator available for that particular band or frequency grouping. Maybe clouds do have silver linings?"

Think up, not out

From Tom Hart AD1B: A tip for getting more mileage from your limited desk or shelf space: "Having a rather compact desk

CARR'S CORNER

continued from page 51

single-operator or multiple-operator station.

6. Signature of the licensee or other participant.

Logs must be received by The Razorback Radio Club not later than October 15, 1998, for award consideration. They may be submitted by E-mail (ASCII text file only) to [k5hog@aol.com].

Awards for 1998 will include plaques for overall worldwide single and multiple winners, and certificates for high single- and multiple-operator stations in each country, state, and province.

Further information is available by mail from The Razorback Radio Club, 604 Julian Avenue, Honolulu HI 96818, or via E-mail at [k5hog@aol.com] or [k5xs@compuserve.com]. 

for my ham station, I have to integrate new items of equipment somewhat carefully and by using a bit of 'ham ingenuity.' Since my monoband transceivers and their associated antenna tuners for two meters, six meters and 10 meters took up way too much precious space when sitting side-by-side, I designed the stacking-bracket system shown in Fig. 1 as a nice alternative.

"I purchased some 1/4" x 2" x 24" oak strips at a local lumberyard to build the support system. Mine worked out well using four-inch strips for the horizontal pieces and five-inch strips for the vertical supports, but these dimensions may vary somewhat with different sizes and configurations of equipment. In addition to saving that valuable desktop and shelf space, the stacking-brackets allow items of equipment of very different sizes to be one above the other, without the danger of scratching cabinet tops or covering vent holes as might be the case if the two items were in actual physical contact. The two items of equipment can also be slid out independently to some degree, which wouldn't be possible with direct stacking. The bracket's vertical section can even serve as a nice spot to put a hand-held microphone.

"The time needed to build the stacking-brackets was minimal, the cost small and the results very satisfying."

Moderator's note: Nice idea, Tom. If you don't want to drill holes in the sides of the top piece of equipment, you can still use Tom's idea by making up a bottom board for the top piece of gear, perhaps using two vertical supports per side instead of one.

Don't pan this idea!

From John Nix: "I recently visited a store in my area that specializes in liquidating damaged merchandise (from insurance claims salvage, etc.), and my eye was caught by some of the variety of rectangularly-shaped roasting pans that are

available today ... for ham radio and electronics use, of course!

"Years ago, I had thought about mounting a particularly sensitive printed circuit inside a cake pan that sported a sliding metal cover, to protect the delicate components inside from possible static damage. Today, however, the array of cookery cleverness is even broader, so it may pay to stop and browse the next time you're in one of the stores that specialize in kitchenware.

"Some of the aluminum roasting pans could easily be converted into an inexpensive housing for a home-brewed monoband transceiver, antenna matching unit, or, fitted with a hinged lid, even a rugged airline carry-on for your ham rig or laptop computer. The secret, if that's the right word, is to try to look at these cooking containers from a different perspective than the manufacturer had in mind when he made them. 'Old-fashioned ham ingenuity,' I think it's called. Cooking containers are usually built very well, to stand up to years of high temperatures, scraping and washing, and yet they're often priced very reasonably, because of the mass production and mass marketing of them, unlike some of the lower sales volume cases that are ordinarily seen in the electronics parts catalogs and stores.

"So I guess the bottom line is this: the next time you need a sturdy enclosure for your ham radio or electronic project, take a look in the cooking section of stores first ... you might just end up with the right recipe!"

Stamping out twist-ties

I've run into a number of ham transceivers that utilize those metal wire (encased in plastic) "twist-ties," used to hold bundles of wires together within the interwiring of the unit. No doubt this shortcut speeds production, but I've often wondered whether anyone has ever encountered a short due to the use of these conductive ties (conductive at each

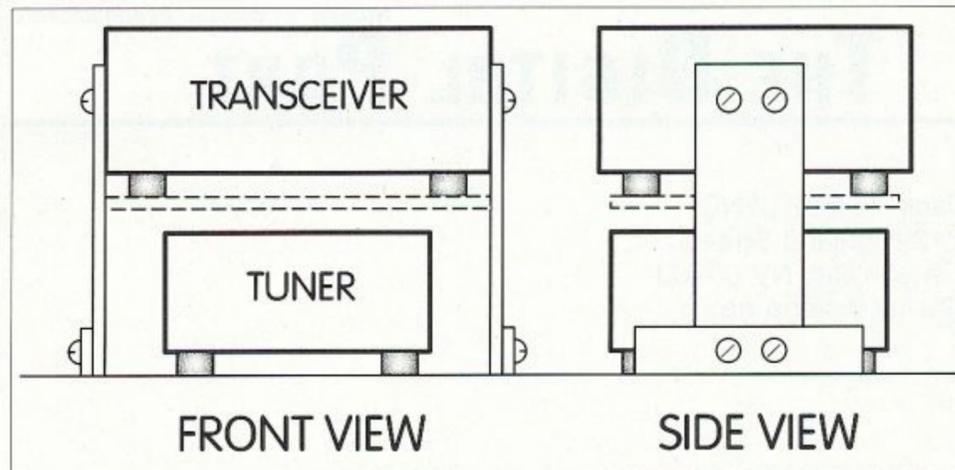


Fig. 1. ADIB's stacking-bracket idea to conserve desktop and/or shelf space, while at the same time allowing equipment of different sizes to be neatly stacked one above the other. If your transceiver doesn't have side-mounting screws, a shelf arrangement may be used instead.

end, at least). I've never encountered a problem that I could directly relate to a short or intermittent attributable directly to the use of these "ties," but it nonetheless seems a somewhat risky choice for use inside an expensive piece of electronic equipment. As I find them inside ham transceivers and other related gear, I've been replacing them with either small plastic "zip-locked" cable ties, or with waxed lacing cord formed into single-loop style of ties. It seems a much better choice, and time well spent, if it leads to less potential for problems in the future.—de NZ9E.

Murphy's Corollary: A Volt-Ohm-Milliamperemeter will always be in the "milliamperemeter" position when a voltage reading is first taken, thus shorting out the circuit under test and blowing the fuse in the meter. The only exception to this rule is when the meter has been inadvertently left in the "ohms" position, in which case the meter's oddball ohms-multiplier resistor will be destroyed.

Thanks go out to those who've steadfastly supported this column with their tips, suggestions, cures for our common problems, and innovative ideas ... and especially this month to:

Roger and Ron Block
PolyPhaser Corporation
2225 Park Place
P.O. Box 9000
Minden NV 89423-9000

Mike Leahan N9PQK
310 Lincoln Court
Sun Prairie WI 53590

Thomas Hart AD1B
54 Hermaine Avenue
Dedham MA 02026

John Nix
9123 Hwy 23 NE
Foley MN 56329

If you're missing any past columns, you can probably find them at 73's "Ham To Ham" column home page (with special thanks to Mark Bohnhoff WB9UOM), on the World Wide Web, at: [<http://www.rrsta.com/hth>].

Note: The ideas and suggestions contributed to this column by its readers have not necessarily been tested by the column's moderator nor by the staff of 73 Magazine, and thus no guarantee of operational success is implied. Always use your own best judgment before modifying any electronic item from the original equipment manufacturer's specifications. No responsibility is implied by the moderator or 73 Magazine for any equipment damage or malfunction resulting from information supplied in this column.

Please send any ideas that you would like to see included in this column to 73's "Ham To Ham," c/o Dave Miller NZ9E, 7462 Lawler Avenue, Nilus IL

Continued on page 54

THE DIGITAL PORT

Jack Heller KB7NO
712 Highland Street
Carson City NV 89703
[jheller@sierra.net]

Great SSTV for the truly budget conscious

Here is a way you can start transmitting and receiving slow scan television with an exceptionally low cash outlay. A while back I wrote about doing SSTV with a program that utilized your Windows 95™ computer equipped with a sound card. So what do you do if you have an older machine without these popular amenities?

You can still do it for under \$25! Those of you who read about and built K7SZL's [http://www.accessone.com/~tmayhan/index.htm] serial interface to do RTTY and other digital modes can get started with no cash out of pocket. John Langner WB2OSZ makes available, through Absolute Value Systems, [http://www.ultranet.com/~sstv/lite.html], Pasokon TV Classic, TV Lite and Easy SSTV (the free taste-test version).

The version I am using is TV Lite. It sells for \$30. The Easy SSTV is free as mentioned. Then, after you have been thoroughly bitten by the bug, the TV Classic is available for \$200. It includes a board to install in your computer and claims much easier use and quality.

These are not Windows™-based programs. You do need a 486-based computer with a minimum of eight megabytes of memory and a VGA monitor. This still puts SSTV out of

bounds for the XT and earlier AT computers, but the average 486 with no sound card will do as long as you have enough memory. And that, considering the used prices on three-year-old computers, is really getting into the low budget price range.

You will need a simple serial interface. In my case, I already had the one I mentioned above. There are other serial modem plans available and this software also comes with information to build yet another slight variation. My modem is now housed in a box that will just about hide in an eight-ounce cup.

To do something a little more mobile, I set up the software in the IBM 365XD laptop. It has all the qualifications plus a slight advantage in the monitor department. The desktop, though it now sports a Pentium™ processor, is still working with a 256-color VGA system instead of the now-popular "millions of colors."

Photo A gives an idea of some of the capabilities of Pasokon. There is a text editor and graphics utility that permits on-the-spot edits. If you look closely, you will notice the image is skewed slightly to the left. This was an early shot before the program had settled down and made its automatic adjustments.

As a little aside, when I hooked up the serial modem to my HF rig, I realized I was in trouble if I wished to work this mode. The cable was wired for

the microphone jack of the ICOM 735 and it is necessary to converse with hams via SSB in between sending and receiving images.

Something new (to me) to try

Before I made the new cable, I decided it was time to revisit the HamComm software and, not finding any RTTY signals at the time, I did something I had never attempted: made a CW contact via the computer. The HamComm software copied on a catch-as-catch-can basis as does most CW software I have observed (you gotta listen close), but the PTT and the transmitted Morse code were flawless. I guess I should expect it to be that good, it just seemed ... well ... so effortless. Plus, while typing at just slightly over 15 wpm I could keep the spelling up to par.

So, back to the cable hookup, it was merely necessary to run four wires into the accessory jack on the back of the 735 and it was ready to play again. My timing was a little off, as I picked a day when the SSTV activity was on the low side. The well-seasoned were complaining about conditions. I didn't care about conditions; I just wanted to see this work—and it did, marvelously.

A contact was made with Bob,Bob (he emphasized the proper pronunciation of his moniker) WB5UZR. I had received some great images from him while monitoring his previous contact. Bob,Bob was a fountain of information. He received the one and only image I had in the laptop at the time which was evidence that it was working. Previously, the only hint of successful transmission came from sending the image into the bucket of oil (dummy load) under the operating desk.

More to hamming than signal reports

This was a good contact in that Bob,Bob shared many of his experiences while working

with digitized images and told me about his equipment. I came away very impressed that there is more to this ham radio hobby than just simply exchanging signal and weather reports. I had met someone who really enjoyed the background work of enhancing and caring for his digital pictures. Claiming a gallery of thousands, he must have a *huge* hard drive.

The software is quite intuitive. As is my downfall with most pieces of software, I had read very little of the extensive on-line documentation; I had to get into *using* it to see how easily it responded to my natural instincts. One of those habits is to hit the "Enter" key without thinking ahead. It never got me in any trouble.

For a time, I felt the way to induce the program to get into the "Receive image" mode was to move the cursor via mouse to the "Receive" button and click it. Not necessary. As I learned, all that is needed was to hit that "Enter" key. When it is time to quit receiving, hit the "Enter" key again and the system goes to standby. Time to transmit, hit "X." To abort transmit, hit "A." Just that simple.

As you inspect the screen layout you will notice it resembles a Windows program in many ways. There are pull-down menus, buttons to push and, with a DOS mouse driver installed, you can control the screen activity quite easily. I did eventually find it necessary to read the documentation. There were just too many surprises. Spell surprises, *features*. I have not seen the freebie program EASYSSTV, nor the high-end version, but this program allows a lot of latitude to cover the needs of the occasional SSTV user.

I attempted to make screen shots or dumps of the screen so you could see the layout of the program, to no avail. Then I took some photographs, but the prints, though of good quality, were dark and wouldn't scan well enough. You will just have

HAM TO HAM

continued from page 53

60714-3108, USA. We will make every attempt to respond

to all legitimate ideas in a timely manner, but please send any specific questions, on any particular tip, to the originator of the idea, not to this column's moderator nor to *73 Magazine*. 73



Photo A. This was, at the time, the only image I had in the computer to send. The SSTV program made it easy to add the text. There was no response to sending it, but others do send such images. Most hams keep many images on file to show and exchange with their friends over the air.



Photo B. This is an example of what happens as signals fade. Since it takes nearly two minutes to send a frame, when the conditions change blemishes appear on the screen. As better filters are used at the receiving end, these problems disappear.

to use your imagination with the following brief description.

How the program looks

Across the top of the screen are the expected pull-down menus that operate either by clicking or use of a mouse as would be expected. In the upper left-hand corner is a tuning indicator. You will find this very effective and useful. It works any time you are in the receive mode. Also in that corner is a graphics toolbox for touchup, in addition to the text capabilities.

The rest of the left side is a panel allowing selection of different operating modes, including Scottie, Martin, Robot and Wraase. It is customary for the sending station to identify the mode verbally, before transmitting. In the lower left corner are the various receive, transmit and standby controls.

Along the bottom are thumbnails, icon-sized pictures you have saved so you can select one of several immediately. Also, the received image will locate itself there as soon as the picture is received, so you may refer back to it, save it or retransmit it yourself.

One of the good experiences of the program was that it installed and worked flawlessly. I like that; so does the wife. When

things work right out of the box, I am much easier to live with.

The program is hungry for interrupts, so it is necessary to run it directly from DOS and not from a DOS window out of Windows. With Windows95 press "F8" when the system is booting and the "Starting Windows95" displays, then choose "6" from the menu. Some programs I have found with these requirements become unstable and crash easily. I have as yet to experience this with Pasokon, a good sign.

In the hopper

George SV2AGW sends word that he has licked the printing

problem in his free Windows95 packet program I told you about last month. He is a very busy ham, plus he tells me his family is in the shoe manufacturing business which would often be enough to keep most hams away from the hobby. Must be a tough guy.

The LDG Electronics packet modem is still on the back burner. Dwayne at LDG has been quite helpful. I should have that going by next month. Another low-budget item for the digital arsenal.

Also, I found why I had such a rash of messages about the Web address for PCFlexnet. It seems that a hyphen had been

edited out of the address during layout. The hyphen in question happened to come at a deceiving line break and looked perfectly natural to omit. Note the hyphen following [<http://d10td.afthd.th>] in **Table 1**. It's gotta be there!

If you have questions or comments about this column, E-mail me at [jheller@sierra.net] and/or CompuServe [72130,1352]. I will gladly share what I know or find a resource for you. On packet, when you get a chance, drop me a line [KB7NO @ N7NPB.#NONEV.NV.USA.NOAM]. For now, 73, Jack KB7NO. 73

Source for:	Web address (URL)
HF serial modem plans & software	http://www.accessone.com/~tmayhan/index.htm
PCFlexnet communications free prgms	http://d10td.afthd.th-darmstadt.de/~flexnet/index.html
Tom Sailer's info on PCFlexnet	http://www.ife.ee.ethz.ch/~sailer/pcf/
SV2AGW free Win95 prgms	http://www.forthnet.gr/sv2agw/
BayCom - German site	http://www.baycom.de/
Pasokon SSTV prgms & hardware	http://www.ultranet.com/~sstv/lite.html
VHF packet serial modem kit	http://www.ldgelectronics.com

Table 1. Current Web addresses (as of this writing) mentioned in the text. There are more, and I will add to this group and post it frequently. All of the above were cut and pasted directly from the Web page to avoid the inevitable errors when copying. If you encounter a problem with a European address, the network is often at fault. Try again later. See text.

ON THE GO

Mobile, Portable and Emergency Operation

Steve Nowak KE8YN/4
1011 Peacock Avenue, N.E.
Palm Bay FL 32907-1371
[pangen@compuserve.com]

Drilling for talent

For the past few months we've faced a wide range of weather problems associated with *El Niño*, and now we are being warned about even more severe problems which may appear with its counterpart, *La Niña*. Although it is true that the news media seems to delight in predicting terrible (and therefore interesting) situations, it's in our best interests to maintain our level of readiness just in case they're right.

Field Day is one opportunity to practice some of the skills needed in an emergency, of course, while having some fun in the process. It's a chance to see the faces behind the familiar voices on the local repeaters. It's also a great opportunity to rack up some serious contacts. On the other hand, it is pretty much a hams-only event rather than one which includes others with whom we'd work in an emergency.

If your community maintains plans for various emergencies

(and they do), ideally they also should hold drills on a regular basis. Unfortunately, even in times of a good economy, government agencies find that they do not have the funds to cover everything they wish to do. A disaster drill is a tempting target to drop from the budget. Dropping a drill will save the agency both time and money, so drills may be sporadic. Likewise, a community which has faced one type of emergency will have used its available funds for relief efforts. Not only will it lack funds, but those who work in disaster relief want a break more than a drill. Finally, because government agencies by definition are political entities, even when a drill is held, other governments or agencies who could may choose not to participate since it may be viewed as "Their" drill, not "Our" drill.

If your community office of disaster services has no plans for a drill in which the ham community could participate, there are other options. Hospitals need to conduct disaster drills on a regular basis to maintain their accreditation. Since many hospitals prohibit cellular phones and transmitters which could interfere with patient monitoring equipment, it may be useful to find out where or how hams could operate in support of a hospital before an emergency occurs. School systems may hold periodic tornado drills, and the airport may be required to conduct air emergency drills. If you have good connections with the community, there should be no problem finding opportunities to practice.

During a recent nuclear disaster drill I got into a discussion with Ken Johnson N4ZEB about the type of support we could expect from the ham community. We are fortunate to have a very large ham population, with over 400 licensed amateurs in this city alone. Our end of the county was tasked with two sites for reception and/or decontamination of victims of the disaster,

as well as checkpoints at the major roads into the area. We also were expected to provide communications for up to 11 shelters as well as net control and liaison with the police department. We had nine amateurs actively involved in the drill and several others who joined us as mobiles for some portion of it. As we talked, I realized that there are several categories of responders within the ham community.

The first group are those who not only have a high degree of commitment and enthusiasm, but also have the flexibility to respond under many conditions. These people include retirees, those whose work schedules are very flexible and/or those who are on the road as a part of their job. In many cases, these folks are the backbone of any efforts.

The second group are those who are every bit as interested, but whose schedules are less flexible. Most drills are held during regular working hours so that those who are involved in the drill as part of their jobs do not incur overtime. (As a taxpayer, I appreciate this.) Some hams who would respond quickly during an actual emergency cannot afford to participate in a drill. In the event of a real emergency, many of these people use vacation or personal time to help out. Others have employers who will permit them to take time off work for disaster relief efforts but not for drills. These hams are the key to sustaining operations in a real emergency for more than just a few hours.

While there are many people who won't assist in an emergency, they tend to be a minority. There are some who appear as if they can't help, but don't be too quick to dismiss anyone. While someone who is confined to a wheelchair or blind may not be able to walk through a storm scene doing damage assessment, he or she may be your best choice for net control. Ham radio is truly an arena in which your abilities are far more important than your disabilities.

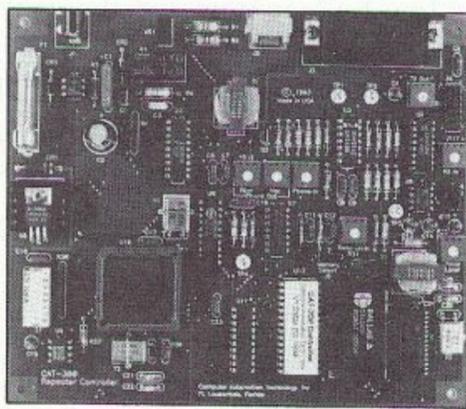
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Do you like flea markets? Certainly, one of the attractions of the rows and tables of old stuff is the thought that somewhere, buried among all the junk, is that gem you have been looking for. Well, over the past score or so of years, this column has been many hams' source for *materia teletypia*.

To begin with, many hams have asked about finding manuals for older teleprinters. Wayne Hall WB4OGM relates that he has a big manual of NAVSHIPS instructions for maintenance, assembly, disassembly and so forth for the old Teletype Model 15 and 19 sets. He is willing to make copies of any parts that readers of this column need.

Contact him directly at [hwhall@compuserve.com], or write him at 5085 Escapardo Way, Colorado Springs CO 80917 for details.

Now, while we are all rummaging around in that flea market, can anyone help one of our readers? A reader signing himself "Heartbeat" [heartbt@sault.com] passes along the following question: "I was wondering if you had a back issue concerning the Emperor 5010 final swap. The finals that are standard are not being made anymore and there was an article (somewhere) that described the process of upgrading the finals to 100-watt, easy-to-come-by finals."

ON THE GO

continued from page 56

Who does this leave? A lot of folks who feel that they have the skills to respond in a real emergency but do not need to commit time for drills. While it's easy to be confident of one's own skills, this may be a flawed approach. Let's work under the assumption that everyone needs practice to do any particular task well. Our hobby use of ham radio is helpful, but not always representative of exactly what we would be doing in an emergency. We need direct, relevant, hands-on practice to keep our skills sharp. After all, we expect this of others. If your doctor had performed hundreds of tonsillectomies, would you let him perform heart surgery on you? Of course not—you'd want someone who had significant experience in exactly the procedure that

was to be performed on you. We owe our communities nothing less. Next time you have the chance to participate, sign up and see how much you've forgotten as well as how much you remember. And while you're at it, bring a friend!

Incidentally, here in Florida we have had a lot of practice with real emergencies, including flooding and tornadoes over the past few months. We've all heard people say that cellular phones have made us unnecessary in an emergency. Interestingly, when the landline phone system failed and people reached for their cellular phones they were unpleasantly surprised. I have heard many complaints that the cell system failed immediately after the wired phone system did and returned to service at about the same time—maybe we're not as obsolete as some would have us believe. 73

Well, I am at a loss on this one. If anyone has information on this unit, pass it along to "Heartbeat," and let us know, as well.

Dave Hough KC7DM, another fan of the page for years, passes along the following:

"Enjoy the page. Been active on and off since 1959. First got on RTTY in mid '70s with a TT7FG (military nomenclature for a Model 15). Then rebuilt a Kleinschmidt TT-76 reperf and a TT-100 page printer. Still have them.

Been inactive on HF for about 15 years. Got rolling last summer and putting together a RTTY setup to work with the Collins S-line. 'RTTY Loop' got me pointed in the right direction. Am also going to get the Kleinschmidts on air."

Dave passed along the photo in Fig. 1, showing a beautiful station from some 20 years ago, when this column was just

learning to walk. Thanks, Dave, for the glances backwards and forwards.

As one gets onto RTTY, the need for some kind of test equipment often arises. Unfortunately, that which was once easily available is now not always so. John Fail KL7GRF, of Bayfield, Colorado, writes:

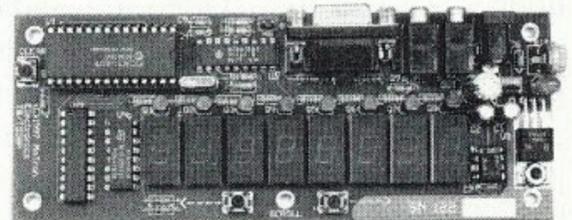
"I am getting back on the air after several years off. I was very active on RTTY in the late '60s and early '70s. I wonder if you know of any sources of a low cost, small oscilloscope that I could purchase and hook up to my MFJ-1278 TNC (it has the internal tuning indicator board installed) for use as a visual tuning indicator to make it easier to tune signals in. Or possibly I could build one if you know of any articles that have appeared in the past although my collection of past issues of all ham

Continued on page 58

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HAMSATS

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Andy MacAllister W5ACM
14714 Knights Way Drive
Houston TX 77083

A new book for new hamsats

When the American Radio Relay League published *The Satellite Experimenter's Handbook* by Martin Davidoff K2UBC in 1984, it brought many hamsat topics together in one publication. Finding information about working the satellites usually had been a real chore. Six years later, Martin updated the *Handbook*. New satellites were in orbit and computers had become a common tool for satellite tracking and other uses in many ham shacks.

In the ensuing years, digital modes and higher frequencies have become common. Martin has again rewritten many key parts of his book to reflect the changes in today's amateur satellites and to address some of the new and exciting possibilities of the next generation of low-earth-orbit and high-altitude satellites.

The new version is called *The Radio Amateur's Satellite Handbook*. It sports 370 pages of information and retails for \$22. For those new to amateur radio satellites, the introductory section provides a nicely detailed

KB4NEW of Hampton, Virginia. He was surfing around and:

"Just found your Web site. Used to read the 'RTTY Loop' columns in 73. Per the January 1998 column, I too would like to find some of the classic RTTY pictures to download or in an ASCII file format. Will hunt around the Internet for some.

"I'm planning on getting back on 20 meters RTTY sometime before the solar cycle peak (probably sooner, like this summer) with RITTY, which I'm using to monitor now, just need a powerful signal. It's my favorite mode, since I'm rather mike-shy and can't copy fast CW."

Thanks, Chuck. Somehow, somewhere, I just can't believe that some of those pictures are not out there on the 'net. We just have to find them! Let's all keep looking, OK?

I mentioned the RTTY Loop Home Page, and alluded to the RTTY Loop Software Collection, as well. Check it out and see the 17 or so disks full of RTTY, CW, and computer material available to you. If you cannot access the Web site, drop a self-addressed stamped envelope to me at the above address, and I'll be happy to send you a printed copy with full instructions.

More next time, as we've now begun the 22nd year of RTTY Loop! 73

magazines is practically non-existent.

"I have called several places and searched all the sources I have and have pretty much struck out.

"I read your column in 73 faithfully (you have been at it a long time!).

"I would appreciate any thoughts you might have."

So then along comes another note, this one from Gerry Gore WB5TXA, who relates a search for test equipment, as well. Unable to find suitable materials, a Web site was born:

"Just a note to give you a URL to my home page, where I have gathered some neat tools for the RTTY ham using tones with their equipment.

"The programs use the sound card on a computer to measure and generate tones. The frequency counter and FFT scope do some neat things for RTTY. There are five separate instruments that are Freeware and all run on Win95.

"I couldn't find a site that had all of these in one place designed for the needs of RTTY, so I decided to make a page just for these types of items.

"I have enjoyed your RTTY Loop since you first started it many years ago. Keep up the good work!

"The URL is:
[http://lonestar.texas.net/gore/ham_index.html]."

I checked the site out, and there are some very nice-looking software versions of well-known instruments. Take a look and see what you think. The price is right!

Regards to Larry N9LR, who is looking for a source for information on digital communication. Check out the home page for this column, the RTTY Loop Home Page, at [<http://www2.ari.net/ajr/rtty/>] for past columns as well as links to digital sites all over the World Wide Web. There is also a listing of software collections amassed over the last bunch of years, and available for a nominal amount to readers of this column.

Robert J. Furlong N4NHQ is a long-term reader who says he has "been reading your column since the beginning. I look forward to your comments each month. I had a Model 35 running back 15 years ago—boy, have things changed! But I think it has been for the good. Just wanted to let you know that your column is appreciated."

Well, Bob, I am not sure who appreciates whom more. Before we each break our arms, though, let me just interject that I sincerely appreciate the feedback from each and every one of you and, truthfully, without that feedback I could not bring myself to write this column.

Mentioned the old RTTY pictures a while back, and received a note from Chuck Swiger



KØVMO - 1978 in Minneapolis, MN.
HT-32 Xmtr and HQ-180 used for HF CW and SSB.
SP-600 Rcvr and Viking II Xmtr for RTTY. KleinSchmidt TT-100 page printer and TT-76 tape reperf. and converted military TU.
Harris DF-403-2 2 meter transceiver and Heathkit IM-4120 counter.
Antenna is an inverted Vee fed w/ 600 ohm ladder line thru a Homebrew tuner.

Fig. 1. Station KØVMO, Minneapolis, Minnesota (1978).

view of the program's history, starting from the perspective of *Sputnik 1*. Schematics of the first *Explorer*, *Vanguard*, and *OSCAR 1* beacon transmitters are included. The complete chronology of the OSCARs and the many volunteer hams who built them is fascinating.

For the experienced satellite enthusiast, the historical sections end with a look to the future. Brief descriptions of upcoming satellites, some of which are scheduled to launch this year, are provided. The list includes *Maelle* from France, *TechSAT* from Israel, *CESAR-1* from Chile, *HUTSAT* from Finland, *SUNSAT* from South Africa, *ASUSat* from Arizona, *PANSAT* from the Naval Postgraduate School, *Sapphire*, *Opal*, and others. One of the appendices includes Internet URLs (Universal Resource Locators) to help locate more data on the new satellites directly from the groups involved.

Following the history pages, Martin's revised offering continues with how to get started in the hamsat chase. In 1984, this was an easy topic. Analog reception and transmission on three bands was standard. Tracking was mostly done with polar maps and overlays, and antenna designs were not excessively difficult.

The new book asks the question, "Is satellite operation for you?" The playing field has changed. New modes, new frequencies, and incredible possibilities can confuse the newcomer. Martin describes five different types of hamsat activity, from the simplistic listener-only mode to the complex issues of high-speed digital operation. The long-time satellite chaser may also find the list of operating options useful. Trying new modes via low-earth-orbit satellites and digital operation via the packet hamsats can rejuvenate interest after years of DX-chasing via the high-orbit OSCARs.

The book continues with operating notes on satellite activities; information resources; and

descriptions of international organizations, conferences, the AMSAT local area coordinators' network, satellite schedules, and the involvement of the ARRL. Various contests are conducted via satellite including AMSAT's own version of Field Day. Many awards are also available for satellite activity through AMSAT and other groups. Weekly AMSAT nets are held on HF, VHF, and UHF, and via commercial geosynchronous satellites. Martin describes many books and periodicals that can provide further insight and information.

Amateur radio satellites are not in geosynchronous orbits. They do not "hang" in the sky like the commercial TV satellites. They all have orbits that vary from circular to highly elliptic. The easiest way to find the hamsats is with a computer and appropriate software.

Martin describes how to find the hamsats using the tried and true graphical methods as well as by using computer software. He explains the data needed to keep tracking program calculations accurate. While a highly elliptical orbit may produce a very long period of signal acquisition, up to several hours, a low, circular orbit, like that of the *Mir* space station, may yield only short passes lasting 10 minutes or less. Accuracy and understanding are important. The "Tracking Basics" chapter starts with easy-to-understand explanations, while later chapters go into more detail on various satellite orbital possibilities and methods to automatically steer high-gain arrays for satellite communications.

The two final chapters of the book describe various satellite onboard systems, and what it takes to actually build a ham radio satellite. Topics include propulsion motors, power sources, onboard computers, radio links, thermal concerns, mechanical considerations, and launch opportunities.

There are several appendices complete with amateur spacecraft statistics including operating

frequencies, manned space activity, spacecraft profiles, and computer program listings for simple hamsat tracking applications and other utilities. A very comprehensive description is included for the not-yet-launched Phase 3D. At this writing, negotiations continue between AMSAT and the European Space Agency for a ride to orbit for the largest, most complex hamsat yet.

The Radio Amateur's Satellite Handbook is more than just an update of the *Satellite Experimenter's Handbook*. It brings new hamsat information and operating practices together with an insight into the history of OSCAR and the possibilities for the future. A lot has happened since the previous handbook was published eight years ago. Copies can be obtained directly from the ARRL or through AMSAT for \$22 plus shipping. AMSAT can be reached at (301) 589-6062.

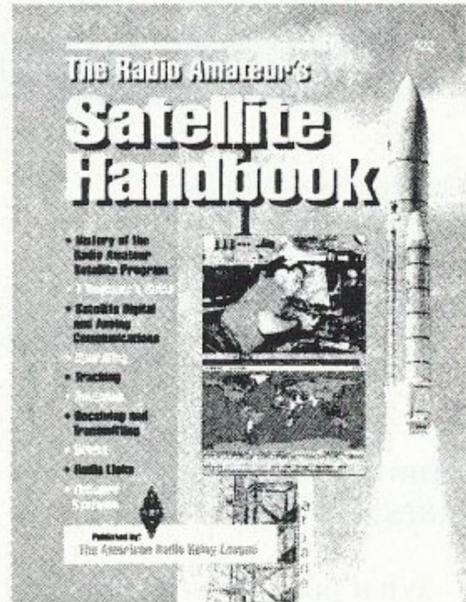


Photo A. Cover of *The Radio Amateur's Satellite Handbook* by Martin Davidoff K2UBC, from the American Radio Relay League.

Field Day 1998

The ARRL Field Day is always scheduled for the fourth weekend in June. This year that occurs on June 27th and 28th. We have a few new low-earth-orbit satellites for extra points

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Ham radio Salute to Gershwin

What in the world does ham radio have to do with the renowned composer George Gershwin? We who have been in the hobby for a while know that the influence and fun of radio can easily permeate many aspects of our lives. So it really didn't seem far-fetched to me to recommend the use of radio operators to assist a friend who was producing the 100th Anniversary Salute to Gershwin at Brooklyn College in Brooklyn, New York.

I'd been trying for months to expound on the benefits of radio communications to my good friend Jerry Parker, who is the former liaison to the Chancellor of the New York City Board of Education. The concert provided me with the perfect opportunity to demonstrate a practical application of ham radio from which he could benefit. Jerry worked very hard planning the logistics and details of this huge undertaking.

The concert on March 19th would feature groups from three Brooklyn schools: the Edward R. Murrow High School Or-

chestra, the Dyker Heights Intermediate School Chorus, and the Fort Hamilton High School Symphonic Band, all performing on the same program as the Brooklyn College Conservatory Jazz Ensemble. An event such as this involves a great deal of organization and effort. For months, I watched as Jerry coordinated everything with Dr. Nancy Hager, the Director of the Conservatory of Music at Brooklyn College and with David Latulippe, the Director of the Conservatory of Music Concert Office.

Finally, I knew the moment was right to suggest the incorporation of ham radio volunteers for communications and security. The idea was presented to the key personnel at the college, and everyone was very receptive.

Next, I announced the need for volunteers at a meeting of my radio club—NYCRA—the New York City Repeater Association. It's very gratifying to know that I can always count on getting a positive response when a call for help is put out. One of the people I know will always be the first to volunteer is my good friend Charles Hargrove N2NOV.

Charles is the ARES (Amateur Radio Emergency Service) Emergency Coordinator for Staten Island, New York. Staten Island is one of the five counties that make up New York City. When he was asked to organize an ARES unit in September of 1996, he read through accumulated materials gathered over his 20 years of interest in scanner listening of the public service bands. Charles thinks that since his uncles, cousins, and grandfather are and were police officers, it was natural for this interest to develop. Since March of 1992 he has been the moderator of the NYDXA Shortwave and Scanner Listeners Net heard locally on 147.360 MHz on Wednesdays at 8 p.m.

The team that Charles put together has developed into an efficient, active crew that has participated in walk-a-thons, parades, races, the New York City Marathon, the receiving of Mayor Giuliani's Proclamation of Amateur Radio Awareness Day, and now the Brooklyn College Salute to Gershwin concert.

I'd be remiss if I didn't mention every member of the group who provided such an excellent communications setup that night. The terrific ham radio operators who added a special dimension to the smooth operations were Charles Hargrove N2NOV; Karen Hargrove N2ZYF; Frank Katalenas N2UMC; Louise Pauly N2RIP; Paul Hansen N2QXB; Ray Valvik N2ZWT; Ron Faup KB2PWS; and Michael Moran KC2CYE. I had the honor of shadowing Jerry Parker, who quickly acclimated himself to the efficient use of the ham radios.

A radio volunteer was assigned to each of the holding

rooms where the children waited until it was time for them to appear. The stage manager had his own shadow and was delighted to see how much of a help it was to him. Young Mike KC2CYE was assigned to the parking area, where he was a tremendous help. Days after the concert, the box office personnel were still talking about the valuable service provided by Karen K2ZYF and the other hams. Charles was net control and manned the crossband 2 m/440 base station. He happily shared information about ham radio with everyone backstage.

When the extraordinary maestro Laurence Laurenzano conducted the finale with the combined ensembles, all the volunteers were able to enjoy watching the wonderful performance from backstage. Paul Shelden, the talented director of the Brooklyn College Conservatory Jazz Ensemble, made a point of letting me know at the end of the evening that he was very impressed with the professional way the backstage communications were handled.

There were at least three people from the Performing Arts Center at the college who requested that I send them more information about getting a ham radio license. I always enjoy using my radio at different events, but this one was especially noteworthy for me because it involved children, the arts, friends, the community, and my very special ham friends. There was no doubt in anyone's mind that the hams provided an invaluable service.

For further information about ARES or emergency communications, call Charles at (212) 978-3375. 73

in the ARRL competition, or for the AMSAT (Radio Amateur Satellite Corporation) activity. The AMSAT rules last year worked well and will show little if any change for 1998. The first-place emergency power/portable station will receive a plaque at the AMSAT General Meeting and Space Symposium in Vicksburg, Mississippi, in October. Certificates will be awarded this year for second and third place. Stations submit-

ting high, award-winning scores will be requested to submit dupe sheets for analog contacts and message listings for digital downloads. Check the AMSAT Web page at the URL [http://www.amsat.org] for details. The Field Day information is down a few levels under the "activities/amsatfd" subdirectories. The rules will also be published in the *AMSAT Journal*, or can be obtained by sending an SASE to me, W5ACM. 73

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VHF and Above Operation

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Bits and pieces for microwave and VHF

This month I would like to address some frequently asked questions concerning microwave hardware, such as: What do I need to pick up to start a microwave test bench? Which components of the test bench are most used for basic work? Also, I want to cover some simple test devices that can be constructed for both microwave and VHF operation.

A basic work bench for microwave should have some means of measuring power capable of displaying low levels of power. Here on microwave we talk of powers of -10 dBm and +15 dBm power. This is in difference of power on a VHF or UHF band where power can be measured in watts of power. Power in microwave is quite dear, in that higher levels of power are precious and expensive to obtain.

There is a direct comparison between power expressed in watts and dBm. It's not hard to remember a few simple facts to keep in mind when comparing the two power levels. For instance, two watts of power can be measured on a microwave power meter to a very fine accuracy, as long as appropriate attenuators are used. Most power meters for microwave are rated to +10 dBm maximum, so to measure two watts of power, which is the equivalent of +33 dBm of power, an attenuator is needed to reduce the power applied to the microwave power meter. It's just simpler to use dB vs. watts of power when making calculations. A simple rule to remember is: For every 3 dB of increase of power, you have

doubled your original power in watts, or a portion of a watt.

As I stated, most microwave power meters are not capable of measuring power over +10 dBm maximum power or the sensitive power head will be destroyed. To allow the power head to work at much higher power levels, you insert precision attenuators in between the power source and the power head, reducing power to an acceptable level below the +10 dBm maximum. For instance, to measure a two-watt power source the level in dB would be +33 dBm. Inserting a 30 dB attenuator would reduce the power to 3 dBm, as read on the power meter, with the 30 dB being reduced in the attenuator. To obtain the true power measured, add the attenuator and the reading on the power meter (+3 dB) to obtain the true reading of +33 dBm.

Let's back up a moment. Remember, we said that +33 dBm was two watts, and as its power doubles, it increases 3 dB for each doubling of power. Therefore, 1 W = +30 dBm; then 2 W = +33; 4 W = +36; and 8 W = +39 dBm; 16 W = +42 dBm. Another good rule to remember is that 1 W = +30 dBm and 10 W = +40 dBm and 100 W = +50 dBm and so on.

To allow you to measure these power levels, you need a good attenuator capable of attenuating power and handling power dissipated in the attenuator, to make a power meter reading. If you wanted to measure a 10 W microwave transmitter or a similar VHF transmitter the method is the same: 10 W = +40 dBm, and the power meter is capable of +10 maximum. Therefore you must attenuate at

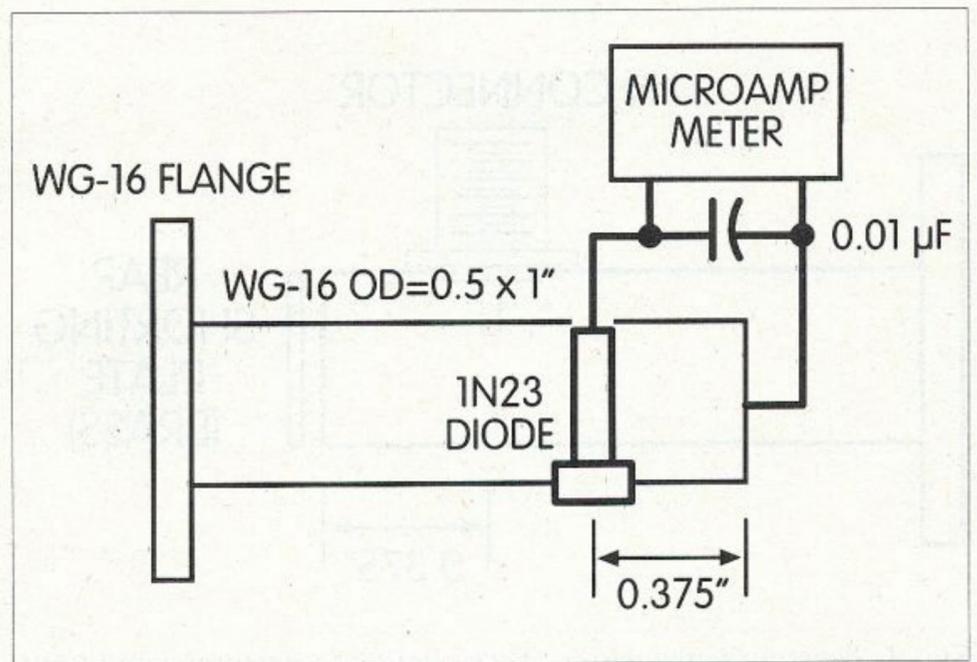


Fig. 1. Microwave Detector mount for 10 GHz showing detector diode spaced 1/4 guide wavelength from rear wall of detector mount. Can be home constructed from scrap waveguide and waveguide flange. Insulate top of IN23 detector diode. Mount suitable meter very close to diode and bypass with .01 capacitor. For increased sensitivity, insert meter amplifier between diode and meter.

least 30 dB, or, better still, 40 dB of power before hooking up to the power meter. Making a reading in this, you would combine the reading on the power meter (either negative or positive) in reference to zero dB on the meter to calculate final power observed.

Measuring 10 watts with a 40 dB attenuator, the power meter should read zero dBm, or 10

watts attenuated to zero dB by a 40 dB attenuator. Similarly, if you had used a 30 dB attenuator you would expect to read +10 on the power meter for the same 10 watts of power. While this will work, it is a bit risky, as it is the maximum power you should be absorbing in the power meter detector head.

A good set of attenuators to have on hand for making power

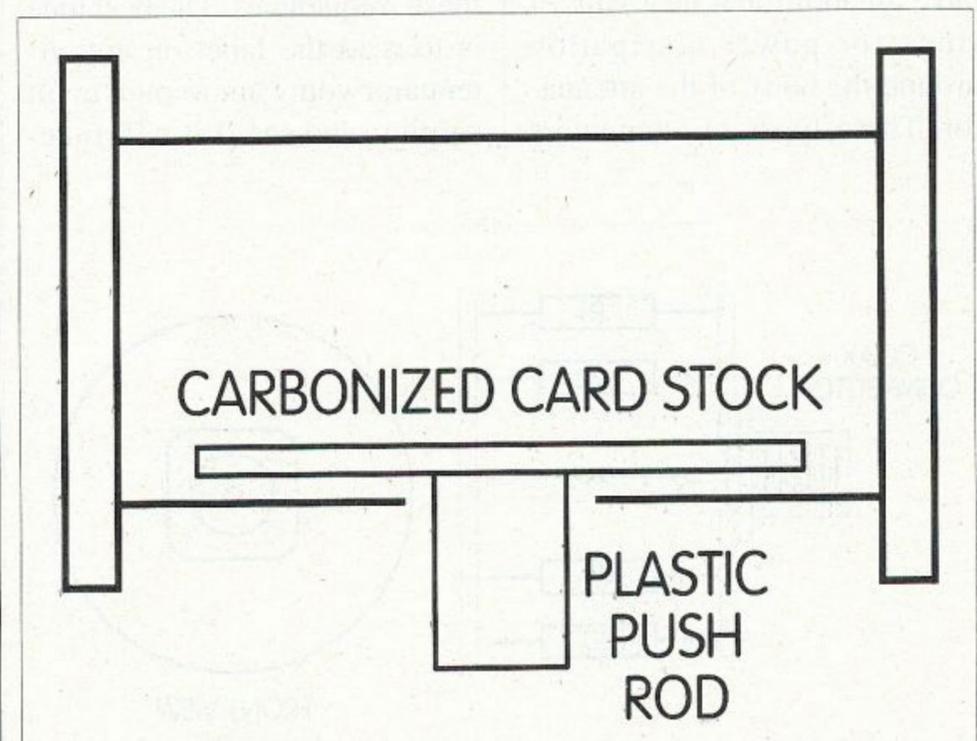


Fig. 2. Waveguide attenuator construction typical of both the fixed and variable types. The fixed can be useful but the variable waveguide types are much more desirable, especially small size variable attenuators. The waveguide attenuator is open on either end; as card is inserted toward center of guide, attenuation is increased. Attenuation is near zero when resting near bottom wall of WG.

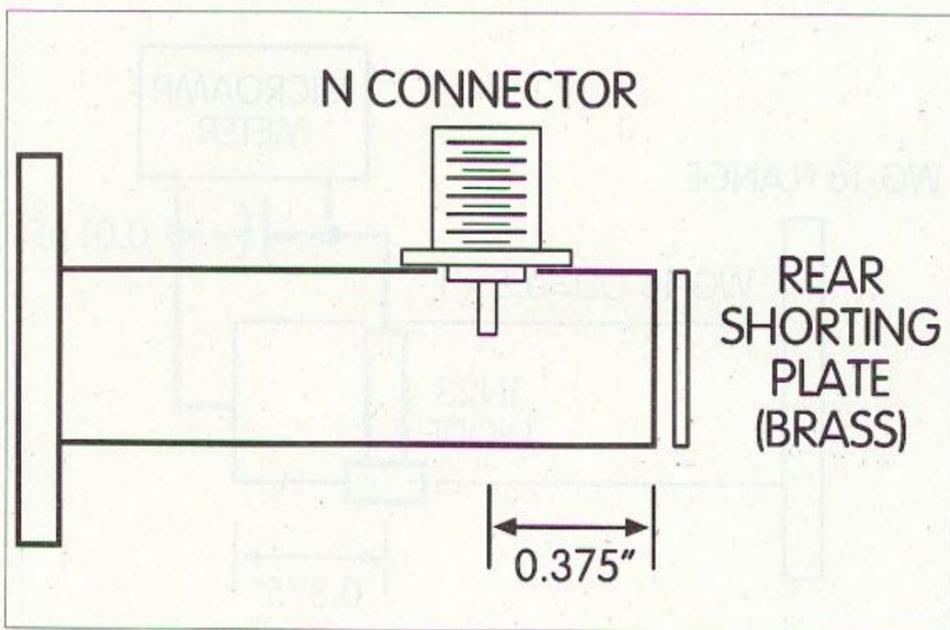


Fig. 3. Waveguide transition. Very similar to detector mount but uses probe from coax connector penetrating waveguide center to pick up microwave energy and convert it from waveguide to coaxial. Typically type "N" connectors are common. The connector is mounted on top of the side dimension of waveguide; drill hole to clear N coax connector flush with bottom of connector and waveguide. Space .375 inch from back of rear shorting brass plate. Solder all parts together.

measurements includes 3 dB, 6 dB, 10 dB, 20 dB and 30 dB. Normal microwave attenuators look much like a coaxial connector with a male connector on one end and a female connector on the other end. This is so that several can be put in series with each other and added together for total attenuation. For the basic types of attenuators two watts is normal. For increased power levels attenuators will have an additional heat sink or rings for power dissipation around the body of the attenuator. These types of attenuators

are much larger and typical power dissipated can be 60 watts to 100 watts.

Another factor in attenuators is their internal structure that limits frequency response. Not all attenuators are created equal. Some attenuators in the two-watt range are good from DC to 12 or 18 GHz. Others are constructed in such a way they function well in the 2 to 4 GHz area but become unpredictable above these frequencies. The best idea is to read the label on any attenuator you want to pick up in surplus, and see if it will func-

tion at the frequency range you intend to use it at. The golden rule is "If it's expensive and unmarked, check it out *very* carefully before purchasing." Don't buy something you can't use.

One way to test to see if an attenuator is alive is to carry an inexpensive VOM in your pocket. A lot of attenuators sold are destroyed by applying over-power to them, cooking the resistors inside. Check to see if you have a DC resistance from input to output on the center pin. Readings should be in the low-to-modest 100 or so ohms. Then check from each end's center pin to case ground. The readings on each end should be similar, and again, in the low-to-modest 100 ohm ranges. For example, a typical "T" type attenuator would measure 50 ohms from input to output and 61 ohms from each end to ground.

Waveguide devices

The most useful waveguide devices that an amateur can use are threefold: a detector mount, a transition, and a variable waveguide attenuator. These devices need be considered only if you intend to work with waveguide. Some devices that can use waveguide fixtures are traveling wave amplifier tubes (high power at microwave), Gunn diode units for wideband FM on 10 GHz and most bench test equipment associated with waveguide fixtures.

The most important item to obtain for waveguide use is the transition that converts a waveguide flange connection to a coaxial connector. This allows interweaving with waveguide in certain pieces of equipment you might have and coaxial connections in the rest of the equipment. Typical useful interconnections are antenna feeds, like waveguide horns, and other antenna hardware.

In this testing arena, a good waveguide detector mount can be put to use on a remote antenna such as a horn or other broadband device. In practice,

horn and detector mount are cabled back to a testing site some 100 to 200 feet in front of the test antenna and detector for indication at the transmit site. Now, you have a simple part of an antenna test range to show dish aiming and a relative gain measurement. It's a good idea to try simple tests and methods to find out how well systems are functioning, using such equipment.

Waveguide attenuators, especially variable attenuators, can prove useful by reducing a signal at the source, to see how far a signal can be reduced before you can no longer copy it, giving some means of finding minimum signal level of detection, another method of comparison to try out using simple equipment.

Waveguide and coaxial attenuators work the same, but in different styles and package forms. The principle is the same in either domain. In a coaxial domain the ends of a connector can be soldered to common small composition resistors, duplicating the values needed for a similar attenuator type. These will function well as an attenuator, but at a very reduced frequency before they become unreliable. The problem with this type of construction is that it's OK for six or two meters, and *might* work at 450 MHz as well, but as the component size starts to become a part of a wavelength at the intended frequency of operation, the performance falls apart very fast.

Components' size and physical construction techniques need to be quite special if they are to function with accuracy at frequencies above several GHz, let alone function to 18 GHz. Normally the resistors used in commercial attenuators suitable for high GHz work are constructed with special-shaped cores and have the resistance material deposited on them. The combination of shape and deposited resistance material give the very special characteristics (low SWR) at microwave frequencies.

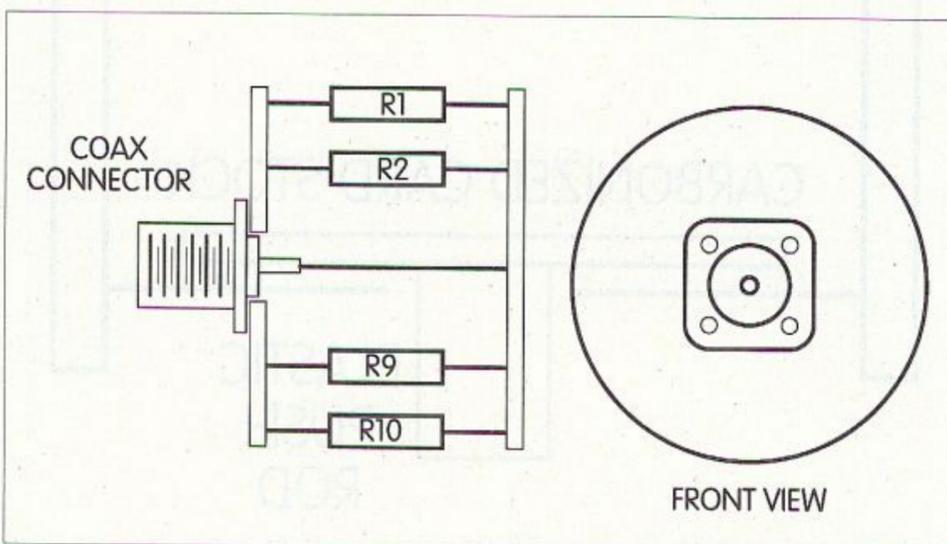


Fig. 4. Dummy load construction showing means of construction for VHF operation from multiple resistors equaling 50 ohms or nearly 50 ohms, placed between two brass or copper plates. The hole in the center of the top disk is for coax connector. Solder to top plate; center conductor of connector is soldered to bottom plate. Unit can be inserted into a small can for shielding after construction.

Attenuators of the waveguide type are constructed with a card inserted in the narrow side of a waveguide and have deposited resistance material on one side of this card material. It can be thought of as being cardboard with graphite on one side of the card for a mental picture. When the card is adjusted to minimum attenuation the card rests against the short side wall of the waveguide. As the adjustment arm is changed in length to more attenuation the card is pushed out from the side wall into the waveguide towards the center of the guide. As the attenuator is pushed or adjusted towards the center of the waveguide the attenuation increases rapidly.

Transmission of RF in a waveguide results in the most RF signal at the center of the waveguide. So anything inserted into the waveguide at this point will intercept a great deal of the applied RF, reducing the output of the system after the attenuator.

50 Ω dummy load

Home construction of attenuators and detector and transition mounts is possible. However, in the case of attenuators, special techniques are needed, allowing good operation in the very high microwave frequency ranges. Home construction is not recommended. I stated before that attenuators and dummy loads can be constructed from common carbon resistors. While it's hard to find an exact 50 Ω resistor, several higher-value resistors can be placed in parallel to obtain a value of near 50 Ω .

Simple 50 Ω dummy loads (terminations) can be easily constructed from a large number of high-value 1 or 2 W carbon resistors. Let's say, for instance, if you want a 50 Ω 10 W load for two meters. Calculate: If you had 10 each one-watt 500 Ω resistors, placing them all in parallel with each other, you would have exactly 50 Ω with a power dissipation of 10 x 1 W ... exactly what you wanted.

In the real world things are not all that neat. But calculate with a standard value like 680 Ω (one watt) by placing 10 in parallel. That would be 68 Ω ; 14 resistors result in 48.5 Ω , and 13 resistors result in 52.3 Ω . See how simple it can be to come up with a 50 Ω dummy load for test?

To find out if you have suitable resistors to total the correct value for a 50 Ω load, just divide the value of resistors by the quantity of resistors. An easier method is to take a value you have on hand and divide it by the value you wish to arrive at, and the result is the number of resistors in parallel needed. (Example: 750 Ω stock resistors divided by 50 Ω desired = 15, the quantity needed in parallel to obtain a 50 Ω final product.)

Waveguide transition

Now what about the transition mount for waveguide that I mentioned earlier? All it needs to be is a short section of waveguide, about an inch long, with a coaxial connector mounted on top of the wide face of the waveguide. Usually a type "N" connector is used to be the coaxial interface to the waveguide. It is mounted on the wide side of the waveguide centered on the broad face of this side. The center connector (solder terminal) is extended into the hole in the waveguide and into the inside of the guide. This pin (center of coax connector) is spaced 1/4 guide wavelength from the closed end of the rear wall of the waveguide. This dimension is approximately .375 inches for 10 GHz operation.

A guide wavelength is similar to figuring a wavelength in coaxial cable, when its length is corrected by the velocity factor of coaxial cable. Just for the record, a guide wavelength (X_g) is equal to 1.5 inches for 10250 MHz making 1/4 X_g equal to .375 inches. Now, if you use an "N" connector it can be placed on the waveguide wide dimension with its flange just extended over the rear of the guide equal to the thickness of

QRP

Low Power Operation

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Ham radio takes to the fields and back woods this month as Field Day once more brings the hams out of the woodwork. If you've never operated Field Day running QRP, you're in for quite a thrill!

A QRP Field Day

Perhaps one of the best things going for a QRP Field Day is the ability to carry everything you need in a backpack! Here's a list of the things I take with me for QRPing in the field:

- A QRP rig. I like a multi-band rig that covers at least the 40 and 20 meter bands. If possible, 80 meters comes in real handy for late-night contacts.
- An 18 amp/hr gelled lead-acid battery—fully charged, of course. One of my expanded analog voltmeters to monitor the

battery's voltage goes in the Field Day kit, too.

- To keep the battery topped up before the 2 p.m. start time, a 10-watt Solarex Lite™ solar panel and a Micro "M" charge controller finish out the power system.

- There are only two antenna choices I will ever use for Field Day. One is the G5RV multi-band dipole; the other, a random-length wire. To use either one, an antenna tuner will be needed. The antenna should be ready to go on site. You don't want to waste time assembling an antenna when you could be drinking Diet Coke® and munching on Oreo® cookies! Of course, you'll need some support rope and perhaps an extra antenna insulator or two, just in case.

Continued on page 74

the flange. When the shorting plate is attached to the rear wall under the connector's flange it makes for a flush mounting.

Both the detector mount and the transition are constructed quite similar in that the active element is spaced 1/4 guide wavelength from the end of the rear wall of the waveguide. Shown in **Fig. 1** is a simple detector mount that has the cartridge-type diode (1N23-type) inserted from the bottom of the waveguide (grounded to WG at this point). The top of the diode passes through the top of the WG through a small hole, and is built up with insulating material just below and on top of the diode, like cellophane tape washers over the diode's pin. The pin is insulated from touching the

sides of the hole and connection is made to the pin with as short a connection of coax cable to the meter as possible, which is bypassed for RF with a .01 capacitor. An amplifier can be used for improved sensitivity by connecting it between the meter and the diode. Normally this type of detector is used on wavemeters and similar-type devices for indicating a relative RF measurement. Construction methods are not critical.

Next month I want to present some items you can put together in your garage that are useful in demonstrating RF transmission on a simple antenna test range. I will get into how SWR is measured at microwave compared to VHF and describe some test and measurement equipment used in these tests. 73 for now, Chuck WB6IGP. 73

Tips from a QSL Guru

Here's how to make your card count.

Bob Shrader W6BNB
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Have you ever thought about how another amateur receiving one of your QSL cards might feel about it, and about its sender? With 68 years of hamming and QSLing behind me, here are some ideas I have picked up about QSL cards. Only cards printed on one side will be discussed at any length.

(Double-sided cards may have only the callsign, a picture or cartoon, and the operator's name and address on the front side, while the back side will usually have blanks for the details of the QSO—the date, RST report, station information, and signature of the sender printed on the left side, possibly with blank lines for the address of the person to whom the card is being sent on the right side.)

When you only want to confirm a contact made with some station, as with many DX contacts, any minimal form of a card will do. But, if you would like to project an image of friendliness after an interesting QSO, then it would be better if your card were more detailed.

A minimal type of QSL card should have your call letters standing out, in fairly large print, either across the top

or at least very near the top of the card. Bright colors are beneficial. In many cases, particularly with beginning amateurs, ham shack walls become resplendent with mounted cards from all over the world. They do make an impressive display for visitors! Call letters that can be easily read from a distance are most desirable. Where the call letters are placed on cards that are wall-mounted is probably not too important. But after a time there may be too many received cards to wall-mount all of them. From then on, received QSLs will usually be filed in one or more drawers or boxes. Whether filed by country, by area number, or by whatever filing system is decided upon, they'll still usually be standing up in their filing container. Unfortunately, if cards are not wall-mounted, in many cases they may rarely be seen again. So how much should you spend for QSL cards? Good question. The single-sided cards discussed here are usually the least expensive.

Filing concerns

No matter what your filing system, it will usually require considerable time fingering through the cards already in

the file to find where newly received QSL cards should be inserted. If the call letters on your filed cards are not shown at, or very near the top of the card, you will have to dig down in between your already filed cards to see what the call letters are of the cards between which the new one is to be inserted. If cards are of different heights, this can be a tedious process. When call letters are printed too low on received cards, in many cases I have hand-printed the call letters of these cards on their top margin with a felt pen so I could see more easily what the card's call letters are. That spoils what otherwise might have been a nice-looking reminder of a past contact. Fortunately, call letters across the narrow dimensions of the card are not too popular.

If a card varies very much from the standard postcard size of five and a half inches horizontally by three and a half inches vertically (14 by 9 cm), it will not fit well into the usual filing container. If it sticks up too high or is too short in the file, it can make finding where a new card should go unnecessarily difficult. I have trimmed off excessively high and/or wide cards

and thereby lost information on them. I have even dumped some of them because they were too tall, too short, too small, or too wide to fit into my filing drawer. Furthermore, odd-sized cards may not mount too well alongside standard-sized cards in a wall exhibit.

Minimal info

On a minimal QSL, the most important information besides the call letters is the operator's name and postal address (street, number, city or town, postal or ZIP code, and country). Print the name and address as it should be shown on any return QSL. Since there is no telling for what reason the other amateur is collecting QSLs, you may want to add your county or other geographical designation, perhaps your grid square, and I have even seen a few latitudes and longitudes on cards. Other information to show on minimal cards is the frequency or band used, and a truthful RST report, not the meaningless "599" given for so many actual "349" or worse DX contacts. If there is anything improper sounding about the received signal, such as hum or distortion, the third number should never be a "9." If you note drifting, chirping, hum, distortion of any type, indicate it with an "8," "7," etc. Such information should be appreciated by the other operator, telling him or her that something should be corrected. At the bottom of the card there should be a "73" and a line on which to sign your name. Minimal cards are to be expected from DX hunters or expeditions. These people are just too rushed when filling out their dozens to thousands of cards to enter anything but the barest essentials.

Smile

A more friendly and informative QSL card will have all of the information of the minimal card plus some additional little niceties. Examples of a possible single-sided QSL card are shown in the illustrations. The "To" is for the other operator's name. After "RST," if fading was bad, the report might be shown as "4 3/8 9." Be sure to have plenty of space on the Rig,

W6BNB

Robert "Bob" Shrader, 11911 Barnett Valley Rd, Sebastopol, CA 95472, USA
 ● Sonoma County ● Grid Square CM88 ● E-mail address: w6bnb@aol.com ●

To of station ur MHz mode sigs rcvd
 here RST at Pacific time (+8 hrs = UTC) Date /_{Mo.} /_{Day} /_{Yr.}
 Rig in use was a running W_o
 Amplifier not/was used/capable of/at W_o
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 Pse/Tks QSL With de Licensed 1931
 Licenses held: Amateur Extra Class - First Radiotelegraph - First Radiotelephone
 Member of: SOWP_{SGP} - ARRL - OOTC - QCWA - CFO - SIRARC - SARO
 Author of: Electronic Communication - Amateur Radio Theory and Practice
 Fire Fighting, How It's Done And How YOU May Have To Do It

Fig. 1. The author says his XYL prefers the callsign-across-the-top style.

Amplifier, Antenna, and Remarks lines. If you underline the "Pse" of the "Pse/Tks" it is asking for a QSL and thanking the other operator for it at the same time. But be sure to cross out the "Pse" if you are sending an answering card. After "Amplifier," if not using your amplifier during the QSO in question, cross out the "was." If the amplifier was used, cross out the "not." If you use no amplifier this line would not be required. If you do not expect to change your equipment for several years, you can have the equipment type, the power output, and the antenna used printed on your cards.

However, if you ever change from your regular operating power to QRP, or change the equipment being used, this would not be allowed for on the card. Also, if you use different equipment for different bands or uses, printed data on the card may not be such a good idea.

Note that I like to use my local time. This tells the other operator what time of day it was at my QTH when his or her signals came through on the band specified. To indicate what the UTC was, add the "(+8 hrs = UTC)," using whatever time difference is appropriate for your area. This also gives the

W6BNB

Robert "Bob" Shrader
 11911 Barnett Valley Road
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 Sonoma County. Grid Square CM88
 e-mail address: w6bnb@aol.com

To of station ur MHz mode sigs
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 Rig used was with W_o
 Amplifier not/was used/capable of/at W_o
 Antenna Remarks

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Fig. 2. Callsign at top left is also an option.

receiving operator a rough idea of the longitudinal distance between your two stations. I rarely take the time to figure out what the local time of day was for a UTC time shown on a QSL card, although knowing it might be of interest in many cases. Obviously, if you like UTC, it can be used instead of your local time. However, I prefer to operate according to my own local clock and not by clocks on longitudes similar to that of Greenwich, England.

Signal reports

Probably the items of most interest to the other operator, besides your geographical location, will be your transmitter's power output and the type of antenna you were using. It allows a comparison to be made with his or her own equipment operation determined by the received RST report and the report you give on a return QSL. Unfortunately, with most rigs, S-meter readings may be fairly accurate only on a couple of bands, due to antennas being used and other variables.

S-meters are rarely accurate on most bands. (If I gave actual meter readings of weak but readable signals according to my transceiver's S-meter, on the higher frequency bands they would all be RST 509 and the other operators would be very unhappy.) We should learn to assess S-units by ear, as was done in "the good old days"

when receivers had no S-meters! Basically, with equal power being radiated by two stations, the S-meter reports should be almost identical. If both are using 100 W_o and one station's report is S9 but the other's is S6, something is wrong—probably one or both S-meters! Of course, if you do not keep a log, no true return RST reports will be possible. (I prefer three-inch by five-inch card files, using typing paper cut to the desired dimensions instead of cards.)

Who made the equipment that produced the RF power output specified may be of interest, particularly if home-brew or vacuum-tube equipment is involved. In the latter cases, describing the type of oscillator being used and the final amplifier stage details can be interesting items. If the RF power output of a home-brew rig is not known, it will usually be pretty close to half of the DC power input (where $P_{in} = I \times E$, using the DC current fed to the final amplifier device, I_p for tubes, I_c for transistors, times the final amplifier DC voltage, E_p for tubes, V_c for transistors). If you know the class to which the final amplifier is biased, ballpark figures might be about 40% for class A, 50% for class B, and 60% for class C. For example, with a DC input of 140 W_{in} and using a class A final amplifier (to produce the lowest harmonic signal output, and minimal TVI), the RF output would be roughly 140×0.40 , or about 56 W_o. Details of home-brew receivers, antennas, and antenna tuners are also of interest to other amateurs, particularly those who do or have ever done any radio construction work themselves.

Remember 2000

Note that the year has been left off. This allows the year number to be filled in. The year 2000 is not too far away! It is going to give us enough grief with our computers, etc., without adding 199_ to any QSLs we order now.

Personal touches

Cartoons, or pictures of the operator or his equipment, may add interest to a

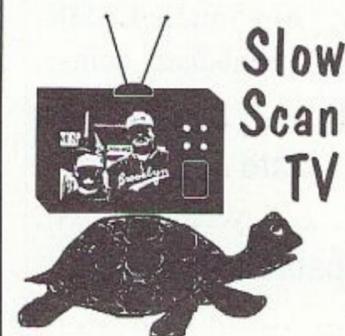
QSL card. If used, though, it is questionable if they should be the dominant item on the card (unless a double-sided card is used). It must be remembered that the most important feature of any QSL card is really the callsign on it. The callsign should not only stand out, but, as mentioned before, should be printed near the top of the card for easy filing. That callsign is important because it can be rightfully claimed by only one person in the world, the operator who is sending the card (club stations and DXpeditions excepted).

At the bottom of the card, you might add something about yourself that might be of interest to the other operator. For example, you can indicate what amateur or other license(s) you have, such as a pilot's or other license(s); the names of amateur or other radio organizations to which you belong (possibly with a printout of their symbols); when you were first licensed and under what call if different from your present one; your E-mail address; and amateur awards you have won. You may be able to include other things about yourself that would be interesting. I list the names of some of the books I have written, as shown.

When you start working a station, check your QSL file to see if you have a card from him or her. If you do and it is properly filled out, the information listed on it may be useful in making the present QSO a lot more interesting. Use the blank left half of the address side of a single-sided QSL card to add any additional information that you might want to give the other operator. It will usually relate to something that was discussed during the QSO.

Remember that any first, good, informative, and interesting QSO, and particularly if it is a DX one, deserves a good, informative, interesting to read, QSL card. One nice thing about more informative QSL cards is that they will almost always result in a return card, which is sometimes hard to get from some DX stations! Remember these suggestions when you are making out your next QSL card order! (No, I am *not* in the QSL business—but QSL card printers might take note.)

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CIRCLE 351 ON READER SERVICE CARD

Roamin' Romania

Part 1: Timisoara, home of the revolution.

George Pataki WB2AQC
84-47 Kendrick Place
Jamaica NY 11432

In the fall of 1997, I decided to visit, probably for the last time, the city where I was born a long, long time ago. I wanted to meet my radio amateur friends and see how they were coping under the new socio-political system, almost a decade after a bloody revolution that freed them from dictatorship.

I flew with *TAROM*, the Romanian airline, the only nonstop flight from New York City to my home town of Timisoara, and in about eight and half hours I arrived at my destination.

The flight was boring, with two dull movies and two flat, airline-type meals. (On my return, I saw exactly the same two boring movies, and I think they served me the same meal I did not eat the first time around ... like my mother used to do. What I did not eat for lunch, I got for supper.)

At Romanian customs, I was asked the routine question:

"Do you have any electronic gear?"

The obvious answer was "No," even with my suitcases full of various things for radios and computers—gifts for hams. The customs officer stretched his long hand under layers of clothing I had brought for relatives, and pulled out a low-pass filter.

"What is this?"

"Is something for a big car," I said, giving the proper answer under the circumstances. The customs officer probed even more deeply into my suitcase. I silently placed a curse on his fingers, and he pulled out a high-pass filter.

"What is *this*?" he inquired again, with the inquisitiveness of a man in uniform.

"Is something for a *little* car." I helped him satisfy his curiosity.

Convinced that I had nothing "electronic," he let me pass.

I even had a heavy box with 100 amateur radio magazines in it. I had no problem with them, except in carrying the box. In New York, I had tied the box with a long and very thick nylon rope, but the box arrived in Romania

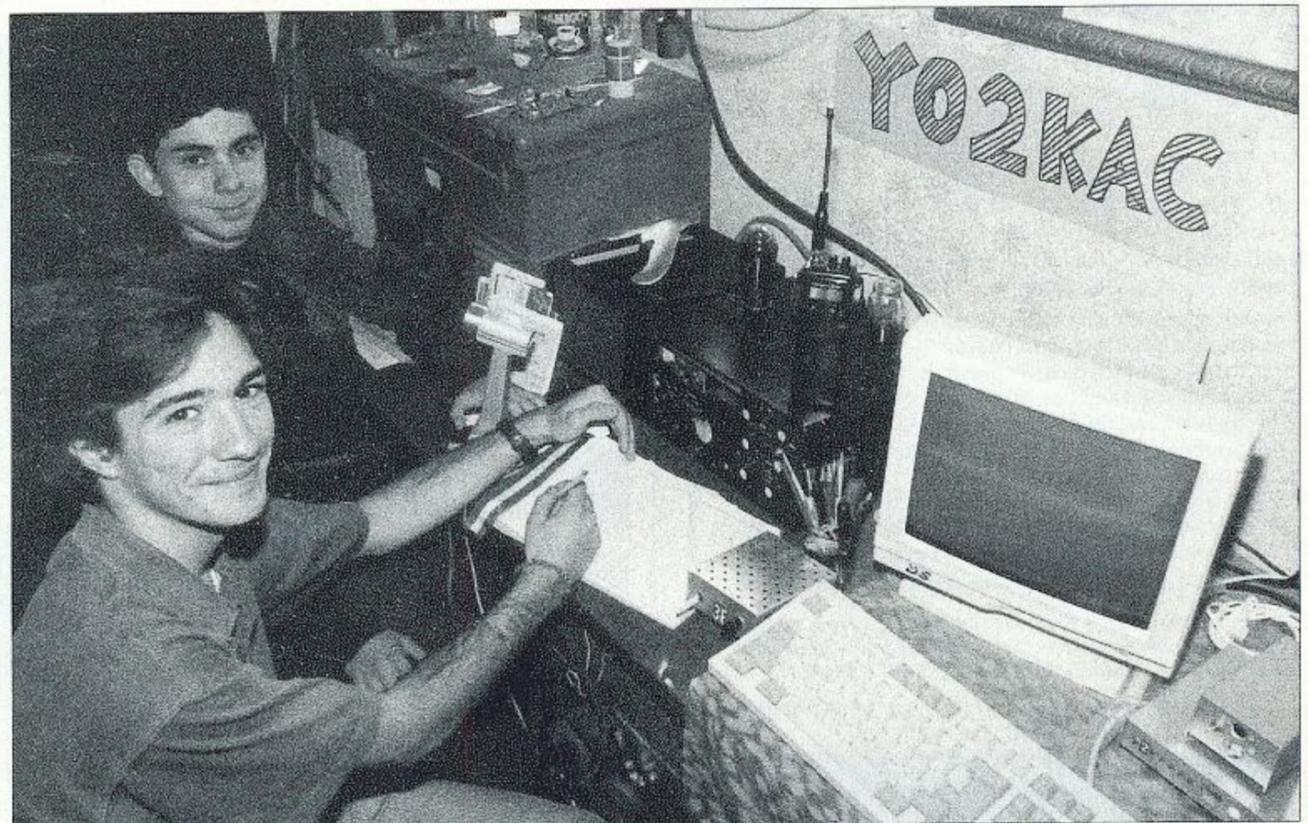


Photo A. Dan YO2LLQ (front) and Sorin YO2LLL at the Children's Palace Radio Club Station YO2KAC in Timisoara.

without it—one of the many mysteries of flying a commercial airline.

In the city of Timisoara, I went to see the club station that I had established back in 1955 at the Children's Palace. Now the teacher and chief operator is Szigy YO2IS. Operators are high school students like Sorin YO2LLL, Dan YO2LLQ, Cristi YO2LOM, and Bobby YO2LIF (**Photo A**). The station is a modest FT-250 with an all-band wire dipole. Now they have a much smaller room than I had there 40 years ago, and the available funds have shrunk a lot. Nevertheless, the operators work with enthusiasm, build various gadgets, make QSOs, and send QSL cards. Some of them even have personal homemade stations.

Next to see was club station YO2KJO of the High School for Telecommunications. There the chief is Norby YO2LGU, a student at the Technical University (**Photo B**). Norby, licensed in 1991, is the sysop for the YO2KJO BBS.

I also visited Bata YO2LAM, licensed in 1982, a petrochemist by training but presently running a furniture store (**Photo C**). Bata just moved into his new house, all white marble,

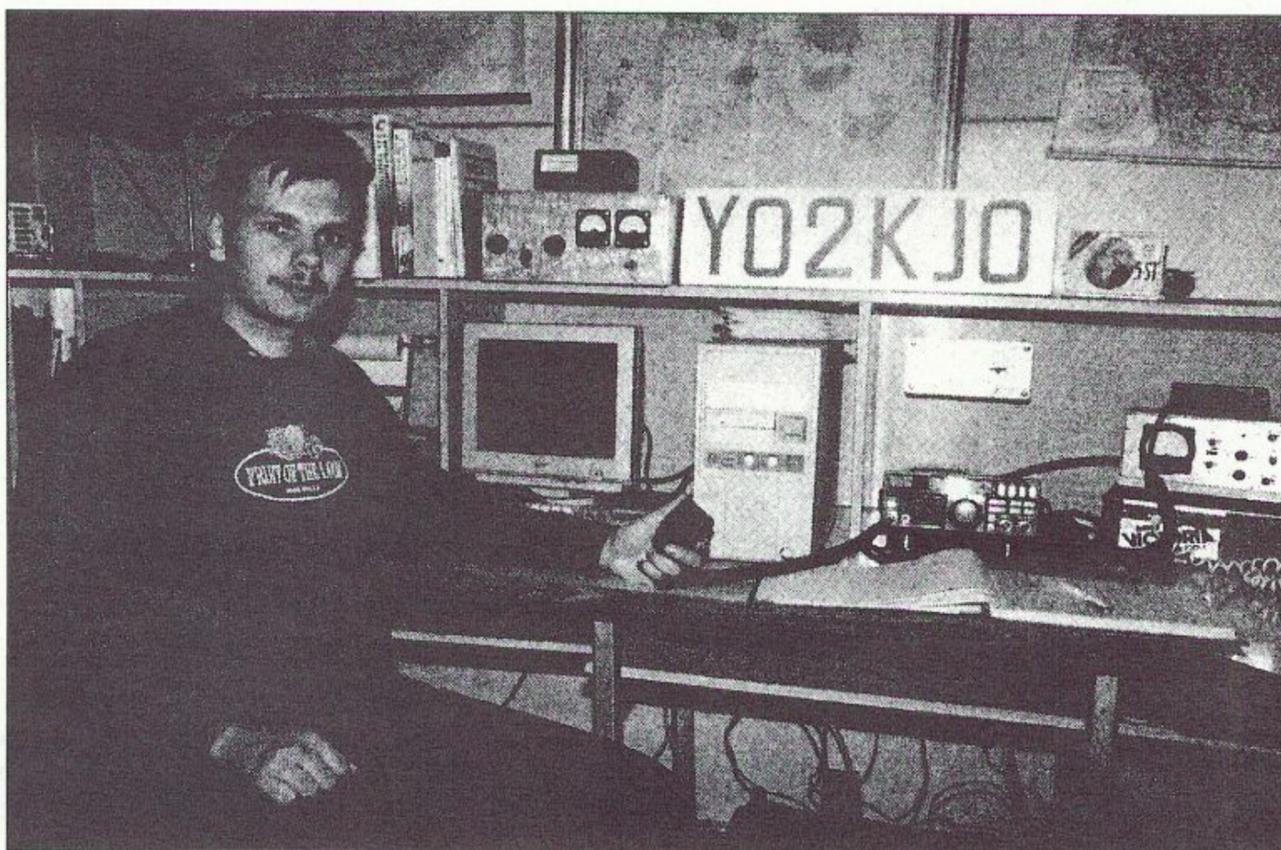


Photo B. Norby YO2LGU at the Telecommunications High School's Radio Club Station YO2KJO, also in Timisoara.

inside and outside, with a special radio room equipped with an FT-1000MP transceiver, an FL-2277B linear, and a Drake antenna tuner. It seems there is a lot of money in selling beds and mattresses. In a backyard cottage, I saw a roomful of large, obsolete Russian military transceivers. On a 50-foot tower, Bata has a TH11DX, a 16-element horizontally polarized yagi for two meters, and a wire dipole for 40–80 meters. On a separate mast installed on the house, he has a five-element yagi for six meters, a 22-element yagi for 70 cm, and a vertical for two meters. Bata YO2LAM is an oc-

casional contester, a DXer, a good QSLer, and an all-around nice guy.

I saw the stations of Szigy YO2IS and his wife Delia YO2DM, quite a famous couple in amateur radio (**Photo D**). Szigy is a teacher. He is running the YO2KAC club station at the Children's Palace but his claim to fame is his prestigious EME activity. Under very difficult conditions, having only a narrow opening between large buildings for his EME antennas, Szigy YO2IS managed to make over 538 EME QSOs on 70 cm, with 33 countries, 138 different stations on five continents, using about 600 watts. On two

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CIRCLE 56 ON READER SERVICE CARD

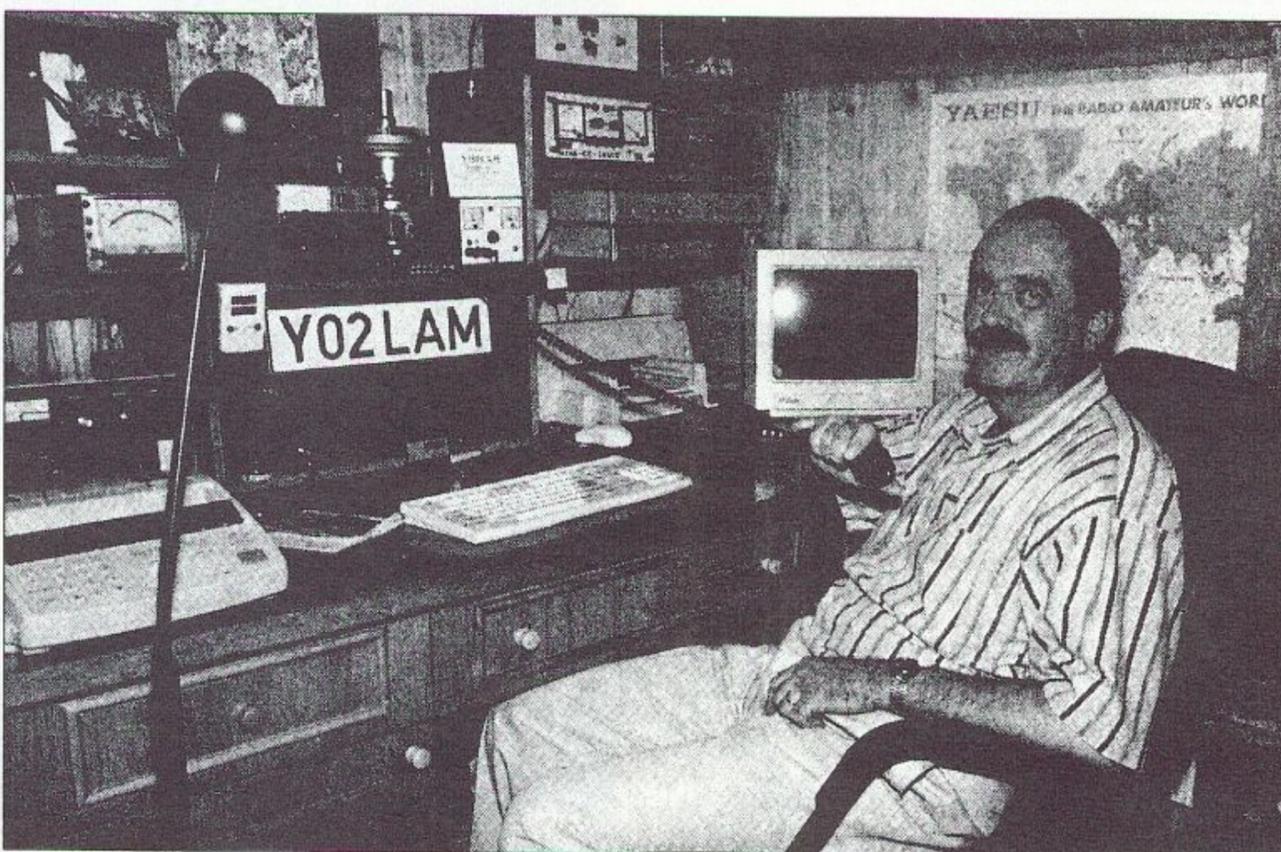


Photo C. Bata YO2LAM, "all-around nice guy."



Photo D. Delia YO2DM and her husband, famous EME-er Szigy YO2IS, show off their completely home-brew shack.

meters EME he made 26 contacts with five countries, 16 different stations, using 1 kW. Everything in his shack is homemade—and he has quite a lot in it.

Delia YO2DM has a full-time job as the chief of the Timis County Radio Club, YO2KAB. She has her own setup, works in contests, is a DXer, and is a reliable QSLer.

Poly YO2BX, licensed in 1956 and a retired engineer, is an old friend of mine (**Photo E**). He is using a modest HW-101, pushing 80 watts to a five-band Windom antenna. Poly is a builder and experimenter, operates

only SSB, occasionally works DX, and *does* QSL.

Vivi YO2AFS, licensed in 1964, is an electrical engineer. He is a master builder, and his radio room is full of his projects. He does not have too much space in his own cramped apartment, so for many years, every day after finishing his work at the factory he has gone to his daughter's house. There is his radio shack, where he tinkers for hours before he goes home. Vivi has a vertical for two meters and was in the process of installing his new, all-band G5RV antenna. He



Photo E. Retired engineer Poly YO2BX has been licensed for more than 40 years.

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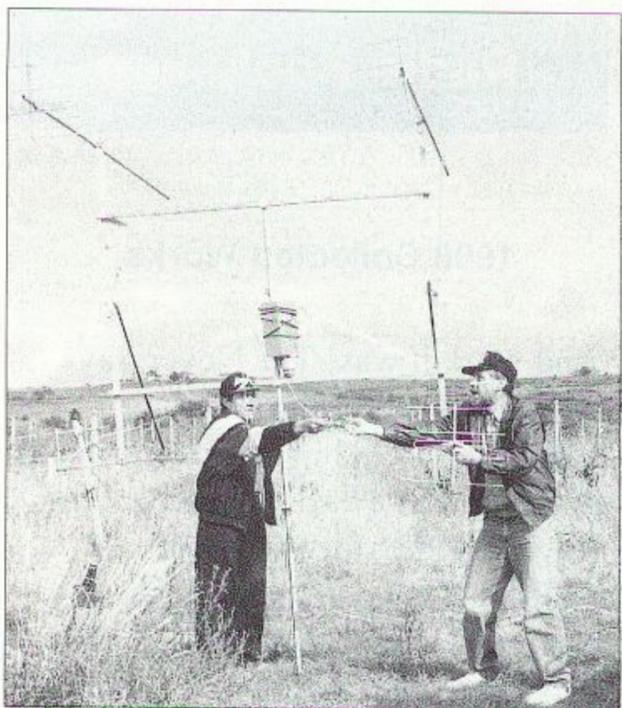


Photo F. Near Buzias, Vivi YO2AFS (left) and Liviu YO2BCT set up a 432 MHz antenna for an IARU contest.

works in contests, participates in fox hunts, and has QSL cards.

I went with Vivi YO2AFS and Liviu YO2BCT on an outing about 20 miles from Timisoara, when they worked on 70 cm in an IARU contest (**Photo F**). We could not drive to the intended location on the top of a hill because of the bad roads, so we went halfway up, to about 650 feet. There we installed an array of four long 16-element yagis, and Vivi and Liviu operated as long as the band was open, making 30 QSOs. When there was no propagation we tried to sleep in cars, but it was quite chilly. At least it did not rain.

We passed some of the time with a little YO ham humor, which I am happy to bring back for you in the form of these pieces of advice for people working DX:

- If you are calling "CQ DX" and a nearby ham is answering, ask him to call you again on the long path.

- If a DX station does not answer you, imitate his accent and he will pick you from the pileup.

- If a DX station does not answer you, call him with a high pitched voice; he'll think you are a YL and will answer right away.

- If you cannot get through a pileup, turn on your super big amplifier and yell "QRP, QRP!"

- If you worked a DX station six times, and he always promised QSLs, and you sent cards every time but received nothing, perhaps it is time to doubt his honesty.

- If a DX station is asking for more money for his QSL than is required for postage, he is just trying to make a "decent" living.

- If you send a DX station your QSL with a couple of green stamps for postage, and he answers you years later via the bureau, be thankful—but put a Gypsy curse on his head.

- If a DX station is working "split" and you keep calling him on his frequency, consider changing your name to "Lid"—everybody else is already calling you that.



Photo G. Bobby YO2AAG designed and built most of his equipment himself.

Let me continue with my trip. Bobby YO2AAG is also an old friend of mine (**Photo G**). Licensed in 1963, he is an electronic technician at the local power plant. Bobby is a master builder. Most of his equipment and antennas were designed and made by himself. He is running 180 watts and has a very tall tower decorated with scores of antennas, including a W3DZZ for 40 and 80 meters. For two meters, there's a 15-element vertically polarized yagi for repeaters; an 11-element horizontally polarized yagi for DX; and a vertical Ringo Ranger. For 70 cm, he is using a 30-element vertically polarized DJ9BW-type yagi, and another antenna similar but horizontally polarized. Also on the tower, in boxes, are two power amplifiers for two meters and 70 cm. And as if these were not enough, there are two large parabolic antennas for satellite TV. Bobby YO2AAG has worked over 130 DX countries, 25 of them on two meters. He does QSL.

Karoly YO2GL, licensed in 1961, is an electronics technician (**Photo H**). He maintains test instruments for the local medium-wave broadcast transmitters. His shack is above the 10th floor of his apartment building, where the elevator motor and its control panel are located. He has direct access to a large flat roof where he can experiment with his antennas. This is the good news—the bad news is that the very strong electromagnetic fields from the nearby huge transmitting tower antennas interfere with everything.

Karoly is a contester, having worked over 130 countries, but he is mostly a builder. He has a G5RV for 10–15–20 meters, as well as a dipole for 40 meters and another one for 80 meters—both strung between two tall buildings at about 165 feet above the ground. For six meters, Karoly has a two-element quad; for two meters, he is using a 16-element rotatable, horizontally polarized yagi and two connected nine-element vertically polarized yagis.

I don't remember if it was Karoly who told me this one:

There was an amateur who wanted to buy a transceiver, agreed on a price, and told the merchant:

"My most respected dealer, if you trust me I'll pay you in about six months. When can I pick it up?"

"My most respected customer," answered the dealer, "of course I trust you. In about six months."

The county radio club located in the center of Timisoara has two rooms: one with a nice station (YO2KAB) and a QSL bureau, and a small meeting room. The chief of the club is Delia YO2DM, and its president is Zoli YO2BP, a very active ham. The station is modest and they use a longwire strung across the street to a tall building.

At the club, I met up with several amateurs (**Photo I**): Aurel YO2BS, Romi YO2AEG, Noni YO2DNO, Valy YO2AQO, Sorin YO2LLL, Dan YO2LLQ, Szigy YO2IS, and Calin YO2LOG, a reporter who interviewed me for his paper. In that article, I blasted the politicians who don't know anything about the services brought to society by amateur radio operators, and don't allocate funds to adequately support this valuable activity.

I had a good time in Timisoara. I visited old friends and made new ones. I went twice to the opera, where I saw a very good *Rigoletto* and a so-so *Cavaleria Rusticana*. The best seat in the house cost me about three dollars. Twice I went to the theater. Both plays were good, and tickets for the first-row seats were two dollars.

I bought a bunch of books written by survivors of the labor camps and extermination prisons of the communist era. I talked with participants in Timisoara's popular uprising of December 1989, which became the revolution that liberated the country. Many people participated in the revolution, and afterwards even more people *claimed* that they had participated. As one revolutionary said: "Few we were, many we remained."

From Timisoara, I took a side trip to the valley of the Jiu River, a rich mining region. In the Jiu Valley I met many amateurs, but that will be the subject of Part 2.

In conclusion, please allow me to straighten out some questions. A rumor is circulating in Romania that I

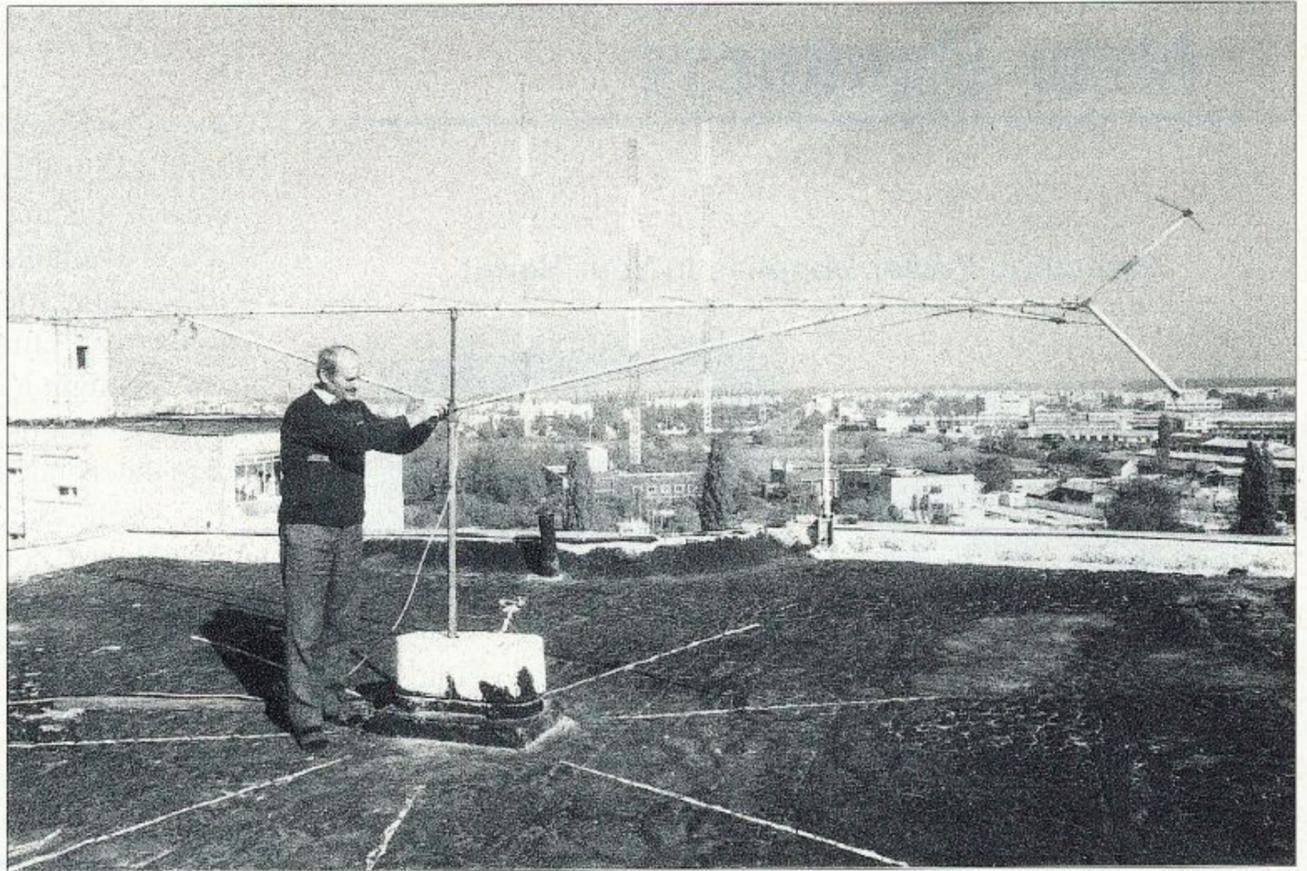


Photo H. Karoly YO2GL's rooftop antennas face constant interference from the large broadcast towers in the background.

am the governor of the State of New York; that I was the mayor in a city in the same state; that I became a rich and famous attorney; that I made lots of money in the stock market; that my grandfather came from Hungary; and that I am a nice and helpful guy.

To all my YO friends, please note: I am not the governor of New York State. I have never been a mayor in any town. I am neither rich nor a famous attorney. I did not make any money in the stock market—rather, I lost some. My grandfather has never

been in Hungary. And, instead of being nice and helpful, I am mean and nasty. Other than these discrepancies, the rumors are fairly accurate.

On the day I returned to New York, my friend Bata YO2LAM and Sandu YO2LIZ, a firefighter, came to the airport to say good-bye (and probably to make sure that I was leaving). I think I asked the local hams too many questions. And I tried repeatedly, often in vain, to make them smile for the camera. It will take time, but this nation will one day smile again. 73



Photo I. Sorin YO2LLL (**Photo A**) makes it to another club station, this time joining Valy YO2AQO at Timis County Radio Club Station YO2KAB (in Timisoara).

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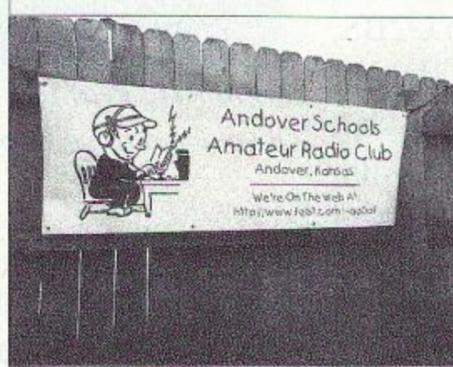
held transceiver designed to operate on the Family Radio Service (FRS) band. About the size of a beeper, the new DJ-S46 has been type-accepted by the FCC. It features all 14 FRS channels and, using AA batteries, transmits with an output power of 340 milliwatts. The DJ-S46 puts two-way radio within the reach of anyone who needs quality communications in a relatively small area—think of the possibilities for farms, ranches, vacations, camping, shopping ... when you last took the kids to a mall or a theme park, did you know where they were every second?

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Ruski Keyski

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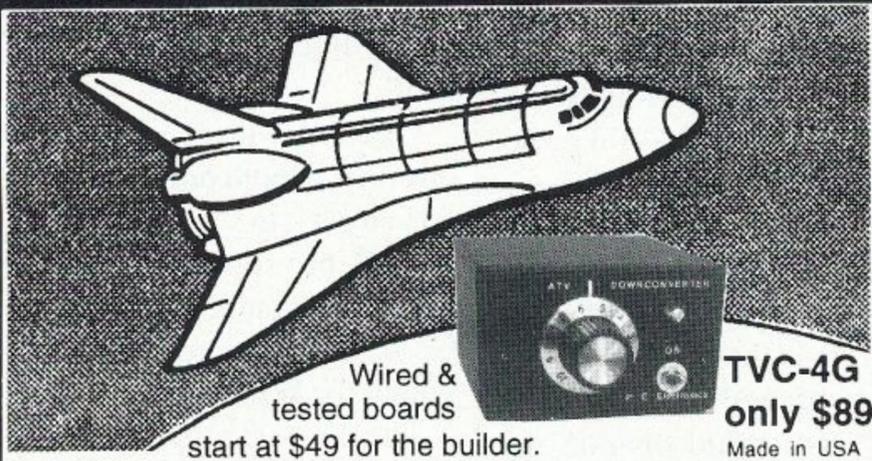
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CIRCLE 22 ON READER SERVICE CARD

QRP

continued from page 63

•Several short lengths of RG-58U for connecting the tuner and rig together are required. Although only one jumper is needed, it has always seemed to me that if you only bring one, that'll be the only one to fail during Field Day! A small handheld field-strength meter is worth its weight in CW contacts as well.

•I like to take some tools with me, too. You don't need to carry the entire tool section of Sears® with you, but a few carefully selected tools will save you many a trip back home.

On my list of tools is a good digital VOM with a fresh battery. Test leads, of course, are required, and several clip leads, in good condition, are a must-have.

I also take a set of wire cutters, black electrical tape, duct tape (never leave home without it!), a small spool of solder and a butane-powered soldering iron. I usually throw in some extra PL-259 connectors and a small assortment of screwdrivers. I determine what kinds of small hand tools by the equipment I've chosen to use. Generally, I take whatever is required to get inside the rig.

If I am really out in the middle of nowhere, and a very, very long way from the nearest Radio Shack™, I take along an emergency parts kit. This kit contains a handful of 2N2222A transistors, some LM386 audio

amp chips, a 2N3866 transistor or two and a 2SC1701 transistor as well. I round out the kit with a supply of .1 and .01 capacitors and some common electrolytic capacitors. Don't forget fuses! I then add some desoldering wick to the toolbox and a few feet of stranded #24 gauge wire. Sometimes having just a few basic parts can keep you up and running in case of equipment failure.

I never have been able to copy CW in my head. Instead, I have to write it down on paper as I go. I don't care to lug around scrap pads of paper. Go the local five and dime and get a "magic slate" in the toy department. These things come with a plastic pen you can write with on the top of the pad. You erase the pad by lifting the top plastic sheet. I throw away the plastic pen that comes with the magic slate and use a dead ballpoint pen instead. The magic slates are under a buck.

This is 1998; the start of the new millennium is just around the bend. All contacts during Field Day are logged into a computer. Laptops are now so inexpensive, especially those 286 clinkers, that everyone should have, or at least can borrow, one.

However, it's not my idea to carry around a desktop computer to the Field Day site to log contacts. Instead, you must have a laptop computer to get the job done. But, you don't need to use the latest and greatest laptop either. Aside from the fact that they're expensive as hell, the

new ones are really power hungry. It's quite possible that the laptop computer will draw more power from a battery than the rig used to make the contacts! Bottom line: You just don't need a lot of computing horsepower to do Field Day logging.

If you can get your hands on one of the older laptops, you'll really save yourself money, and battery power. In the past, I've used a Tandy 1100FD computer. This guy has an LCD screen, DOS 3.3 installed on ROM and *no* hard drive. The processor was an 80C80 (or something close to it) and at the time the computer was new, the processor was state-of-the art. The 1100FD would run for hours on its internal six-volt battery. The lack of a hard drive is an inconvenience, but since the operating system is on ROM, there was no problem. The LCD was readable in bright sunlight, but alas, since the screen was not backlighted, it was hard to read at night. In a brief moment of weakness, I sold my 1100FD.

Check out the hamfests in your area for these computers. Also, the local computer store may be of help. Don't spend too much money on one—I'd go no more than \$100 for one right now, and *that* would be pushing it.

I've seen Grid laptops with the orange gas discharge screens for \$150 at hamfests. These units came with 60 meg hard drives and would operate directly from a 12-volt source. By the way, Grid laptops were used by the military.

Now, having said all of that, you need software to do the Field Day logging. And the reason why you can get by with such old computers? Old software!

There are two programs that I have used in the past for Field Day logging. They both work just great, are easy to use and will run on any computer from an 8080 to the latest super chip. Both programs are DOS based. You don't need the Windows operating system. Either one will operate and hold its data on one floppy disk, you don't need

a hard drive, and thus can use the Tandy 1100FD—and best of all they're both free!

Here they are:

For text-only based Field Day logging on a computer that does not support any graphics, my choice is the program called "FieldDay" by Forrest Hudspeth WA3FAE. It's an oldie, version 1.0 copyright 1986.

If your computer can display graphics, my choice is the WR9R Field Day Logging System. This program is a fine example of the kind of programming that could be done in the days before the inflated operating systems such as Windows® came along.

Both programs generate all the necessary forms and dupe sheets. All you have to do in either one is add in the bonus points, and sign your name!

Both programs are small. The Field Day Logging System is only 60 K in size, so you can easily hold up to 17,000 contacts on a single 1.44 meg floppy disk. If you run out of space on a single floppy please contact me—I'll fly you in for our Field Day!

Okay, now that I've sold you on either or both programs, how do you get 'em? That's easy. The WR9R program is available from the CompuServe ham net. Go to the software library and search for WR9R or Field Day.

The FieldDay program by Forrest Hudspeth WA3FAE can't be found on any of the online services.

So, what's a ham to do? Well, send me a formatted 1.4 meg floppy disk, a return label and \$3 for priority mail and I'll send you both programs and some sample data. My address is at the top of the column.

Now if only someone would come up with the software to use a Palm Pilot™ and store the contacts on a RAM card!

Some quick Ten-Tec mods for the QRP rig

These came in from Tom Kaitchuck WB9EAW. Tom's

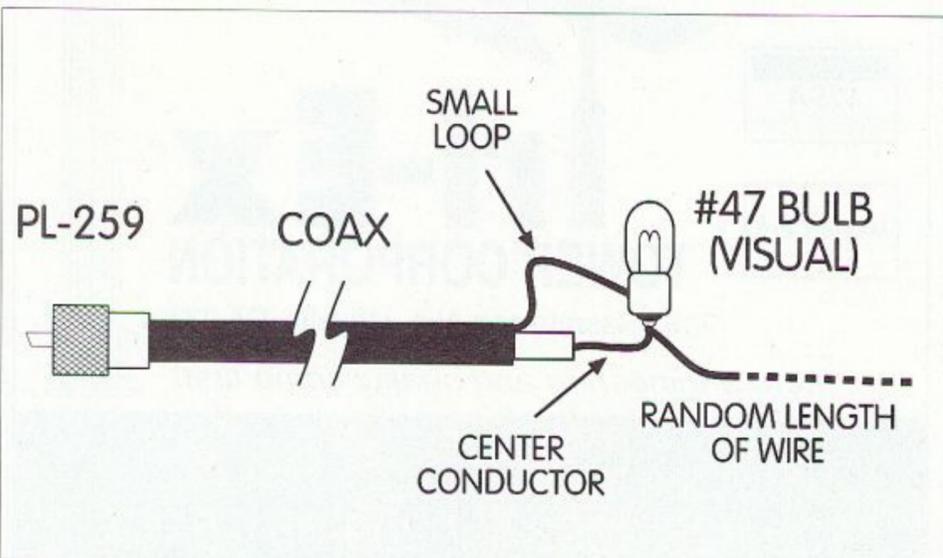


Fig. 1. WB9EAW's foolproof, "install anywhere" antenna that will get you contacts.

HOMING IN

Radio Direction Finding

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ARDF is off and running

International style foxhunting (also called foxtailing, radio-orienting and ARDF) continues to make inroads in the US. As I reported last month, the American Radio Relay League (ARRL) formally recognized the increasing interest in this combination of radio direction finding (RDF) and athletics at its January meeting of the Board of Directors. In a white paper delivered at the meeting, the League's Executive Secretary Dave Sumner K1ZZ wrote: "It is difficult to predict with any degree of confidence whether ARDF will become popular in the United States, but I believe it is fair to say that for the first time, there is enough volunteer enthusiasm to give it a fair test."

ARRL's actions were welcome news to Americans and Canadians in the North American ARDF Organizing Task Force that was formed last fall. They are laying the groundwork for formal national and international competitions in this hemisphere and seeking grassroots support from hams and their clubs. That support is emerging, as my E-mail and postal mail attests.

Champions among us?

Because it is both a mental and physical challenge, ARDF

appeals to both "techies" and "jocks" of all ages. It takes skill to get proper bearings, plot them, set a course and navigate through the woods. It takes physical conditioning to do it faster than your fellow competitors. Perhaps you or a fellow club member have what it takes to become an ARDF champion. Your children and grandchildren might, too. Remember, a ham license is not required to receive and track fox signals.

You don't have to be a combination of rocket scientist and marathoner to have foxtailing fun. There is a lot of trotting, walking and pausing on the course, plus a lot of head-scratching when the bearings don't appear to make sense. There is also immense satisfaction for everyone who completes the course, no matter how long it takes.

Since the first one in 1980, World ARDF Championships have normally been held in even-numbered years. In the odd-numbered years between, championships take place at the IARU Regional level. Region 1, which includes Europe, Africa and former Soviet Union states, is by far the most active. The national amateur radio societies of 29 European countries have active ARDF Coordinators. Krzysztof Slomczynski SP5HS

of Poland heads the region's ARDF Working Group, the multi-nation committee that governs the sport. Region 3, encompassing the remainder of Asia and Oceania, has five countries that participate under the leadership of Chen Ping BAIHAM of China.

The odd/even sequence was broken in 1996 so that Australia could host the Region 3 championships. Region 1 championships were held in Bulgaria that year. World Championships were delayed until September 1997 at St. Englemer, Germany.

The sequence returns to normal this year with World Championships in Hungary from September 1 to 6. Hosted by the *Varosi Radioklub*, the events will be in Nyiregyhaza, 210 kilometers east of Budapest. Registration deadlines for international teams will have passed by the time you read this, but the hosts may still be able to accommodate visitors from the western hemisphere in the "friendship" category. If you are interested in traveling to the 1998 World Championships at your own expense, contact me immediately so that official inquiries can be made to the sponsoring organization. The next World Championships are tentatively planned for Australia in the month of April 2000.

There is a good chance that 1999 will be the first year in which there are IARU ARDF Championship meets in all three Regions. Croatia plans to host Region 1 radio-athletes in September, South Korea wants to host Region 3, and some industrious hams in Portland, Oregon, are working hard to earn the right to host the first Region 2 (North and South America) ARDF Championships. That event would be combined with the sixth biennial Friendship Radiosport Games (FRG), in which hams from the US, Canada, Japan and Asiatic Russia meet for friendly competitions in QSOing, CW skills, and foxtailing.

There is much to accomplish before FRG-99 can become the



Photo A. Carrying his control card, this runner nears the finish of an advanced orienteering course through muddy terrain, as his clothing shows. Note the "gaiters" that protect his lower legs as he crashes through the brush.

first Region 2 ARDF Championships. Unlike the others, our region has no formal mechanisms in place to promote and govern foxhunting events. Right now there is no regionwide ARDF Working Group, no committees, and no funding. But IARU's leadership is cautiously optimistic about the prospects. Region 2 President Thomas Atkins VE3CDM writes: "We believe that 'the store is in good hands' and wish you every success in the further development of ARDF activity. I look forward to further development not only in North America, but throughout this hemisphere."

Regional ARDF Working Groups are made up of ARDF Coordinators appointed by national societies such as the ARRL and Radio Amateurs of Canada. Two Region 2 countries, the US and Canada, now have ARDF Coordinators. The subject of official support for ARDF development and events is likely to be a topic of the

Ten-Tec QRP rig is on 30 meters. See Fig. 1.

1. Homemade felt washer behind main tuning knob to steady and smooth out feel.

2. Some rigid screen or mesh between speaker and cabinet—a must to protect the speaker.

3. Tom does not say if you need a tuner with this antenna or not, but you sure *can* install it anywhere!

So, until next month, have a good time at Field Day, and send in some photos of your efforts! 73

IARU Region 2 Conference in Venezuela at the end of September. You can help by promoting the sport in your area, holding events, and sending your ARDF news to me so I can pass it "up the chain."

Even if it does not become a Regional IARU Championship event, FRG-99 in Oregon is sure to be a time of fun, camaraderie and international goodwill, especially for on-foot foxhunting enthusiasts. Mark next year's calendar for August 7-15 and watch for more announcements about this important event.

Rules, rules, rules

Another issue facing the ARDF Organizing Task Force is how to adapt international ARDF rules to the prevailing practices of hams in the Americas. Formal "Rules for Championships in ARDF" documents have been written and amended by the ARDF Working Groups of Regions 1 and 3. They are nearly identical, prescribing the number of foxes, power, timing and slow-CW messages. Administrative matters such as competitor categories, referees and international juries are covered in detail.

All of the above-mentioned rules are suitable for ARDF in the New World, but others are more controversial. For instance, all two-meter foxes in other IARU regions use amplitude modulation (AM) and horizontally polarized (HP) antennas. Hams here are used to frequency modulation (FM) for VHF voice transmissions. Vertical polarization (VP) is almost universal for two-meter FM in the US, to facilitate mobile operation.

ARDF fox antennas should be non-directional in azimuth, but that does not mean that they have to be vertical dipoles or whips. Omnidirectional HP antennas exist; FM broadcast stations have been using them for decades. VHF CW/SSB DX fans use turnstile or halo antennas on their mobiles to achieve HP. Similarly, Europeans and Asians have settled on turnstiles

for two-meter foxes. According to Rik Strobbe ON7YD, ARDF Coordinator for Belgium, "Tests were done on terrain with many reflections, steep hills, and varying weather. Horizontal polarization proved to be the best. With HP, the attenuation in forested terrain seems to be less, which means you need less transmitter power." Some veteran foxhunters claim that multipath from trees is less of a problem with HP.

Two-meter foxhunters using yagis, quads, and phased arrays such as the HB9CV will have no trouble twisting their antenna booms to determine which polarization is being used; they can get bearings either way. But not users of time-difference-of-arrival (TDOA) sets, which are more popular in this hemisphere than elsewhere. These dual-dipole or dual-whip add-ons impose an audio tone to the fox

"FRG-99 in Oregon is sure to be a time of fun, camaraderie and international goodwill, especially for on-foot foxhunting enthusiasts ..."

signal. Direction is determined by the nulls of that tone. Ambiguity is eliminated by signal processing and left-right indicators. TDOA sets usually do not work well on HP signals, even if the antenna set is held horizontally. That's a strong argument for using VP foxes here, especially for events where some users will have TDOA sets.

It is not difficult to build two-meter foxes with FM transmitters, as shown in "Homing In" for March 1998. VHF-AM transmitters are more difficult to find and somewhat more complex to build from scratch. The special ARDF receiver/antenna sets favored by Europeans and Asians can usually tune in FM signals by "slope detection," at least well enough to get bearings and to determine which fox is transmitting.

On the other hand, FM receivers, including popular handie-talkies, do not properly demodulate AM signals. AM foxes sound like dead carriers to people hearing them on FM receivers. Many new ARDFers will start by using their FM handie-talkies with TDOA add-ons, or else with active attenuators (see "Homing In" for May 1998) and beams or quads. That is why the Task Force presently favors FM for two-meter foxes here in IARU Region 2.

One possible solution to the AM/FM dilemma is to use both modulation types on fox signals. ON7YD writes: "In the early years of ARDF here in Belgium, a lot of people started with FM-handies and external attenuators. Those who were really interested in ARDF soon switched to special AM ARDF receivers. At that time, we found out that the best ARDF transmissions for this

population of AM and FM receivers were combinations of FM and AM. The FM discriminators in the handies still did their job well, while there was a major improvement for those with AM receivers."

In experiments with my own FM fox boxes, I discovered that adding a small amount of AM could be easily done by modulating the LM317 IC that regulates supply voltage to the driver stages. I simply connected a 0.33 μ F capacitor from the deviation potentiometer to the ADJ terminal on the LM317. Voilà! About 20% AM was now on the signal in addition to the FM.

Modulation levels of two-meter foxes should be kept low, whether AM, FM or a mixture. High levels cause unwanted receiver S-meter fluctuations and degrade the performance of

TDOA add-ons. You may find that 20 to 50% AM and 3 to 4 kHz FM deviation is plenty.

In the coming months, the ARDF Task Force will wrestle with the issue of rules for Region 2. Should we break with IARU tradition to speed the development of the sport here? You can help by testing and observing in your own local hunts. Try both HP and VP. Experiment with levels and combinations of AM and FM on fox signals. Then pass along your experiences and recommendations to me.

An orienteering connection

Hams in the US have done mobile T-hunting for over 50 years, so there are plenty of veterans around to give advice and act as Elmers. But when it comes to international-style foxhunting, almost everyone in the US is a beginner. We all have a lot to learn, especially about navigating through the woods with a map and compass. But there may be some experts in your home town—orienteers—who can show you the ropes. Orienteering is a forest sport similar to foxhunting, but without RDF. Orienteers receive a marked map and must navigate to control flags with their map-and-compass skills. There is a good chance that an orienteering group is holding regular practices near you.

In my area, the Los Angeles Orienteering Club (LAOC) sponsors an event almost every month. I attended one in a 500-acre park on a cloudy Sunday (**Photo A**). Five courses had been set up ranging from 1.9 kilometers total (the "white" course) to 5.2 km (the "red" course). There was no mass start; the 60 participants were individually timed and scored. Anyone could try out the sport by paying a small fee of \$5, reduced to \$4 for members of LAOC.

After signing a hold-harmless release, choosing a course, picking up a map and filling out a punch card, participants



Photo B. An official at the finish line checks control cards and computes the elapsed time of each participant in this orienteering event.

logged their starting times with the official starter, copied the orienteering instructions for their chosen course onto their map, and headed out. Time limit was three hours or the scheduled end of the event, whichever came first.

Upon returning, an official checked the participants' control cards for the number of correct punches and determined their course times (**Photo B**). He tore off the stub of each control card and folded it over the appropriate string on the results trellis. This clever device (**Photo C**) makes it easy to keep track of standings continuously, without a computer. There is one string for each of the courses. Stubs

are placed on the string in order of number of controls found and elapsed time. The strings can be rolled up at the end of the event and taken away for later entry into a computer or transcription into a report.

Does this give you some ideas for putting on ARDF practice sessions in your local parks? Another feature of this LAOC event was a small "String-O" course for little children, to give them an idea of the basics of orienteering. Similarly, we should put out a couple of very easy micropower transmitters on a separate frequency for demonstrating RDF equipment to newcomers before they try going out on a course by themselves.

While simple in-the-park events such as this are the most common form of orienteering, there are many interesting variations, just as there are many kinds of transmitter hunts. For example, Ski-O is just what the name implies—orienteering in snow country on skis. This sport is popular enough to have national and world championships of its own. Hams in Australia have been doing a foxhunting version of this event, called SnowDF, since 1995. They gather at Mt. Buller for a full day of skiing and trying to find two-meter fox transmitters on snowy hillsides.

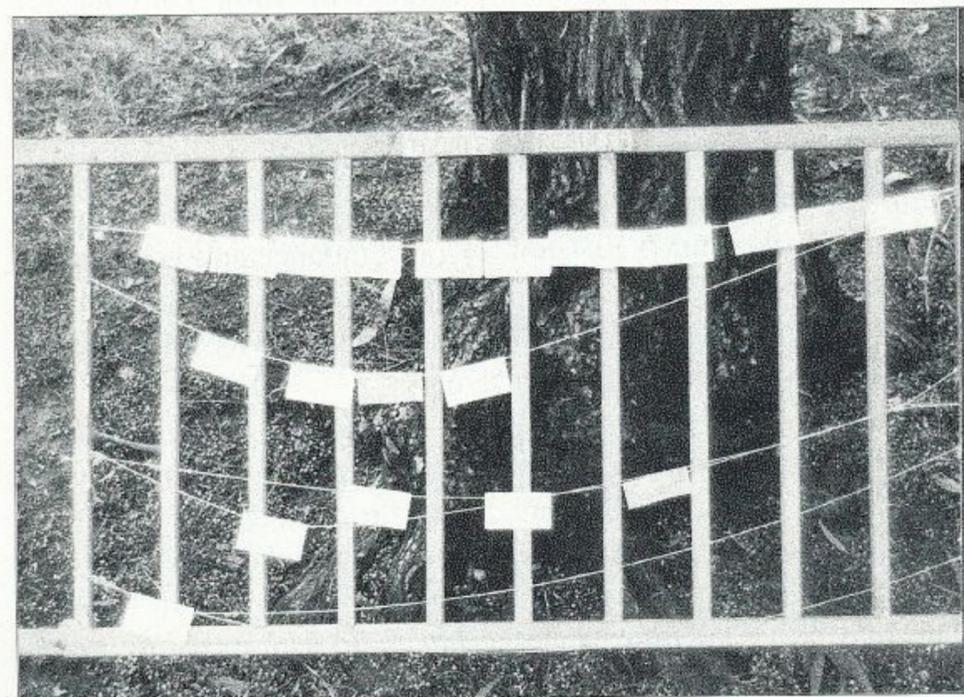


Photo C. Even with random start times, no computer is needed to figure out the winners and display the results. There is a separate string for each course with card stubs organized in order of scores.

Perhaps the most demanding orienteering events are called Rogaines. Named after three Australians (Rod, Gail and Neil), this sport is designed to test stamina and endurance as well as orienteering skills. Teams of at least two orienteers set out from a base camp to see how many controls they can find within a predetermined time limit, working together. Although there are short-term Rogaines of only three hours, serious Rogainers prefer events of 24 hours or more to test their night navigation skills.

A typical Rogaine course covers 75 square miles and contains several dozen controls. The route to all of them may be 40 to 70 miles total. Competitors must carry the food, water, clothing and medical supplies they need on the course, but they are permitted to return to base camp as often as they wish to munch and restock. Rogaining sites include mountains, deserts and other wilderness areas. Team members must work together, staying within voice or sight range at all times on the course.

Imagine an event like this with dozens of hidden transmitters instead of control flags! Obviously more than one frequency would be needed and

many of the foxes would have to run more than a couple of watts. Now that southern California mobile T-hunters are accustomed to weekend-long hunts with up to a dozen transmitters in as many as four states, the idea of a Radio-Rogaine doesn't seem farfetched. Who will be the first to organize one?

You will find much more information on ARDF development at the "Homing In" site on the World Wide Web, including an introduction to the basics of the sport and ideas for simple inexpensive ARDF equipment. There are announcements and results of championship events, plus news of the Friendship Amateur Radio Society and the Friendship Radiosport Games. Among the 117 RDF-related Web links at the "Homing In" site are 18 links to other sites around the world devoted to radio-orienteering.

Your ARDF news and ideas are welcome. Canadian foxhunters should get to know your ARDF Coordinator Perry Creighton VE7WWP, E-mail [fars@bc.sympatico.ca]. I want to hear from readers everywhere via E-mail or postal mail to the addresses at the beginning of this column. 73

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LETTERS

continued from page 7

however, in reality, there are few, if any, modern two-meter receivers having a noise figure high enough to create the need for external preamplification once connected to an antenna. In a shielded system (no antenna), a 0 dB NF will create a 2 dB S+N/N improvement over the "typical" 2 dB NF receiver, certainly. Once an antenna is connected, however, this is not the case. "Atmospheric" noise (e.g., solar noise, mostly) is sufficient to override internally generated noise almost anywhere on this planet providing the receiver's NF is 2 dB or less and the antenna is normally exposed and illuminated. (In the case of unusual antenna systems, such as a very narrow beamwidth dish antenna pointed away from noise sources, this figure is reduced.) I have, indeed, used SINAD meters (owning two of them helps) to prove beyond reasonable doubt this is the case. Using "ordinary" (typical amateur) two-meter antennas, including omnidirectionals and stacked beams having >15 degree E/H beamwidth, I have never been able to achieve a SINAD improvement using my 0.5 dB NF GaAsFET preamplifier (15 dB nominal gain) ahead of my 2.0 dB NF receiver. If you have, I'd like to hear more about it!

#7—I don't think my explanation is in error. 1538 VA at 230 V is 6.687 amperes, assuming a P/F of 1.0. 1538 VA at 115 V is 13.374 amperes, assuming the same power factor. The current on the 230 V line is exactly one-half of what it would be on the 115 V line delivering equivalent AC power.

Charles Moizeau W2SH. Your December 1997 issue contains two articles, "Distributed Capacity Folded Loop" and "How to Silverplate RF Tank Circuits," both of which imply that silverplating applied to copper will improve the RF conductivity

of the components receiving this treatment. In support of this opinion, each article shows a table of the relative resistivity of several metals, among them copper and silver. From the tables one might infer that because *pure* silver shows only 94% of the resistivity of *pure* copper, plating *ordinary* copper with commercially available silverplating solutions will improve the RF conductivity of the plated component by 6%.

This is quite untrue, as revealed by A.M. Fowler in an article, "Radio Frequency Performance of Electroplated Finishes," published in the May 1970 edition of *Proceedings of the Institute of Radio and Electronic Engineers, Australia*. A century ago, the smelting of copper had not reached the standards generally attained today. With a greater impurity content, it was at that time possible to improve copper's conductivity by plating it with silver. Moreover, a century ago the silverplating techniques in use achieved a coating whose properties were closer to pure silver than is the case with the plating products marketed today. Fowler maintains that the highest conductivity obtainable (in 1970) from silverplating could only reach 88% of pure silver's conductivity, and the least effective plating resulted in a conductivity of only 0.1% of pure silver!

For years, millions of dollars have been wasted, with silverplating of RF components still firmly enshrined in US military procurement specifications. However, it is false to assume that the modest conductivity advantage of laboratory grade silver over laboratory grade copper will also occur in the real world when applying the former as a plating to the latter.

Your readers would achieve better RF performance and savings in cost and effort if they avoided the silverplating exercise. Indeed, there is anecdotal evidence showing deteriorated RF performance to

be the result of silverplating of copper components.

Cory Hamasaki AH6GI/4. Hi, Wayne, I saw your editorial about the IRS's Y2K problems in the February issue of 73. I've been tracking and working on Y2K issues since 1979 and the IRS is only a tiny portion of the problem. There is a larger problem with embedded computers, banking, financial, stock exchange, insurance, manufacturing, and other non-government systems. I am a programmer with 29 years of hands-on experience on large mainframe systems and an MS in computer science. My opinion is that widespread Y2K failures are very likely, almost a certainty. I suspect that Y2K failures will cause disruptions in power, communications, transportation, the distribution of goods, etc.

I work with corporations to help them correct their software for the year 2000. Last month, a rep from a very large financial organization asked me about the possibility of using ham radio gear to communicate with their branch offices, if and when Y2K computer problems take down the telephone, cell phone, fiber optic, and Internet infrastructure. I also learned that same day that another very large financial organization has plans to stockpile diesel fuel to run their generators. Both of these organizations are household names, conservative, responsible members of the financial community but they are talking and acting like survivalist-nut cases.

I don't know that Y2K will take down the phones and power grid, that is not my area of expertise. Some experts in power distribution and computers are predicting grid failures and local outages for up to a month. This may be a good time to start amateur radio civil emergency exercises. I used to be active with the local group. We were preparing for small emergencies and did some real emergency

work when the Air Florida flight hit the 14th Street bridge.

Y2K may be different. If the outages last as long as some predict, emergency generators, spare rigs, stockpiled fuel will be important. So will the ability to organize and handle large volumes of emergency traffic on a national level.

John Hicks ex-W2CIP/W3CCJ/W9GEH. After reading *NASA Mooned America* and *Moon Shot* (which was sent to me by a NASA big shot), I am persuaded that René is right. That brings up a greater question: Can one believe that an agency of our federal government could possibly be capable of such a colossal deception? My answer to that, sadly, is yes.

Sir, we genuine Americans trust every word our President, his Cabinet (including the Vice President), and our Congress tells us. We also totally trust the IRS, the FBI, BATF, DEA, NSA, CIA, DIA, and the FDA. However, for anyone interested in reading René's well-researched subversive document, it's \$28 from Radio Bookshop ... Wayne.

Steve Kimber W7WEW. My wife and I can hardly wait for our 73 *Amateur Radio Today* to arrive each month. We're folks who took your advice years ago and stopped smoking; we eat only good healthy foods (veggies), drink spring water, take vitamins and walk daily. We really want to thank you for your guidance and hope everyone out there will get serious about your advice and counseling.

Fat chance! Steve sent along a short non-ham article on an easy-to-make gadget which allows any fisherman to cast a minnow wa-a-ay out there. It has to do with a casting weight that drops off when the minnow gets to the bottom. Any fishermen interested can send an SASE for a copy of his clever idea ... Wayne.

Shuch. He has just returned from a two-week lecture tour of Australia and New Zealand, as part of his three-year-old effort to inform and involve radio amateurs around the world.

SETI scientists seek to determine through microwave measurements whether humankind is alone in the universe. Since Congress terminated NASA's SETI funding in 1993, The SETI League and other scientific groups have been attempting to privatize the research. Experimenters interested in participating in the search for intelligent alien life, or citizens wishing to help support it, should visit us on the Web at [http://www.setileague.org/], E-mail to [join@setileague.org], send a FAX to (201) 641-1771, or contact The SETI League, Inc. membership hotline at (800) TAU-SETI. Be sure to provide us with a postal address to which we will mail further information. The SETI League, Inc. is a membership-supported, nonprofit [501(c)(3)], educational and scientific corporation dedicated to the electromagnetic Search for Extra-Terrestrial Intelligence.

From a press release from The SETI League, Inc.

Reach for the Sky!

Hams in Mason County, Washington, won't be encumbered by a telecommunications ordinance that would have restricted the height of ham radio towers to 70 feet and imposed other regulations. Andrew Forsberg WV7M, of Grapeview, reports that several hams in the largely rural western Washington county (population approximately 30,000) cited federal preemption over local regulation of amateur radio activities as well as the hobby's public service dimension to get the County Board of Commissioners to exclude ham radio from the new law last month.

Forsberg says that, as originally drafted, not only would tower heights have been limited to 70 feet, but building-mounted towers could not have been more than 20 feet tall. It also would have held the height of vertical antennas (called "whips" in the proposed regulations) to 15 feet. In addition, the proposed law would have required landscaping to hide a tower and lot setbacks equal to a tower's height—something often impossible on a small residential lot.

Forsberg said that, at first, the drafters of the new ordinance "seemed to be unmoved by amateur radio considerations." In addition to federal preemption, the county hams pointed out the connection between a good antenna system and ham radio's public service contributions—in an area subject to floods, earthquakes, power outages during winter storms, and even volcanic activity. Commissioners "began to soften their position," Forsberg said.

"By the time the vote was taken, the commissioners were well-informed of our position and were commending amateur radio for its outstanding contributions to the community," he added.

From the *ARRL Letter*, Vol. 17, No. 6, by way of *PARKing Ticket*, newsletter of the Plano (TX) Amateur Radio Club, March 1998.

10 Sure Ways to Destroy Your Club

1. Stay away from meetings. Show up at meetings only if you have problems or complaints.
2. Decline office or appointment to any committee. Then get angry if you are not nominated.
3. Insist on describing the club in negative terms only.
4. Never prepare an agenda, never plan the details of an event, and never coordinate with affiliates.
5. Don't do any club work if you can avoid it. Then, when the old reliables pitch in and get the job done, accuse them of being a clique.
6. If you do come to a meeting, don't speak until the meeting is finished. Then criticize and say how things should have been handled.
7. Oppose all new programs as being a waste of the membership's money.
8. When nothing new happens, complain that the officers lack imagination.
9. Read your bulletins infrequently. Then complain that you don't know what's going on.
10. Never introduce yourself to new members or visitors—make them come to you.

By John E. Matheson, *Board Briefs*. We borrowed it from December 1997's *Modulator*, newsletter of the Fort Myers (FL) ARC, Earl Spencer K4FQU, editor.

Russian Device Could Make Bombs Impotent, *Jane's Defence Weekly* Reports

Washington DC, March 19, 1998. Russian scientists have developed a compact high-current electron accelerator that could potentially stop car engines and destroy the electronics arming and firing circuits of bombs, *Jane's Defence Weekly* reports in its March 18 issue.

The device, called RADAN, is smaller than an attache case, weighs about eight kilograms, has a directional antenna and a 12-volt rechargeable battery, Dr. Ira Merritt, of the advanced technology directorate at the US Army Missile Defense and Space Technology Center, told the Congressional Joint Economic Committee recently.

Merritt said the device can stimulate the output of lasers, x-rays, wideband radio frequency and high-power microwaves. RADAN has a pulsewidth of two nanoseconds and an output pulse bandwidth from 1 MHz to 5 GHz.

JDW reports that US Army scientists have long been monitoring Russian, French and Swedish programs in this area to more fully understand the vulnerability of US battlefield electronics and computer systems to RF weapons.

"There is an increasing variety of equipment capable of generating very short RF pulses that are capable of disrupting sophisticated electronics," Merritt said.

These types of pulses, which may last a nanosecond, are not considered in many current electronics design standards and will require new forms of RF and electromagnetic interference protection.

Jane's Information Group, which publishes *Jane's Defence Weekly*, was described by the CBS program *60 Minutes* as "the closest thing there is to a commercial intelligence agency." Jane's is the leading provider of defense, aerospace, aviation, transportation, geopolitical, and police and security information to the world's militaries, governments, universities and businesses.

From a press release by Jane's Information Group.

Paraguay Orders Radio Station Off the Air

The government of Paraguay has ordered a radio station off the air for airing a phony news program that simulated a coup in progress in the country.

Radio Uno, in the capital city of Asunción, was ordered closed by the state's National Commission of Telecommunications, under a law which establishes that broadcasting must be based on the transmission of objective news from responsible sources. The program faking a coup came just two days after rumors of a real coup circulated throughout the Paraguayan capital.

From shortwave reports, via Bill Pasternak WA6ITF at *Newsline*. 73

The Fun Radio

continued from page 20

speaker or stereo headphones to an adequate audio level. As an option, of course, the Fun Radio could be connected to the phono input of a hi-fi audio amplifier system.

Conclusion

In years past, a longwire and ground provided the necessary signal input for the radio. With the options available today, most anything will work, but a longwire should be used for the fun of it. Also, be sure to use a good earth ground.

Build the Fun Radio and enjoy a step into the past with the fun of today. Put on the headphones—twist the regeneration and tuning dials and listen to the squeals and sounds of yesteryear! 73

NEVER SAY DIE

continued from page 39

anger started with portable phones, but it reached the level where the cellular companies had to funnel big bucks through their Washington lobbyists to Congress, thus forcing our legislators to put increasing pressure on the FCC which, Congress reminded them, *they* were funding. The Commissioners got the message and changed the rules accordingly.

To those who are well aware that it's money that's running our country, and that it isn't *our* money, which Congress uses with abandon, it's the millions that

go into what is called (nudge-nudge) the Congressional re-election campaigns.

Britain has long had restrictions on radio listening. Indeed, they charge a tax for receivers. This is what pays for those stuffy BBC services.

Yaesu is fighting back, and though their arguments are reasonable, when big money is concerned I can't recall the last time reason prevailed. Yaesu pointed out that the modification required is not simple; that the prohibition of the public listening to the radio spectrum infringes on the First Amendment of the Constitution; that the unit in question has been authorized by the FCC for sale; that the cellular frequencies are those of the old TV channels 70-83 and that older TV

sets can easily tune in on cellular calls; that cellular phones have the ability to scan and are much more easily modified for that purpose; that if phone users want privacy they should go somewhere private or use voice scrambling.

Speaking of phone privacy, many phone company employees have confided to me that the phone company has always listened in on calls as a regular practice, so that the whole idea of telephone privacy is a façade.

As I say, if reason prevails I am going to be very surprised. When reason and politics (a/k/a money) conflict, reason seems to be the loser every time.

The FCC Auction Debacle

The FCC spectrum auctions looked like a great way for Congress to get something for almost nothing. Now the Hundt balloon is bursting. Ex-FCC Chairman Hundt originated the auctions, which seemed like a wonderful idea — a way to provide Congress with more money to spend on their favorite pork projects.

In 1966 there was a bidding frenzy as start-up companies pledged \$10.2 billion for channels. So far the FCC has collected less than 10% of that and there seems little prospect for the US Treasury to ever see most of it.

The auction held last April sold off spectrum at bargain basement prices. It was put on with such short notice, under pressure from Congress, that few bidders showed up. The Congressional Budget Office projected almost \$3 billion in sales, but after 29 rounds (!) they raised only \$13.6 million. Some bidders got spectrum licenses for as little as \$1. Hundt resigned a year early "to spend more time with his family." Sure. And three other Commissioners left when their terms expired instead of staying on, which most usually do.

So far companies have bid about \$23 billion for licenses, but only about half of that has been collected.

More auctions are coming, with virtually all of the spectrum except that allocated for public safety and TV subject to auction.

The FCC made it easy for the bidders, offering financing for 90% of the bid and requiring successful bidders to put down only 5% of their bid. This put the FCC into the banking business, for which it had no experience and was not at all well suited.

The FCC really should have weeded out small companies instead of courting them. Wireless communications isn't for small businesses. It requires a huge infrastructure of long-term investments and the muscle to deal with other carriers.

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CIRCLE 188 ON READER SERVICE CARD

What does all this mean for amateur radio and our chunks of the spectrum? That would seem to depend mostly on how loud a voice we have in Washington, and that hinges on how many licenses we have, and how interested they are in what's going on. We're out there on a very weak limb.

Sorry, I'm probably boring you.

Fat

In the 1960s 17% of middle-aged Americans met the clinical definition of obesity. Today that figure is 32.2%. Worse, recent surveys show that 75% of Americans are at least 20 pounds overweight. At Dayton I see what seems to be thousands of grossly fat hams, with huge fat constipated guts hanging over their belts. The number of people with Class Three Obesity — who are too fat to fit into an airline seat — has risen 350% in the last 30 years. But it isn't just grown-ups who are fat, the percentage of preschool girls who are overweight has gone from 5.8% to over 10% in the last 20 years. And all this despite our spending \$50 billion a year on diet clubs and special lo-cal and lite foods.

Despite the millions spent on special diet books, none of these diets works in the long run. None. And that goes for *The Zone*, Puhn's five-day Miracle Diet, Dr. Atkins' *New Diet Revolution*, and so on through the best-selling diet books of the last 30 years.

Okay, wise guy, if all that stuff millions of people have read and believed is baloney, then what, if anything, *does* work? You're not going to like the answer. I, personally, hate the answer. I love a slab of roast beef with lots of delicious fat. I love ice cream, the fatter the better (thanks, Häagen-Dazs — one cup of their ice cream has as much artery-clogging fat as three McDonald's Quarter Pounders™). And Lindt chocolate — yummm.

Why are babies getting fat? Surprise, it's what we're feeding 'em. The same reason you are fat and getting ever fatter. The same reason your family is fat. It's the diet you're in the habit of eating.

Fat not only significantly shortens your potential life span, it also makes what years you live more miserable. First, no one likes to look at fat people. Fat is ugly. It's a sign of a weak will. It's a clear sign that a person is self-destructive. Like smoking or drinking (including beer). Fat greatly heightens the risk of heart disease, diabetes, cancer, arthritis, gallbladder disease, gout, blindness, birth defects, and a host of aches and pains.

I got fed up (pardon) with being fat 25 years ago and went on a 1500-calorie diet for about eight months and took off

85 pounds. And, by golly, I've kept it off. But I did that by changing my diet. Today I eat mostly raw fruit and vegetables and I don't really miss ice cream or frozen yogurt. Not even fantastic Breyer's vanilla with a heaping portion of crushed pineapple on it (sob!).

Well, I understand why drug addicts have such a difficult time. Fattening food *is* addictive. If you get your kids started on it, they're going to be fat and probably unable to ever change their eating habits. I was lucky. My mother fed me real food. It wasn't until I stayed one summer with my grandparents, where my grandmother baked lots of cookies, pies and cakes, that I got fat.

How about you, can you eliminate sugar and white flour products from your diet? Can you eat mainly raw fruit and vegetables? I love 'em now.

The body you inherited was developed over millions of years to work best when it got regular exercise. Half as many Americans walk to work today as did 20 years ago. Me? I'm out there jogging a couple miles almost every day.

If you eat right and exercise, you'll lose your fat and your body will last longer and give you less pain. So forget all those magazine articles and books

about diets and change your lifestyle. Sure, it takes motivation to make the change. Well, you've got that. But it also takes determination and perseverance. How are you doing in those departments? I was afraid of that. So, are you going to continue on slowly killing yourself and your family? Please advise.

Continued

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Quarantined?

The announcement by Mr. Wisnosky of NASA that all plans for the exploration of space beyond near-Earth orbits had been canceled was viewed by some conspiracy theorists as proof that the extraterrestrials are calling the shots and that Earth has been "quarantined." My own conspiracy theory is that this is an admission of the inevitable — that the NASA top brass and a few other government officials know full well that man can't live for long after going through or outside of the Van Allen belt. The radiation from the Sun is just too strong for human survival without ridiculously thick shielding. Like six feet of lead.

The furor over the NASA announcement resulted in a good deal of waffling and back pedaling by NASA Chairman Dan Golden, but I doubt this is going to change NASA's long range plans.

I've enjoyed the conspiratorists on the Art Bell show who believe that our government already has well-established bases on the Moon, and perhaps even on Mars. Yawn. There's Richard Hoagland, who is convinced that there are domed glass cities on the Moon. On the back side, of course.

I've been thinking more about the Moon. Any ham who's gotten interested in meteor scatter contacts knows that there are sizable meteors hitting our atmosphere day and night. There are enough of 'em so the ionized trails they leave in the upper atmosphere are consistent enough to provide fairly dependable reflectors for communications. I recall reading that the Earth is hit by several thousands of small meteors every day, but that almost all burn up in the upper atmosphere, with only the large ones ever making it to the ground, or even to our orbiting satellites. That's an awful lot of meteors.

Well, is there any reason to believe that the Moon isn't being hit by just as many meteors per acre as Earth? And since there's no atmosphere

on the Moon, these meteors would be raining down at thousands of miles an hour, peppering the Moon's surface. So how did our astronauts survive this while they were visiting the Moon?

The LEM walls were made of a thick layer of foam plastic with an inside and outside layer of 0.001 aluminum foil, so any stray meteors hitting it should have gone right through it like a bullet through toilet paper. And those space suits shouldn't have provided much more protection.

I wonder if our orbiting astronauts have been having any problems with meteors, micro or macro? Or with the tons of cometary water that scientists claim are being dumped from space on Earth every day?

Art mentioned another interesting fact. He talked with astronaut Mitchell who, when asked how it felt walking on the Moon, said that he had no recollection of it, that the whole episode had somehow blacked out for him. Well, I'd wondered why all of the Apollo astronauts have been so silent about their time on the Moon.

The high points of my life are still with me, indelibly. Like operating from Navassa (both times), from Nairobi, Kabul, Damascus, Katmandu, Kuching, Kota Kinabalu, King Hussein's palace in Jordan, the American embassy in Tehran, and working my home station from Australia on both 20m and 75m one night. Visiting the pyramids in Egypt, the junction of the Blue and White Niles at Omdurman in the Sudan, the incredible sound of Murchison Falls in Uganda, climbing the Great Wall, the terra cotta soldiers of Xian, the Taj Mahal, piloting a C5 simulator and making good landings under extreme conditions, piloting a nuclear attack submarine under the Pacific Ocean, ballooning over the South African veldt, the first time I sang solo before an audience of 5,000, working New York State from Mt. Monadnock (NH) on 10 GHz in a heavy fog — these are still as fresh in my memory as when they happened. I don't

see how anyone can forget the more exciting times of their lives.

Well, it's easy to remember the details of things that have actually happened, but when one has to lie, one has to worry about getting tripped up later.

Oh yes, one more item. It seems that the space station project has also been quietly canceled. Is this part of the alien quarantine program, or a recognition that the basic purpose of the space station had to do with the cold war and thus is no longer needed by the military? I viewed it as just another government scientist welfare project.

Congressional Hocus

And pocus, too.

This fascinating tale of our Congress at work started when a pilot tried to renew his license. The FAA demanded that since he had a rural address that he provide them with a map showing the location of his home. The pilot, being a troublemaker, asked to see the law requiring a map. Well, he found, after being shunted from one department to another for several days, that they'd *had* such a rule, but it expired in 1990. They then cited Public Law 100-690. So our hero asked for a copy of that. Sorry, said the FAA, we don't have a copy.

The pilot was able, after a lot of leg work, to find a summary of the 1988 law. But the law itself, he found, was just not available. It seems that Congress printed only three copies of the law. Three, that's right. One went to the president, and left with him when he checked out. No one knows where to find that copy. It's somewhere in a warehouse. The second copy went to the Senate. Nobody could find it. The third went to the House, which sent it to the Library of Congress. It's there, but they don't loan it out. No, there is no microfilm copy either.

The summary was interesting. The law authorizes the assignment of HHS personnel

to work within organizations and the use of traditional native Hawaiian healers as well as Western-trained medical personnel. It establishes the declared policy of the US Government to create a drug-free America by 1995. It includes provisions to restrict the sale or issuance of bank checks, cashier's checks, traveler's checks or money orders for cash in transactions involving more than \$3,000. It prohibits the distribution of obscene matter by cable or subscription television. It requires an OJJDP study of illegal parental abduction of children. It requires DOT rule-making regarding the trucking industry use of emergency flares and maintenance and inspection of brake systems.

Well, it goes on like that for God knows how many pages.

There was something about the FAA giving special attention to pilots using mail drops or a post office box, but nothing about rural box holders. Our pilot checked Miami pilots' addresses and found 74 pilots all with the same suite number (mail drop). So much for the FAA's following their own rules.

I thought you might be interested in this tiny tip of the federal iceberg. Yes, when our pilot hero forced the FAA to go to court their lawyers listened to a few of the things he'd found and quietly gave him his license to shut him up.

Hug Me

Can I get you to stop poisoning yourself with sugar, coffee, alcohol, nicotine, and dental mercury? Can I get you to exercise every day, reduce your stress, and drink large quantities of distilled water? The results are worth it and you'll be in line to hug me at Peoria in September. You *are* going to come and see me at Peoria, aren't you? The hamfest is September 19-20th and I expect you to make a major effort to be there, armed with questions.

Yes, I'll be playing the same health-wealth tune I lay on you every month. Hello, is anybody home?

Titanic Goof

Yep, I enjoyed the movie. The computer-generated graphics were amazing! But one of the key elements in the disaster which the movie forgot to mention was discussed by Titanic expert Jim Clarey on the Art Bell show. It seems that after the collision with the iceberg, which ripped a hole in the forward part of the hull, the captain put the engines on half power and steamed ahead at 12.5 knots for over 20 minutes. This had the effect of jamming lots more water into the hole, which caused the ship to sink much faster than it might have otherwise. If he hadn't done that many more lives could have been saved. It also made it impossible to launch the lifeboats. What was he thinking? He apparently still believed the ship was unsinkable and was still hoping to set a record time for the crossing.

Prisoners

We're all prisoners — and we don't even know it. We're so used to the prison walls that they look normal to us.

What do I mean by this? Most of us are prisoners of the food eating habits that our folks taught us. We are prisoners of the religion they taught us to believe. We are prisoners of many things that we were taught to believe when we were young and which, by now, are solid mental prison walls.

I wrote a piece some time back pointing out that if you believed in doctors you were a sucker. That if you believe in the value of college you are a sucker. These are beliefs that we are all taught when we are children and which are reinforced by our media, in articles and news reports written by other people who have been similarly inculcated (brainwashed).

What I haven't discussed is the power of these beliefs. If we believe something then it is going to be true for us. If a doctor, a person in whom you believe, tells you that you have an incurable illness, then I guarantee that you really do

have an incurable illness and that "it" is going to kill you. Well, being more honest about it, you are going to kill yourself using this illness.

I started to get an idea of the power of the mind when I read what was possible under hypnosis. Like phenomenal feats of strength. Like eidetic recall of events. Then, as I became accomplished in the use of hypnosis I understood even better the incredible power of the mind, once it is disconnected (unlocked) from the beliefs of the conscious mind.

Imagine a person whose memory, strength, and senses are not being hobbled by their conscious mind and the beliefs controlling (imprisoning) it. Yogis are able to control their body temperature, their heart rate — even to stop their hearts — and almost every other autonomic function of the body. They can anesthetize any part of their body. These things show us the abilities of unlocked minds.

Then take people with multiple personalities. The more you read about them, the more you can appreciate the degree to which the mind is controlling us. Multiple personalities can have different eye colors, different allergies, different illnesses. Even serious illnesses.

There is abundant evidence that most, if not all, of our physical illnesses are triggered by our minds. Yes, nutrition, dehydration, and putting poisons into the body can wreck your immune system, but without the mind triggering an illness, it'll take a lot longer to kill you.

One of the main things I did to help people under hypnosis was to find the times in their past when the destructive beliefs were programmed into their subconscious minds, and then I erased the power of that programming.

I once wrote about Dwight Bulkeley's research, where he discovered that virtually every accident people have can be traced back to a traumatic event about 33 hours earlier. Even accidents which seem completely out of the blue.

And that brings up the weird coincidences which we label as synchronicity. Somehow the power of our minds can make things happen. I've recently referred to three books which explain how you can harness this power and use it for your benefit. One is Scott Adams' *The Dilbert Future*, which is a fantastically funny book — except for the last chapter, which explains how you can use this power of your mind. Bevy Jaegers has a book on the subject, as does Eugene Maurey. See my *Guide*.

How can plants know what we are thinking? How can they identify any one person from a group? How can a dowser locate water or oil, or even a missing person by dowsing a map? How can our cells stay in instant communication with us (and each other), even when separated by thousands of miles?

It would be interesting to research what happens to a blood donor when the donated blood is put into a sick person. Can that sickness be communicated back to the donor in some way via the donor's blood cells mixing with the sick person's blood? Ditto organ transplants.

Changing our diet from what we were brought up to eat is extremely difficult. Getting over the thoroughly inculcated belief that we must go out and get a job instead of starting our own business when we grow up is almost insurmountable. Overcoming childhood beliefs in inferiority is a bitch. If we find that being sick is the solution to our childhood problems we're going to use that response later on.

Even something like a cold or the flu just isn't going to happen to you unless there is some stress that triggers it.

Our medical industry is totally under the control of our pharmaceutical giants, so you know there aren't going to be any research projects funded to find out how to avoid being sick. Unless you get sick, the drug companies, doctors, hospitals, insurance companies, and so on won't make any money. They all have a power-

ful interest in keeping as many people sick as they can. And money doesn't just talk, it plays the tune we all are dancing to.

How sick are we making ourselves? There is abundant evidence that our cells are designed to operate for about 150 years, so we're living only half our possible lives, on the average.

If you can convince yourself that you are very healthy and are going to stay that way, that's the way you'll be. Oh, you do have to give your body a break by supplying it with the food, water, sun and exercise it was designed to use, and to stop poisoning it.

Yes, we are our own worst enemies. The so-called placebo effect can cure us — or kill us.

We complain about the rat race, yet it is our lack of initiative which imprisons us. Like sheep.

A hundred and fifty years of our public school system has trapped us, our parents, and their parents before them. The school system was originally chosen by church leaders of the day because it had been so successful in producing unquestioning soldiers for the Prussian military, a group that made possible the might of Germany.

This was exactly what the industrial revolution needed to produce an endless supply of production workers who would do what they were told without asking questions.

So here we are, the products of 150 years of mind control. And we help by passing along the system to our children from their earliest days as basic programming, when their minds are being formed. It's like Microsoft's operating system, only *our* windows have been opaqued so we can't see through them to see what the world is really like.

So we believe in working for others for a living. We believe in our political system which intrudes into our lives with laws and government bureaus which are doing things "in our best interest." Sure. We believe in our religions, in our

doctors and hospitals, and never mind the facts. We believe in ball games, TV advertising, and the promises of our food conglomerates.

How can you free yourself of several lifetimes of mind control? How can you free yourself of the tyranny of the rat race? When you have your own company you can't be fired, downsized, made redundant, or laid off. If you know what you're doing you'll have plenty of money to do the things you want — to travel anywhere — and even live where you want — if you plan it right.

I started 73 from a tiny office over a grocery store in Brooklyn, New York City. A little over a year later I rented a U-Haul truck and moved to the mountains of New Hampshire, where I now live on a 200-acre farm on a hill overlooking the beautiful Contoocook River valley. We've got deer, wild turkeys, pheasants, coyotes, wolves, foxes, bears, beavers and moose for neighbors. Wild flowers are everywhere, wild raspberries, blackberries, blueberries, and strawberries too.

Oh, I was trapped in the city for 30 years. Fighting rude, angry people, car exhausts, filthy air, jammed subways, ever fearful of being robbed or conned. I feel so sorry for the millions of people who are trapped in our cities — trapped and being brainwashed into accepting the system. Driving in long, slow lines to and from work every day, or packed solid in subway trains. Working at jobs with little future.

Oh, I'm a sucker too. I can't help myself. I tend to believe in people and trust them. Over the years I've brought many people to my area to work for me, often helping them buy homes. I remember the first chap I did this for. That was Jim Fiske W1DTY, whom I brought in from California. I paid the way for him and his family. I gave him the money for the down payment on a beautiful home on a nearby lake. I got my reward when he left to start a competing ham radio

magazine in a nearby town. But before leaving he did his best to get rid of as many of my subscribers as he could by dumping all our computer records, and stopping the sending of renewal notices for almost a year.

Yes, I kinda let all this happen by being distracted with the pain and distress of my first divorce. That really knocked me out for a couple of years, complete with chronic fatigue syndrome, which left me unable to work for more than a few minutes a day.

Almost losing 73 Magazine helped snap me out of my funk. I had to work 18-hour days for a couple of years to salvage it, but soon it was bigger and better than ever and *Ham Radio* blew away.

Did this stop me from bringing people to New Hampshire to work for me and buying them houses? Of course not. And every one of them screwed me in return. Several royally. I just shrug it off with a "big deal." I'm not going to waste my time fretting about stuff like that. Well, yeah, I do grumble.

Say, is there any chance that you can start thinking for yourself?

One more thing — if *any* of the prophets are right about the future you people living in cities are going to be wiped out. And some of these prophets have some amazing records for being right.

Music Lessons

Did you see the report in the papers showing that toddlers who take music lessons develop higher IQs? Yep, the study showed that youngsters who'd had eight months of music lessons, classical or jazz, excelled at intelligence tests involving higher brain functions, doing significantly better than similar children who were not given lessons.

The music apparently stimulates the same brain areas used to form mental images of objects and understand changes in their positions. Well, we know that the more we can get children to use their brains, the more neuron

connections are made in them and the higher their IQs. As I recall, if you pass this critical time by without providing the stimulation for neuron growth, then the opportunity is missed. It's like learning languages. Kids of two and three can learn almost any number of languages and learn to speak them without an accent. When you wait until a few years later it's much, much more difficult to learn a new language. If you had to learn a language in high school you know what I'm talking about.

My thanks to NIGLW for the newspaper clipping on this one. The report comes as no surprise to me.

Wellness

By luck, or perhaps perseverance, I've managed to find a book that's a gem. It's only \$6 and is worth a hundred times that to you. It's *Wellness: Just a State of Mind*, by Eldon Taylor. This 107-page book really does explain the connection between wellness and your attitude. It explains how and why when you expect the worst, that's what you get. And conversely, when you expect the best, you get that. Your sickness, bad luck, and so on are all your own doing.

I've always expected good luck, and I've usually had it. All of my really big disasters have come from my trusting people.

"Purely practical logic teaches us that becoming angry or stressful does not produce happiness or joy. As a matter of fact, anger or stress produces only more anger or stress — to say nothing of the toxins such negatives generate in our bodies and slowly poison us." Confirming that we're our own worst enemies. Or, our own best friends. I think you'll really enjoy the book and it may even help you have a healthier, happier life. Or would you rather keep being angry and stressed, get sick and die. Your choice. R.K. Book, 816 W. Big Bear Blvd., Big Bear City CA 92314. ISBN 1-55978-034-7.

Your mind can not only make you sick or well, it can even change your physical characteristics — like blood sugar or even eye color, and at a snap of the fingers. Some multiple personality people have diabetes in one personality and none in another. Maybe it's time you learned more about your mind and what it can do for or against you.

Magnets

Stas Yascolt N8GRX of Pinconning, Michigan, was kind enough to send me a *New York Times* clipping about a new study showing that magnets are being used successfully to alleviate pain. The rest of you who read the item didn't bother to send me a copy. Tsk.

My life is complicated enough with reading books and magazines, so I've avoided reading newspapers for years. Thus, when you see something I ought to know about in a newspaper, I hope you'll send me a copy. Jeeze, is that too much to ask?

The main problem with using magnets to get rid of pain is that there is no way for the pharmaceutical companies which are running the medical industry, the FDA, NIH, WHO, and so on, to patent magnets and sell them at a high price, the way they can their drugs.

Not that I'm a big fan of pain reduction. The body uses pain as a warning that we're doing something wrong. So we take an aspirin to get rid of the pain instead of stopping whatever is causing the trouble. And that makes for even more trouble later.

Arthritis sufferers are plagued with pain, so they naturally wolf down pain pills instead of changing the diet that's giving them arthritis, which is 100% the result of doing their body years of damage ... mostly with sugar.

But magnets can help get rid of pain, though no one knows how they work. They also can greatly speed the healing of wounds, even on animals. I suspect it has to do

with the magnet increasing the blood flow to the painful area.

Before the recent study showing the success of magnets was released they were considered quackery. Indeed, Professor William Jarvis, a professor of public health and preventive medicine at Loma Linda University and the president of the National Council Against Health Fraud recently published a paper calling magnet therapy quackery.

Doing Your Homework

Do you have a strong opinion on global warming? Would you be willing to spend \$15 to get the facts? Here we are, with Congress getting ready to slap a carbon tax on fossil fuels to help "save the planet" from the greenhouse effect, caused by mankind's careless burning of gas, oil, coal, and forests. Even if your congressman hasn't the time to find out the truth, maybe you can educate yourself about this and make yourself unpopular with ecology fanatics.

Arthur C. Clarke says that *Hot Talk, Cold Science* by Fred Singer shows that the evidence that mankind has influenced the global climate is, at best, sketchy and incomplete. The book is published by The Independent Institute, 100 Swan Way, Oakland CA 94621. Send for their catalog.

Also, if you believe that raising the minimum wage is going to benefit any workers, it's time to do a little more reading. In *Out of Work* you'll find out what damage the minimum wage has done so far, as well as the harm done by welfare, unemployment compensation, and labor controls. For an employer it's one hell of a mess. For the worker, it's worse in the long run. Same publisher, \$19.

Doomsday?

Yep, still another doomsday scenario! It seems as if we're going to be in deep trouble yet another way. It wasn't bad enough with the runaway greenhouse effect going to parboil us, or the com-

ing ice age going to freeze our galuccis, or the poles going to shift to what is now the equator. No, this one is even worse!

By the way, I got an excited call from René the other day. He'd finally been able to confirm through astronomical sightings that our beloved Earth does *not* have a bulge at the equator. This helps confirm the theory that the past ice ages were the result of the Earth's axis shifting, rather than the whole world getting colder.

This is not inconsistent with Noone's theories in his book, *5/5/2000*. It also ties in with the Mayan calendar prophecies.

Anyway, I've read a new book. It's a scary one, too. This is by Dr. David Jacobs of Temple University in Philadelphia: *The Threat*. The subtitle is "The secret agenda: What the aliens really want ... and how they plan to get it." Unfortunately, Jacobs makes a good case. If you're interested in preserving your semi peace of mind, for heaven's sake don't read this book. It's a 287-page Simon & Schuster 1998 hardcover book.

Jacobs has interviewed hundreds of abductees under deep hypnosis, trying to find out what the aliens are really up to. Yes, I know about false memories and all that. I've had a good deal of experience in using hypnosis, so I know how to avoid coloring the memories of a person under hypnosis. So does Jacobs.

What he found was that most abductees were started when they were youngsters, with frequent abductions, all wiped clean from their memories. Later abductions involved collecting sperm and eggs for hybrid breeding purposes. Then fetuses are implanted in the female abductees and allowed to grow for several months before being removed and grown until birth in incubators. The results are hybrids that look like us, but have very docile personalities. No one has a clue as to how many thousands or even hundreds of thousands of these hybrids have been grown.

What Jacobs did find out, through hints from many abductees, was that some sort of major world catastrophe is due, perhaps next year, at which time the ETs will replace us with these hybrids.

How come hybrids? Well, it seems that the aliens (the grays) are not well adapted to our atmosphere, so they needed to create (engineer) a hybrid race that was adapted to our world.

With their technology being thousands of years ahead of us, and with their ability to read and control our minds, the takeover and wiping-out of most of what's left of the human race after the catastrophe shouldn't be difficult.

But doesn't our government know about this? Some parts of it do, but they've been busy shielding us from what's been going on.

If Jacobs' scenario is right, it's already too late for us to get busy and do the research on ESP, telepathy, and so on that it would take for us to develop our minds so they could deal successfully with the aliens' ability in mind control.

You have the choice of doing some research for yourself on this or shrugging your shoulders and mumbling about Wayne Green being crazy. Before you turn away, thinking maybe I'm naïve, do me the favor of checking the data out for yourself.

The other millennial-doom-and-gloom scenarios hold out the hope that some of us will survive, and that come the catastrophe, amateur radio communications could be a major factor in pulling things back together. Dr. Jacobs is silent on what we might be able to do about this, even if everyone could be warned.

Those Darned ETs

After hearing Jim Marrs on the Art Bell talk show I quickly got his book, *The Alien Agenda* (Harper-Collins, ISBN 0-06-018642-9, 434 pages, 1997, \$24). Jim has done a massive amount of research into the ET-UFO

situation. If you are naïve enough to buy the Air Force's debunking of UFOs then you may not want to upset your view of the world with facts. Well, most people seem to prefer *Geraldo* to PBS.

As you read the history of what's been going on you'll understand better why the government has gone to so much trouble to cover up the situation. Yes, there *are* UFOs, and ETs, and they've been around for a long, long time. There are, actually, quite a few different ETs from many solar systems and even galaxies, all keeping track of us.

Jim covers the crop circles, animal mutilations, interviews with abductees, the results of remote viewing, etc., putting things into perspective and speculating on the ETs' goals. I've written about the crop circles a few times. Are you aware that the real ones, and that's almost all of them, can't be duplicated by any known technology that we have? Ditto the cattle mutilations.

How much do you know about remote viewing? Do you know that our military used it to locate Russian submarines and that it is a very reliable system?

I recommend the book.

Kids 'n' Computers

How come computer hackers are mostly teens? How come software companies are out there robbing high schools, paying some 17-year-old kids \$50,000 a year for working three days a week? The Department of Labor reports that 22,000 teens, from 16-19, worked in the computer data processing industry last year. That's more than four times the number three years earlier. What's going on here?

The key, I suspect, is the amount of time and interest teens can devote to computers, not some inherent genius. It takes time, patience, motivation, and an inquisitive mind to deal with computers. Teens who are not wrapped up with cruising, watching ball games, or TV have the time it takes to get good at

programming. Once they're in college, the work load doesn't allow as much time for building computer skills. And then, when they're working and have families, their spare time is so restricted compared to high school students' that they'll never catch up.

This also explains why so many of these computerized teens are nerds. The more gregarious kids are busy dating, cruising in cars, and standing around corners endlessly talking about nothing. Heck, it was the same two generations ago with teenage hams. Nerds, for the most part. If they'd had computers when I was a teen I'd have been right there in the middle of them, hacking away.

Luckily, in a way, I've never grown up, so when the first microcomputer kit was announced I had to be one of the first to get one. That was the Altair 8800, back in 1975. There was no software for it then. Not even a keyboard, so I got a South West Tech Products keyboard and used that. When Bill Gates turned up at MITS a few months later with his cobbled-together version of Basic for the 8800 I got an early cassette copy. It was a bear to use. I often had to load it several times before it would run, and then there wasn't a lot to do with it.

But I was so busy with *73 Magazine* that I didn't have time to get nearly as involved as I would like to have. I saw the potential for this new technology so I got busy starting *Byte* magazine, which left little time for me to become a software expert. It took an enormous amount of my work to launch the new magazine, even though I had the help of the 73 staff with the production phase.

Any adult who has the time and interest can get very good at computer hacking. And, considering the money out there for someone with computer smarts, maybe it's worth the time. Of course, as one gets older, one tends not to be as creative in one's problem solving, which explains why virtually all major new tech-

nological developments have been pioneered by youngsters. On the other hand, our public schools are doing more and more to discourage creativity and motivation, perhaps giving old-timers an edge.

In the ham field NBFM, slow scan, sideband, repeaters and so on were all developed by youngsters. Since, for the last 35 years, we've been discouraging youngsters from entering the hobby we've had almost no important new modes of communications develop. From 1946 (right after World War II) until 1963 80% of all new hams were teens, with 50% being either 14 or 15 years old — the same age group that is now doing so well with computers. That was the golden age of hams, developing and pioneering new communications modes.

The jobs are out there. Gobs of well-paying jobs, if you can hack it.

Cacophony

With pirate microstations popping up all around the country there is a move afoot for the FCC to legalize one-watt stations for use on one FM and one AM channel, with antennas no more than 50 feet above the ground. If this goes through you might be able to generate quite a business in putting together the Ramsey FM transmitter kits for the electronically impaired. My adventures with the Bioelectrifier have convinced me that the average American hasn't a clue as to how to connect two batteries together in series, and is afraid to even learn.

One could, I expect, build quite a business making microstation transmitters and operating consoles.

The idea is attractive. Many teens would like an opportunity to have their own broadcast station where they could play the music they like (ugh!!!) and make endless uninformed social commentary. With a hundred thousand or so stations, all on one channel, the results should be

less than fascinating and make our repeater wars of the '60s pale by comparison. That was before I knocked heads together and repeater channels were standardized.

I'll be surprised if this one doesn't go through.

No Problem?

You probably haven't been paying as much attention to the Asian stock market meltdown as you have ball scores or Clinton's sex problems, but this could have a longer lasting impact on your life. And mine.

Is "meltdown" an exaggeration? The Japanese market dropped 25% last year, Singapore ditto, Hong Kong 27%, the Philippines 55%, South Korea 59%, Indonesia 60%, Malaysia 68% and Thailand 75%.

So what? Tough on them, right? Alas, though countries are splitting apart politically, world commerce and finance have been growing into a tightly interconnected web. The world's money goes where the interest rates are highest and money is most secure. Sinking currencies and markets are quickly abandoned, spiraling economies downward. This is what has been pushing the dollar upward against the other currencies.

This, in turn, will force businesses in Asia to cut their prices to the bone to try and export their way out of their misery. That will put our American competitors at a severe disadvantage, while at the same time pricing American exports out of foreign markets.

Foreign investment in China dropped by 40% last year, so even Communist China is not immune to the problem. Worse, the Asian markets were buoyed up mainly by over-valued real estate loans by their banks. We saw the results of that just a few years ago when a recession hit New Hampshire very hard. Housing values quickly plummeted, forcing thousands of home owners to abandon their homes when the values of their homes dropped way be-

low their mortgages. The banks then auctioned off the homes for anything they could get and we saw most of the New Hampshire banks disappear, washed away in the flood of loans turned bad.

You surely remember the hundreds of billions of dollars the government had to shell out to cover the savings and loan debacle. In Asia the governments aren't going to protect bank depositors.

This is not a good time for American businesses to expect to expand their foreign markets. This is when they should be producing products aimed at American customers.

Epilogue

Now for the commercial. Naturally, I want to you buy my booklets. The most important one is my \$5 review of books you ought to be reading (order B). Next is the \$10 story of the Bioelectrifier, complete with a reprint of the Miller article on how to build one. This may help with emergency repairs to your body that your bad habits have brought about (order A). Then there's *Making Money*, which for a lousy \$5 explains how you can make all the money you want, with or without any diplomas (order M). I've reprinted my 1998 Jan-Apr editorials in one 92-page book for you for \$5 (order J). And my 1997 editorials run 240 pages for \$15 (order O). There's 45 of my older ham-oriented editorials, which are great grist for ham newsletter editors \$5 (order P). There are two reprints of 50 earlier non-ham-oriented editorials, *Grist I* and *Grist II*; these are \$5 each and both run 60 pages (order F & G). How can you live happily without getting my exciting World War II adventures in a top-scoring submarine? \$5, 60 pages (order S). The travel diaries of my visit to the hams and scuba diving of a bunch of Caribbean islands, 84 pages, \$5 (order U), and my travel diaries of Sherry's and my visit to Rus-

Continued on page 87

PROPAGATION

Jim Gray W1XU/7
210 E Chateau Circle
Payson AZ 85541
[jimpeg@netzone.com]

As the calendar indicates, about half of the days this month show Good or Good-to-Fair propagation (G, G-F/F-G) on the HF bands. The remaining days will probably provide only Poor (P), or Poor-to-Fair (P-F/F-P) conditions. Summer months seldom provide good DX, and now because we are in the low solar flux portion of new sunspot cycle 23, DXers face plenty of operating challenges to snag rare DX. In spite of this rather gloomy outlook, the days between the 15th and 22nd, and again on the 28th and 29th, appear to represent your best opportunities for DX contacts. Remember, however, that propagation forecasts are only educated guesses, and the most successful DXers are always alert for sudden and unexpected opportunities.

10-12 meters

You may expect occasional short-skip openings from about 500 to 1500 miles. There may be rare openings to greater distances, but not regularly.

15-17 meters

You can expect some reasonable short-skip propagation out to 1500 miles or so, and occasionally greater distances, particularly transequatorial DX

skip—with sometimes surprising signal strengths.

20-30 meters

As almost always, 20 meters will be your best DX band for both daytime and evening periods. 20 will stay open until well after dark, and 30 really begins to shine in the late evening hours. Peak conditions exist shortly after sunrise at our location, and again in the late afternoon. Midday conditions are not likely to be good due to excessive ionization and absorption. Short skip will be excellent out to about 2500 miles on both bands on the best days.

40-80 meters

Forty will be excellent after dark unless the noise levels from thunderstorm activity are excessive. These will be "all-night" bands, with 40 slightly better than 30, except for noise. Daytime short skip will average 1000 miles or more and nighttime short skip will average 1500 miles or more—usually more.

80-160 meters

These two bands are not known for summertime DX because of high noise (QRN) levels. However, on quiet evenings you may find superb DX across the Atlantic on 80 meters for US

June 1998						
SUN	MON	TUE	WED	THU	FRI	SAT
	1 F-P	2 P	3 P	4 P	5 P-F	6 F-P
7 P	8 P-F	9 F	10 F	11 F	12 F-P	13 P
14 P-F	15 F-G	16 G-F	17 F	18 F	19 F	20 F-G
21 G	22 G-F	23 F	24 F-P	25 P	26 P-F	27 F
28 F-G	29 G	30 G				

and European hams. 160 is always a summertime problem, but those of you with Beverage antennas for receiving and vertical antennas for transmitting will do better than average.

Gray-line DX

Always be aware that a half hour before and after local sunset often provides some really

fine DX along the paths of darkness on all bands. Use it to your advantage. W1XU/7.

Note about chart: The indicated band is only a guide. Always check the next higher or lower band. Where 10 meters is shown, listen on 12; where 15 meters is indicated, listen on 12 and 17; and so forth.

EASTERN UNITED STATES TO:												
GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA							20	20				
ARGENTINA								15	15	15	15	15
AUSTRALIA						40	20	20			15	15
CANAL ZONE	20	40	40	40	40		20	15	15	15	15	20
ENGLAND	40	40	40				20	20	20	20		
HAWAII		20			40	40	20	20				15
INDIA							20	20				
JAPAN							20	20				
MEXICO		40	40	40	40		20	15	15	15	15	
PHILIPPINES							20	20				
PUERTO RICO		40	40	40			20	15	15	15	15	
RUSSIA (C.I.S.)							20	20				
SOUTH AFRICA									15	15	15	
WEST COAST			80	80	40	40	40	20	20	20		
CENTRAL UNITED STATES TO:												
ALASKA	20	20						15				
ARGENTINA										15	15	15
AUSTRALIA	15	20				40	20	20				15
CANAL ZONE	20	20	40	40	40	40			15	15	15	20
ENGLAND		40	40					20	20	20	20	
HAWAII	15	20	20	20	40	40	40					15
INDIA								20	20			
JAPAN								20	20			
MEXICO	20	20	40	40	40	40			15	15	15	20
PHILIPPINES								20	20			
PUERTO RICO	20	20	40	40	40	40			15	15	15	20
RUSSIA (C.I.S.)								20	20			
SOUTH AFRICA										15	15	20
WESTERN UNITED STATES TO:												
ALASKA	20	20	20		40	40	40	40				15
ARGENTINA	15	20		40	40	40					15	15
AUSTRALIA		15	20	20			40	40				
CANAL ZONE			20	20	20	20	20	20				15
ENGLAND									20	20		
HAWAII	15	20	20	40	40	40	40					15
INDIA		20	20									
JAPAN	20	20	20			40	40	40			20	20
MEXICO			20	20	20	20	20					15
PHILIPPINES	15							40	20			
PUERTO RICO			20	20	20	20	20	20				15
RUSSIA (C.I.S.)									20			
SOUTH AFRICA											15	15
EAST COAST		80	80	40	40	40	40	20	20	20		

NEVER SAY DIE

continued from page 86

sia and many other great places, 72 pages, \$5 (order T). There's a \$3 s/h charge for any total order. MC or Visa are okay. Order from Wayne Green, 70 Hancock Road, Peterborough NH 03458. Yes, of course I'll send you a catalog of my other stuff.

Back Issues
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Only \$5.00 Each!
Call 800-274-7373
or
Write to 70 Route 202 N.
Peterborough NH 03458

Barter 'n' Buy

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

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

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

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

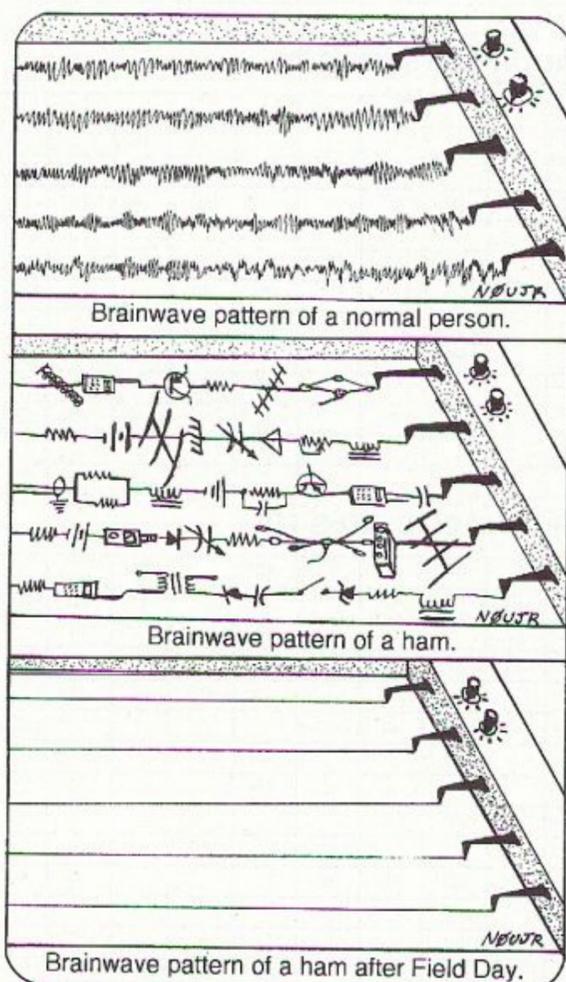
So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old-timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

Send your ads and payment to: 73 Magazine, Barter 'n' Buy, 70 Rt. 202N, Peterborough NH 03458 and get set for the phone calls. The deadline for the September 1998 classified ad section is July 10, 1998.

MAHLON LOOMIS, INVENTOR OF RADIO, by Thomas Appleby (copyright 1967). Second printing available from **JOHAN K.V. SVANHOLM N3RF**, SVANHOLM RESEARCH LABORATORIES, P.O. Box 81, Washington DC 20044. Please send \$25.00 donation with \$5.00 for S&H. **BNB420**

WANTED: Johnson Viking 4740 27 MHz mobile CB radio. **(516) 796-8268**. **BNB699**

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RF TRANSISTORS TUBES 2SC2879, 2SC1971, 2SC1972, MRF247, MRF455, MB8719, 2SC1307, 2SC2029, MRF454, 2SC3133, 4CX250B, 12DQ6, 6KG6A, etc. **WESTGATE**, 1-800-213-4563. **BNB6000**

METHOD TO LEARN MORSE CODE FAST AND WITHOUT HANGUPS **Johan N3RF**. Send \$1.00 & SASE. SVANHOLM RESEARCH LABORATORIES, P.O. Box 81, Washington DC 20044 USA. **BNB421**

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ASTRON power supply, brand-new w/ warranty, RS20M \$99, RS35M \$145, RS50M \$209, RS70M \$249, **AVT**. Call for other models. **(626) 286-0118**. **BNB411**

TOWER for sale. 100' MILITARY AB-105C. Heavy duty galvanizing. Dismantled, includes guy wire, screw anchors, new bolts, excellent condition. **Jim W9GLR**, 5165 Island View Circle South, Polk City FL. [jimw9glr@juno.com]. (941) 984-1317. **BNB56**

WANTED: Old Altair, SOL or Imsai computer. Also software, drives and S-100 boards. **Bob Wood**, 3612 North 12th Ave., Pensacola FL 32503. (850) 432-3782. **BNB52**

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- 13** COMPUTER INTERFACE • Built-in RS-232C interface for advanced computer applications.
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