

73 Amateur Radio Today

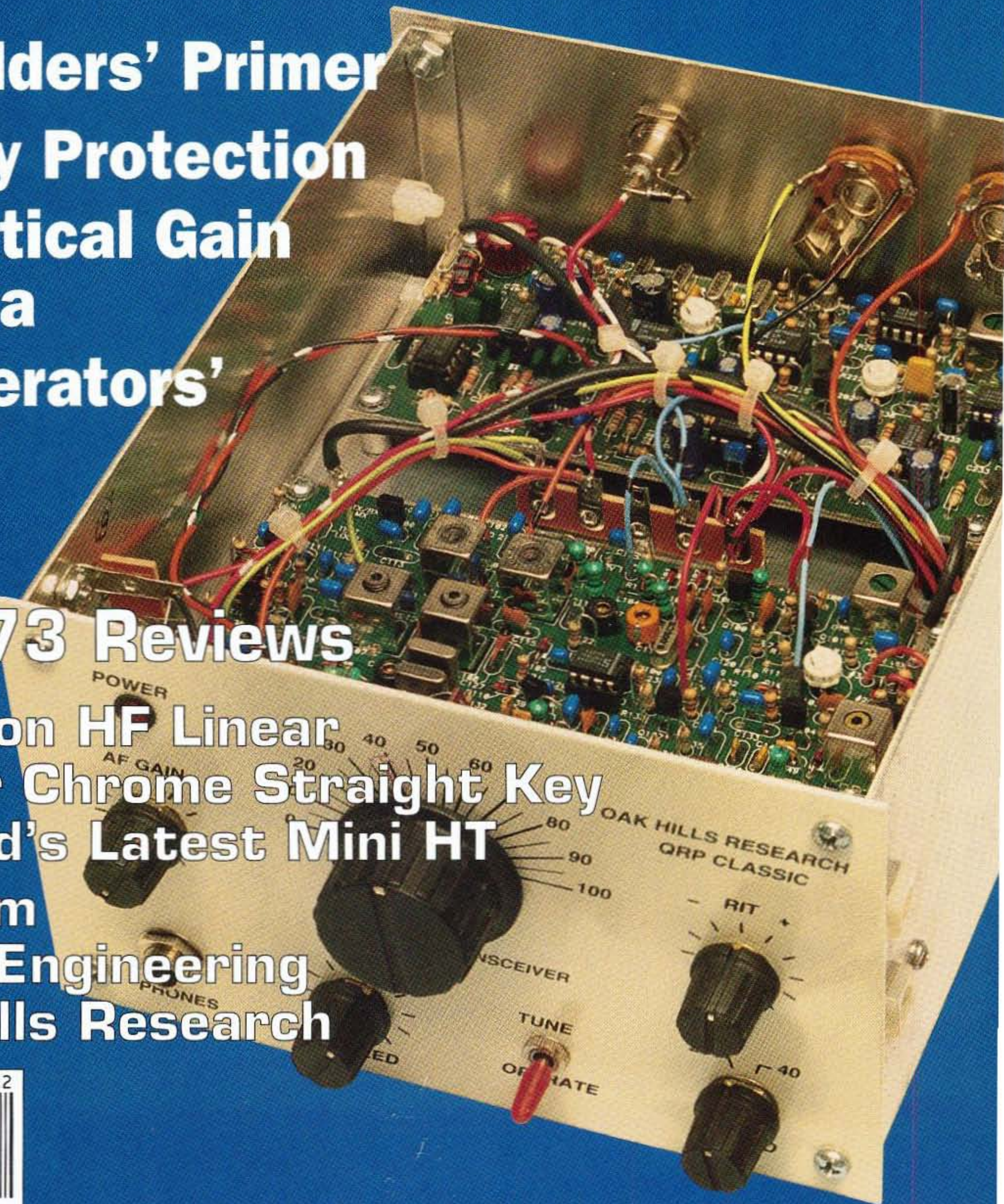
DECEMBER 1994
ISSUE # 411
USA \$2.95
CANADA \$3.95
A WGI Publication
International Edition

BUILD YOUR OWN!

Kit Builders' Primer
Polarity Protection
6m Vertical Gain
Antenna
CW Operators' Friend

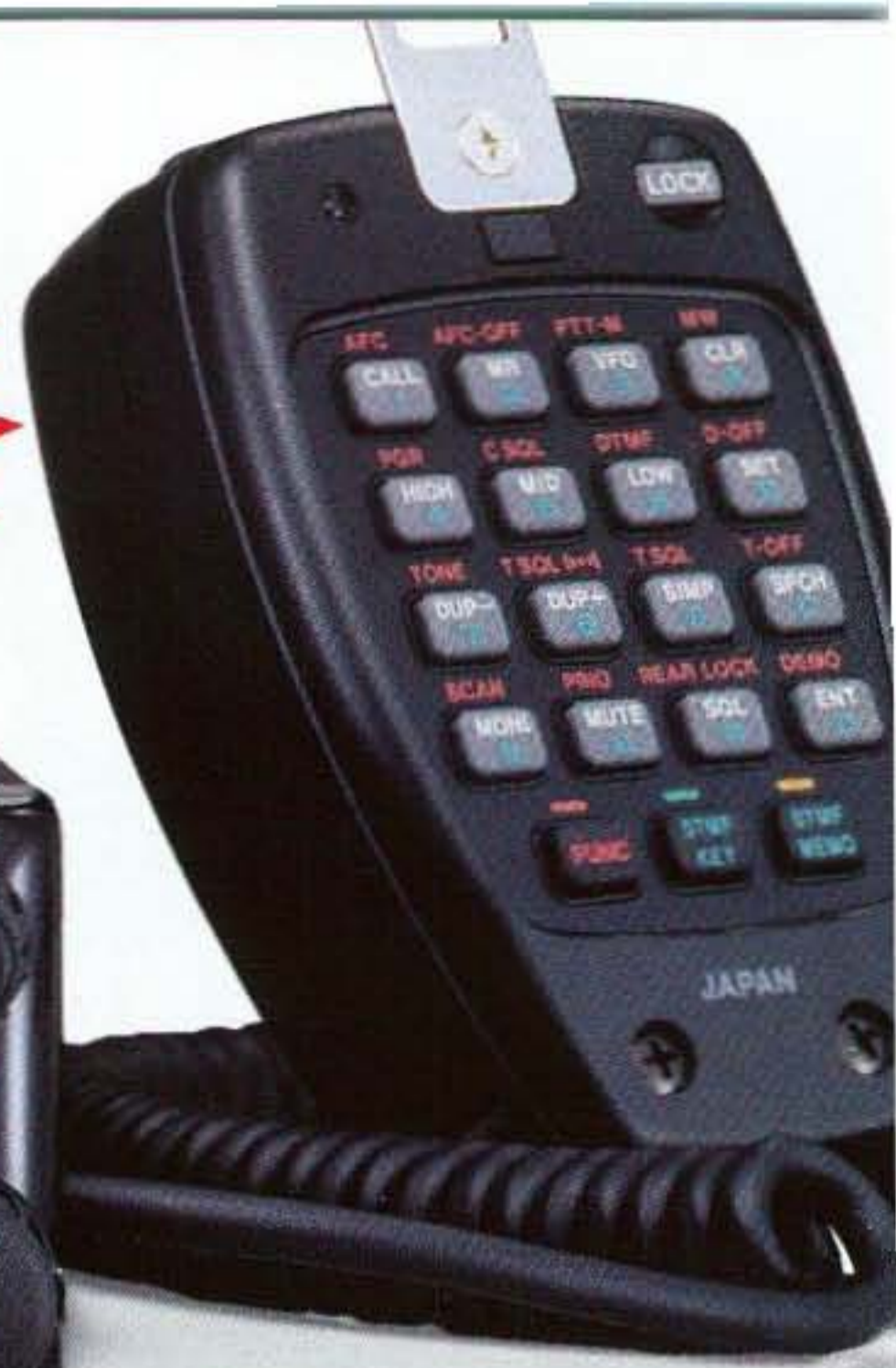
More 73 Reviews

Ameritron HF Linear
Bencher Chrome Straight Key
Kenwood's Latest Mini HT
Kits from
S & S Engineering
Oak Hills Research



The Choice is Yours...

The new IC-2700H or IC-2340H give you a choice of features and budget. Choose the one that best fits your needs. Either way you win ... it's an ICOM!

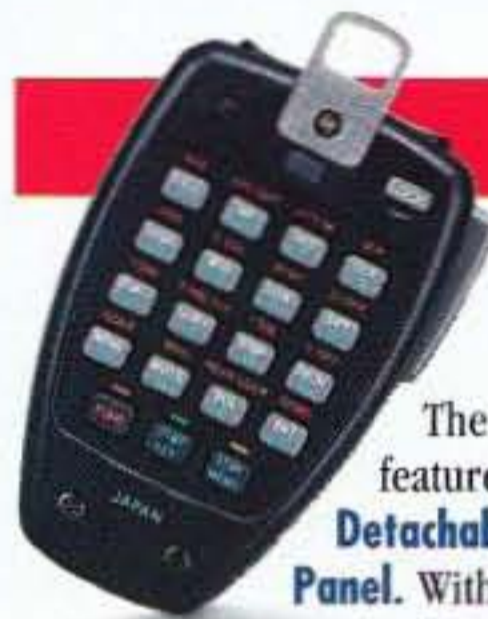


IC-2700H with supplied HM-92 DTMF Microphone.

IC-2700H

- Covers 2 M (144-148 MHz) and UHF (440-450 MHz)
- 50 W VHF, 35 W UHF (selectable)
- Detachable Front Panel
- 3 Channel Scratch Pad Memory
- Separate Tuning Dial, Volume and Squelch Control for Each Band
- FULL Remote Control Microphone
- INFRARED Wireless Microphone (opt.)
- 3 Repeater Quick Memories
- 118 Total Memory Locations
- Remoteable DTMF Control
- Auto Repeater Duplex Direction
- V/V or U/U - Simultaneous Receive of 2 Signals on the Same Band
- Built-in Pager and Code Squelch
- 24 Squelch Levels
- One-touch PTT with Time-out Timer
- Tone Scan (w/optional UT-84)

Cutting-Edge Technology & Features...



Wireless IC-2700H HM-90 infrared mic (optional).

IC-2700H

The IC-2700H features a **Detachable Front Panel**. With the optional mounting kit you can mount the faceplate in an easy-to-see location while keeping the main body in a secure place, such as the trunk of your car. With its **Easy to Read Display**, all indications are visible and separate for each band providing safe operation while driving.

The IC-2700H has **Independent Controls and Switches** for each band. Often-used

dials and switches for each band are duplicated, providing true dual band operation in V/V, U/U or V/U modes.

The supplied **DTMF Microphone** provides **full remote control of all transceiver functions**. The optional **Wireless Infrared Microphone** also provides full control. The IC-2700H *can even be controlled by a passenger in the back seat of a vehicle! Talk about back seat driving!*

Transmitted frequencies are *automatically* entered into **Scratch Pad Memories** for easy recall. Each band has 6 scratch pads, 3 for duplex settings (repeater

use) and 3 for simplex settings. The **Memory Allocation Function** allows you to divide the memory channels between bands to suit your preferences - 20 to 80 memories can be allocated to a band for a 2 band total of 100.

The **Auto Repeater Function** automatically selects the proper duplex offset direction, allowing you to work repeaters with ease.

The optional **Tone Scan Function** scans for and sets the subaudible tone frequency being transmitted by another station for you. This is especially helpful when travelling in unfamiliar territory.

IC-2340H

- Covers 2 M (144-148 MHz) and UHF (440-450 MHz)
- 45 W VHF, 35 W UHF (selectable)
- Independent Controls
- 110 Total Memory Locations
- Auto Repeater Offset Function
- Remote DTMF Mic (opt. UT-55)
- 14 Autodialing Memories
- Direct Frequency Input
- One-push Action Buttons
- Built-in Duplexer
- 2.4 W Audio
- Large, Easy to Read Display
- Tone Scan (opt. UT-89)
- Voice Synthesizer (opt. UT-66)
- Optional Pager and Code Squelch
- Optional Tone Squelch and Pocket Beep

NEW LOWER PRICE!



IC-2340H

The IC-2340H offers **Independent Controls and Switches** for each band (VFO/MHz, Memory/Call, Volume/Squelch and main tuning dial) for **True Dual Band Operation**. Both frequencies are "stacked" for quick visual reference and greater driving safety.

Easy to read in ambient light or direct sunlight, the IC-2340H's **Large**

OR...True Dual-Band Operation

IC-2340H with supplied HM-77 DTMF Microphone.

Display is easy to view and operate, even while driving.

The IC-2340H features **110 Memory Channels** (each band

has 50 regular memories, 2 scratch pad memories, 1 call channel and 2 scan edges).

One Push Button Controls allow you to adjust functions on your IC-2340H with a single push of a button. This offers increased operating convenience and safety while driving.

The IC-2340H also offers both an **Auto Repeater Function** and optional **Tone**

Scan Function. Just as with the IC-2700H, the IC-2340H will automatically select the proper duplex and offset direction for repeater operations. It will also scan for and set the subaudible tone frequency being transmitted by other stations.

View a video demonstration of this radio



at your participating ICOM dealer today!

ICOM America, Inc. Corporate Headquarters
2380-116th Ave. N.E., Bellevue, WA 98004

© 1994 ICOM America, Inc. The ICOM logo is a registered trademark of ICOM, Inc. All stated specifications are subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 2700/2340B94Y

Call our Brochure Hotline for FREE literature on ICOM radios: (206) 450-6088.

Experience the Quality

ICOM

STARTEK INTERNATIONAL INC. FREQUENCY COUNTERS

FIND FREQUENCIES FAST with the **Startek ATH™ Series**
Four **AUTO TRIGGER & HOLD** Models, **TWO Priced Below \$200!!**

**NEW!
ATH-10**

\$149.
\$179 value

MADE
IN
USA

ATH™ SERIES FEATURES:

- Easy to use - simple controls
- Ultra fast response time
- Extra **BRIGHT LED** digits
- AC or Battery operation
- Maximized sensitivity

Optional #TA-90 Antenna

WARRANTY
5 Years Parts
1 Year Labor

\$189.
\$235 value

BAND PASS FILTERS

ACCESSORIES

#CC-90	Soft Case for all models.....	\$12.
#TA-90	Telescope BNC antenna.....	12.
#TA-90-L	Telescope Elbow BNC antenna	16.
#RD-150	150 MHz Rubber Duck antenna.....	16.
#RD-2750	27 & 50 MHz Rubber Duck antenna.....	28.
#RD-450	450 MHz Rubber Duck antenna	16.
#RD-800	Cellular phone band RD antenna	29.
#C/6A	ABOVE 7 items, SAVE \$30.99.	
#M-207-IC	Interface Cable MFJ ant. analyzers.....	10.
#P-110	200 MHz 1X-10X probe.....	39.
#LP-22	Low Pass, Audio probe.....	25.
#DC-10	Direct, 50 OHM probe.....	20.

Model 1350
Economy Frequency Counter
1-1300 MHz, 3 gate times,
Hold switch
(No ATH or Bar Graph)....**\$119.**

All instruments are true Pocket Size: 4" High x 3.5" Wide x 1" Deep, <14 cubic in. and are shipped with factory installed Ni-Cad batteries and AC charger/adaptor. Antennas are optional.

FEATURES

	ATH-10 \$149 reg \$179	ATH-15 \$189 reg \$235	ATH-30 \$249 reg \$299	ATH-50 \$289 reg \$339
FREQUENCY RANGE	1 MHz - 1200 MHz	1 MHz - 1500 MHz	1 MHz - 2800 MHz	5 Hz - 2800 MHz
AUTO TRIGGER & HOLD	YES	YES	YES	YES
SIGNAL BAR GRAPH	NO	YES	YES	YES
LOW BATTERY IND.	NO	YES	YES	YES
ONE-SHOT & RESET	NO	OPTIONAL	YES	YES
HI-Z LOW RANGE	NO	NO	NO	YES

OPTION #HST-15 is a high accuracy, high stability, time base upgrade that can be ordered with any ATH series model (0.2PPM TCXO).....**\$100.**

Extend readability distance with **BAND PASS FILTERS. \$49 ea.**

#LP-60	DC - 60 MHz	#BP-150	130 - 500 MHz
#HP-400	400 - 1500 MHz	#HP-800	800 - 2000 MHz
#BP-4 All 4 Filters \$189			

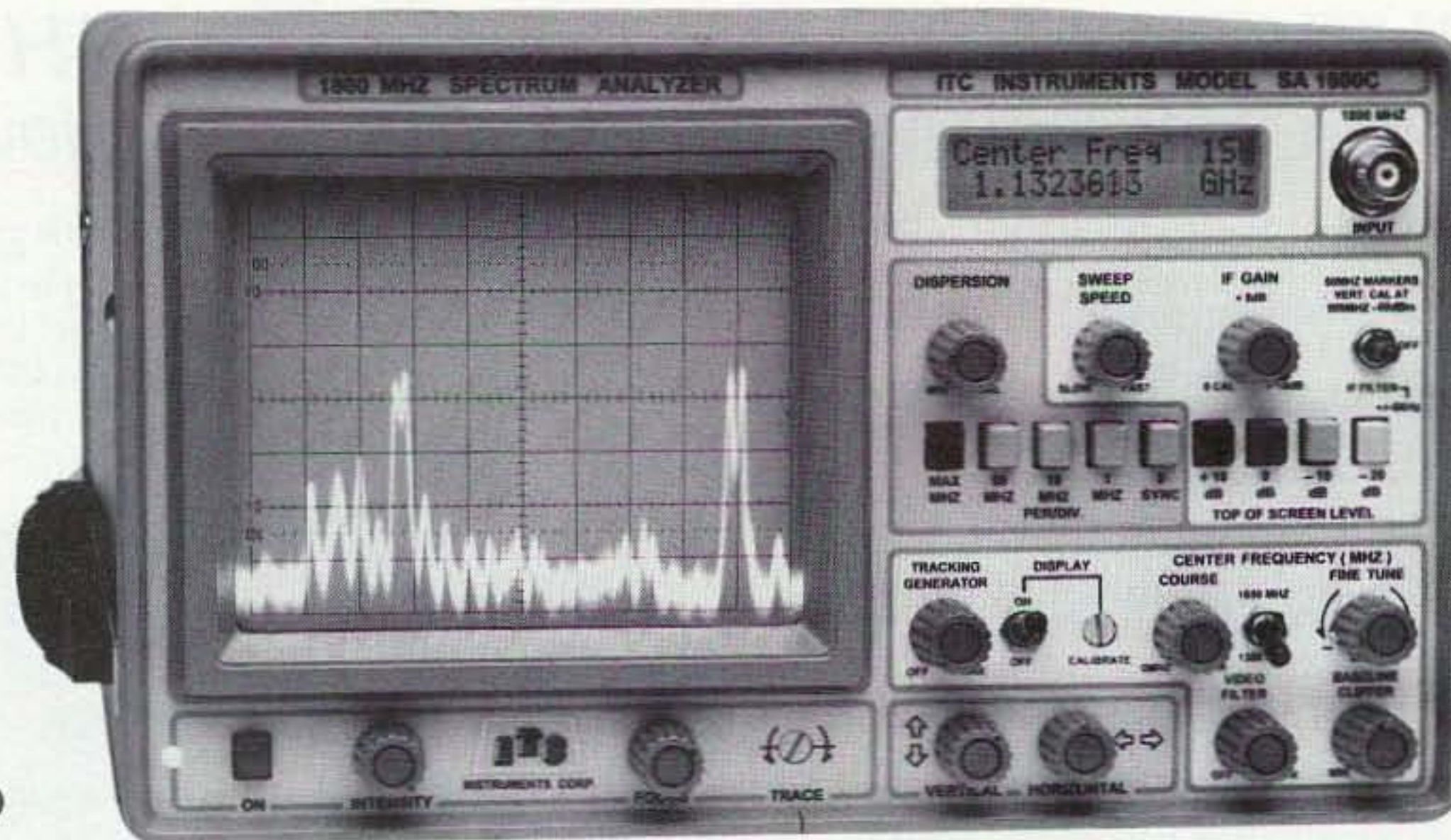
Factory Direct
Order Lines
SAME DAY SHIPMENT
Orders & Information
305-561-2211
Orders Only
800-638-8050
FAX 305-561-9133



STARTEK INTERNATIONAL INC.
398 NE 38th St., Ft. Lauderdale, FL 33334

Terms: Shipping/handling charges U.S. & Canada 5% (\$5 min., \$10 max) Others add 15%. FL residents add 6% tax. COD fee \$5.
VISA, MC, Discover accepted. Prices & specifications subject to change without notice or obligation.

500 MHz SPECTRUM ANALYZER \$895



6" x 12" x 16" (H x W x D)
(only 16 LB)

SA1800C SHOWN
\$2295.00

1-1300 MHz *In One Sweep* \$1895 MADE IN THE USA

ALL NEW SPECTRUM DISPLAY MONITOR PLUS FULL FUNCTION SPECTRUM ANALYZER

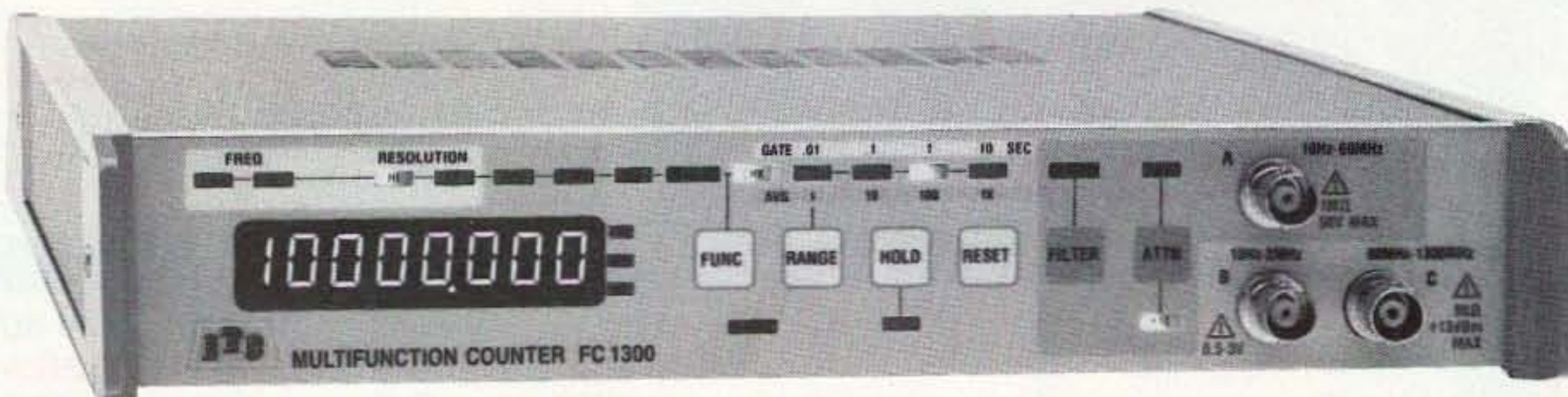
LET THE SA500A SPOT THOSE HIDDEN SIGNALS

The SA500A easily attaches to any receiver IF output jack. Providing a panoramic signal display of your 1-30 MHz and 30 to 2000 MHz scanner or communication receiver. The SA500A is a Professional Spectrum Surveillance Technology Monitor. A Full Function Spectrum Analyzer with +/- 5KHz Narrow Band Filter, Center Freq. Display, 50 MHz Marker Generator. Capable of Tuning Duplexes, Amps, Filters Receivers, Transmitters & Perform EMI, RFI, FCC, Testing. SA500A First affordable Professional Spectrum Monitor/Analyzer for all serious Ham Radio and Radio Monitoring Operators. just **\$895.00**

.2-1.3GHz SA1300B THE ULTIMATE LOW COST ANALYZER

Quality & Performance that's what ITC Spectrum Analyzers are known for. 80 dB on Screen, -110 dBm Sensitivity, Center Frequency Display, +/- 5KHz Narrow Band Filter (for 5KHz resolution bandwidth) 50 MHz Marker. DISPERSION ZOOM, Baseline Clipper, Sweep Speed, Adjustable Video Filter, 40dB of Input Attenuation. Standard on all ADVANTAGE Spectrum Analyzer specials. The SA1300B and SA1800C provide Laboratory Performance at a fraction of the normal cost. The SA1300B **\$1895.00** -SA1800C .2-1.3GHz & .8-1.8GHz **\$2295.00**. Add a 1.3GHz Tracking Generator to any unit

1.3GHz FREQUENCY COUNTER .001 ppm



\$479.00

ISO9002 CERTIFIED
**FIVE YEAR
WARRANTEE**
REG. PRICE \$599.00
SAVE \$120.00

Laboratory Performance PROCESSOR STABILIZED OVEN OSCILLATOR .001 ppm

ITC FC1300: the first truly Accurate low cost Frequency Counter. Accuracy is the #1 Frequency Counter Requirement. The \$200 - \$800 counters being advertised the past few years are but toys when it comes to accuracy. These guess-so-matic units are off 5 to 10 PPM over temperature & time (That's +/- 6,000 -13,000 Hz at 1.3 GHz) The **FC1300** is accurate to within **+/-13 Hz at 1.3 GHz 0-40 degrees C.** Sensitivity is < 5mV 1Hz to 13 GHz, 50 Ohm & 1 Meg Ohm inputs, LP filter, 1x -10x input Att. Frequency Measurement, Period Averaging, Time Interval, External Counter, Freq. Ratio, Hold & Reset Functions, 4 Gate times .01 to 10 Sec. Tired of guess-so-matic Counters: **Serious About Accuracy:** Ready to step up to **Laboratory Performance Accuracy:** Call Today & **Order**

ADVANTAGE INSTRUMENTS CORP. MASTER CARD -VISA - DISCOVER - AMX

3817 S. CARSON ST. # 818 CARSON CITY NV. 89701 Terms: COD - Check - Money Order

702-885-0234 FAX 702-885-7600 Call Toll Free 800-566-1818 - BBS 310-549-0321

PRICES & SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION. F.O.B. CARSON CITY NV. NV. RESIDENTS ADD SALES TAX.

Call 800-566-1818
To Order or Info.
Free 1995 Catalog
ADVANTAGE
Carries a full line of
Scopes - Analyzers
Frequency Counters
Generators
LCR Bridges & DMM'S

THE TEAM

PUBLISHER/EDITOR
Wayne Green W2NSD/1

MANAGING EDITOR
Hope Currier

SENIOR/TECHNICAL EDITOR
Charles Warrington WA1RZW

EDITORIAL ASSOCIATE
Joyce Sawtelle

CONTRIBUTING EDITORS
Bill Brown WB8ELK
Mike Bryce WB8VGE
Joseph E. Carr K4IPV
Michael Geier KB1UM
Jim Gray W1XU/7
Chuck Houghton WB6IGP
Arnie Johnson N1BAC
Dr. Marc Leavey WA3AJR
Andy MacAllister WA5ZIB
Joe Moell KØOV
Carole Perry WB2MGP
Jeffrey Sloman N1EWO

ADVERTISING SALES MANAGER
Dan Harper
1-603-924-0058
1-800-274-7373
FAX: 1-603-924-9327

TECHNICAL DRAWINGS
Charles Warrington WA1RZW

GRAPHIC DESIGN
Suzanne Self

GRAPHIC SERVICES
FilmWorks, Inc.
Antrim NH

GRAPHICS MANAGER
Linda Drew

CIRCULATION MANAGER
Harvey Chandler
To subscribe: 1-800-289-0388

WAYNE GREEN, INC.

Editorial Offices
70 Route 202N
Peterborough NH 03458
1-603-924-0058;
FAX: 1-603-924-9327

Subscription Services
1-800-289-0388

Foreign Subscribers
1-609-461-8432

Reprints: \$3.00 per article.
Back issues: \$4.00 each.

Write to 73 Amateur Radio Today,
Reprints, 70 Route 202N,
Peterborough, NH 03458.

Printed in the U.S.A. by Quad
Graphics, Thomaston, Georgia.

73 Amateur Radio Today

December 1994
Issue #411

TABLE OF CONTENTS

FEATURES

- 10 Kit Builders' Primer**
Yeah, I built that.....WB8VGE
- 30 Stretched Vertical Gain Antenna for 6 Meters**
Here's a way to dramatically improve your 50 MHz operating capabilities.
.....WB2EQG
- 36 The CW Operator's Friend**
Simply push a button and send those frequently-repeated CQs, IDs and QTHs.....WV5Q
- 40 Polarity Protection Plus**
Don't take a chance of smoking your next project!.....K5DKZ
- 42 DTMF Computer Interface**
Harness the power of your PC to operate DTMF tone controls.....K7CAH

DEPARTMENTS

- 68 Above and Beyond**
73 Ad Index
72 Ask Kaboom
66 ATV
79 Barter 'n' Buy
54 Carr's Corner
47 Dealer Directory
17 Feedback Index
47 Ham Help
60 Hams with Class
62 Homing In
6 Letters
4 Never Say Die
80 New Products
52 Packet & Computers
79 Propagation
56 QRP
8 QRX
50 RTTY Loop
74 73 International
77 Special Events

REVIEWS

- 14 The Oak Hills Classic**
Dual-band QRP kit.
.....AC4HF; Wee
- 18 S & S Engineering's**
ARK-4
A 40 meter transceiver
kit.....WB8VGE
- 22 The Kenwood TH-22AT**
Hand-Held Transceiver
Meet the latest in little
HTs from Kenwood.
.....WB9RRT
- 26 The Ameritron**
ALS-500M Solid-State
Mobile HF Amplifier
The long-awaited linear
lives up to its promotion.
.....W6KOW
- 48 The Bencher Chrome**
Straight Key
Experience the feel of a
well-built code key.
.....WB6NOA



Would you like to combine beautiful scenery with hamming, camping and bicycling? Turn to page 56.

On the cover: Build your own Oak Hills Classic dual-bander.
A review begins on page 14. (Photo courtesy of KE8KL.)

FEEDBACK... FEEDBACK!

It's like being there—right here in our offices! How? Just take advantage of our FEEDBACK card on page 17. You'll notice a feedback number at the beginning of each article and column. We'd like you to rate what you read so that we can print what types of things you like best. And then we will draw one Feedback card each month for a free subscription to 73.

FB

Editorial Offices
70 Route 202N
Peterborough NH 03458
phone: 603-924-0058

Advertising Offices
70 Route 202N
Peterborough NH 03458
phone: 800-274-7373

Circulation Offices
70 Route 202N
Peterborough NH 03458
phone: 603-924-0058

Manuscripts Contributions in the form of manuscripts with drawings and/or photographs are welcome and will be considered for possible publication. We can assume no responsibility for loss or damage to any material. Please enclose a stamped, self-addressed envelope with each submission. Payment for the use of any unsolicited material will be made upon publication. Please submit all material on disk as an IBM-compatible ASCII file. All contributions should be directed to the 73 editorial offices. "How to Write for 73" guidelines are available upon request. US citizens must include their Social Security number with submitted manuscripts.

73 Amateur Radio Today (ISSN 1052-2522) is published monthly by Wayne Green Inc., 70 Route 202 North, Peterborough NH 03458. Entire contents ©1994 by Wayne Green Inc. No part of this publication may be reproduced without written permission of the publisher. For Subscription Services, write to 73 Amateur Radio Today, P.O. Box 7693, Riverton NJ 08077-7693, or call 1-800-289-0388. The subscription rate is: one year \$24.97, two years \$39.97; Canada: \$34.21 for one year, \$57.75 for two years, including postage and 7% GST. Foreign postage: \$19.00 surface or \$42.00 airmail additional per year. All foreign orders must be accompanied by payment in US funds. Second class postage paid at Peterborough, NH, and at additional mailing offices. Canadian second class mail registration #178101. Canadian GST registration #125393314. Microfilm Edition—University Microfilm, Ann Arbor MI 48106. POSTMASTER: Send address changes to 73 Amateur Radio Today, P.O. Box 7693, Riverton NJ 08077-7693.

Contract: You have entered into a binding agreement with Uncle Wayne and the team to heat up your soldering iron and build a kit. It's fun and rewarding. Learn more, starting on page 10.

NEVER SAY DIE

Wayne Green W2NSD/1



Yes, I'm an Optimist!

I've been accused of being a doddering old man with a Pollyanna approach to life. Now I admit that I'm a crummy businessman. Always have been. Oh, I know what I should do to make money, but never having had much interest in money, I've always tended to avoid that aspect of business and depend on others to manage the day-to-day business and handle the accounting . . . including my personal investments. And that has encouraged people with scruple deficits to take advantage of the situation, causing me periodic traumas.

I'm enthusiastic about helping to promote new technologies, as I have in the ham radio field with sideband, solid-state, RTTY, NFM, SSTV, repeaters, and so on. As I have with computers, compact discs, and now cold fusion. And I happen to think that amateur radio holds an important key to getting America more competitive with countries like Japan, so I've been plugging for ham growth, particularly for youngsters. I believe that only by generating at least a million new, young hams will we have a good chance of holding onto our ham bands. And whether any of them can copy 13 per is irrelevant. America needs a high-tech work force, not skilled brass pounders.

Yep, I'm old, but I'm not exactly doddering . . . yet. I get out every morning soon after sunup and jog a couple of miles up and down our challenging New Hampshire hills. And I usually put in 100-hour work weeks, just like I did 50 years ago. It's just that for the last couple of years I've been more interested in finding solutions to our country's social problems . . . like crime, drugs, welfare, the deficit, our crooked Congress, wasted foreign aid money, health care, our lousy school system, and so on. And then I got involved in starting a magazine to help cold fusion get out of the laboratory and into production so we could start getting rid of the pollution caused by coal, oil, gas, and even nuclear power. No more smog some day?

When some people I trusted got together recently to try and put me out of business so they could start businesses in competition, I had to

clean house and take over as CFO, general manager, 73 editor, and so on. Oh, I can do it, I just prefer doing creative things to running a bunch of businesses. In addition to managing 73 and *Radio Fun*, there's Uncle Wayne's Bookshelf, the Golden Recording Studios, the Independent Music Producers Syndicate (IMPS), with mail order, distributing, samplers, and manufacturing divisions. Then there's "*Cold Fusion*" and the editor who left to try and start a competing magazine. Fortunately John Kane AB3C stepped in as the new tech editor. He's a retired physics professor who's worked at several universities and put in a few years at Brookhaven and Bell Labs working on particle physics.

Sure, I have my hands full bailing out the mess, but I enjoy a challenge. And once I have everything running fairly well I'll be looking for someone

pressure from my draft board, I left college and joined the Navy. There I was paid a pittance to learn electronics in what I believe was the best electronic school in the world. Then I operated and serviced radio, sonar, and radar equipment on a submarine, making five war patrols. Work? Ha! Room, board, travel, education . . . and I got paid. There was a good deal of excitement and danger too, making it more fun. You can read about that in my book, *Uncle Wayne's Submarine Adventures in WWII*.

The government paid me to go back to finish college for two years, then I got my first post-war job as the chief engineer of WEEB in Southern Pines, NC. I was only being paid 50¢ an hour, but I had a ball as an engineer-announcer. I'd have done it for nothing, even with those 90-hour weeks.

**"If you do what you enjoy,
and get good at it, the chances
are you'll end up with far more money
than you ever expected."**

to take the reins so I can write more books, do more teaching, and even try doing a radio talk show.

I was not surprised when hamdom's pinko version of the *Enquirer*, with about as much scruples and credibiliy, interviewed a couple of my ex-employees . . . who were a major part of the problem, and published a personal attack on me. If any potential employers ever ask me for a recommendation I'll send 'em a copy.

Are You Being Paid Enough?

I've gotten paychecks all my working life but, in thinking back, I've never worked for a paycheck. The pay was always icing on the cake. I enjoyed my jobs so much I'd have done 'em for free. My first real job was with GE, back in the summer of 1942, testing and tuning transmitters for the Army. Working on radio gear wasn't work, it was great fun . . . and I got paid too!

Then, with some not too gentle

Next I put WPIX (TV) in NYC on the air as chief cameraman. Wow, was that fun! By then I was being paid a big \$70 a week to have fun. At WXEL in Cleveland I made \$80 a week as a TV director. And about the same at KBTB in Dallas as a director. Then there was a stint at Airborne Instrument Laboratories as an engineer, where I pulled down around \$90 a week managing Air Force radar and radio development projects. That was fun, and frustrating. I saw endless millions of dollars being wasted, with the Air Force happily picking up the tab, no questions asked. I really hate to see money wasted . . . probably an old Scotch gene that's kicked in.

But how about you? Are you working for a crummy paycheck, or is the pay just a bonus for doing things you enjoy? If you aren't anxious to get to work every day, and hate having to leave, maybe it's time to re-evaluate. Maybe it's time to look for "work" that

is fun for you.

When I took over as the editor of *CQ* in 1955 I was being paid only \$10,000 a year, but what fun. Imagine, getting on the air and operating as part of the job description. Going on DXpeditions, ditto. Getting to test the latest ham gear. Nirvana. It's no wonder when I got fired from that job in 1960 that I soon started my own ham magazine. I still love trying out new gear, getting involved with new technologies, talking at ham clubs, hamfests, and conventions. That's work? Har-de-har!

And though I've never done any of these things because of the money, for some reason the money has always come in. Oh, sure, I've gotten into financial binds now and then because I haven't paid much attention to the accounting, but it's never taken long to get things perking again. At times far more money that I ever dreamed of has poured in.

If you do what you enjoy, and get good at it, the chances are you'll end up with far more money than you ever expected. And you'll also find that there are plenty of unscrupulous people who are money-oriented who will try to steal it from you.

Speaking (well, writing) about my days at WEEB, one of the writers at the station had had a play produced on Broadway. "Men Of Iron." It was about building a skyscraper. When I quit to work for WPIX in New York, Joe came to visit me and show me the script for a new play he'd written. It was about Van Gogh. Unfortunately he put it on the seat of the subway train and forgot it when he got off at my stop. And that was in the days before photocopiers and word processors, so it was his *only* copy.

It was never turned into the BMT lost and found, but about three years later his exact play appeared as a movie, so someone found it.

While I was working for WPIX I got to know a chief of detectives in New York who had an idea for a TV series. True-life stuff. For instance, he explained how they were able to get confessions from even the toughest criminals by taking them around the corner from the station house to a dentist who would drill the suspect's teeth without anesthetic until he confessed. Then he'd fill the holes and no one could prove anything. Thought you'd like to know about that.

How's Your Geography?

One of the more exciting aspects of amateur radio is our ability to make friends just about anywhere in the world. A good DXer gets to know every country, and just about every island in the world. So here's a little test (Figure 1, page 76) for you to see how you're doing. No fair looking 'em up. Three points for each you get correct.

Yep, there are some toughies.

Continued on page 76

How to throw out 136 fewer batteries this year.



Throwing out batteries is throwing out money. And adding to our rapidly filling landfills.

But now there's a smarter choice – Rayovac Renewal. They're the only alkaline batteries created to be reusable, 25 times or more. So each Renewal replaces many single-use alkalines.

But don't confuse Renewal with yesterday's rechargeables. Renewal batteries are totally different. They're alkalines, so you get longer life from each charge. And the Renewal Power Station® makes charging hassle-free.

So switch now. You'll save trash. And you'll save cash. **SMART MOVE**

RAYOVAC
RENEWAL
REUSABLE ALKALINE™

©1994 Rayovac Corporation

Call 1 800-237-7000 for more information.

*Performance depends on your devices and how you use them. Frequent charging maximizes savings.

MAIL-IN REBATE EXPIRES JAN 31, 1995

Save \$10 to start **RAYOVAC RENEWAL**
REUSABLE ALKALINE.

Get \$10 back by mail on your purchase of any Renewal Power Station and 3 packages of any Renewal batteries.

To receive your rebate, enclose dated cash register receipt with purchase price circled, and proof of purchase (1 Power Station and 3 battery card UPC symbols and numbers).

Mail to: **Renewal Rebate Offer** Name _____
Dept. AR-01 Address _____
P.O. Box 7237 _____
Osseo, MN 55569-7237 City _____ State _____ Zip _____

Only this official form and original UPC and original cash register receipt accepted, no facsimiles. Offer good only in U.S.A., void where prohibited, taxed or restricted by law. Mail-in offer only, not for store redemption. Offer is limited to one response per family, group, organization or mailing address. P.O. boxes without street addresses will not qualify as mailing addresses. Multiple submissions will not be acknowledged. Request must be postmarked by Jan 31, 1995. Limit: 1 rebate per mailing address.



From the Ham Shack

Fred Weinberg, Tulsa OK Wayne, while I am not a subscriber, I am a reader and follower of your career. My first radio was a Heathkit Twoer, converted for use for the Civil Air Patrol, and that led me to a career in communications in which I've owned broadcast and print properties.

Currently, I'm helping restore AM radio to its original place in the scheme of things under the theory that if you give me a transmitter that a lot of people can tune in, we'll find a way to capture that audience. It helps that the big boys have abandoned AM as dead because it brings the prices down.

I figure that spread spectrum and digital compression will make TV broadcasters of us all, so it's really the software that counts.

When I think of how far we've come from the days of that Twoer (and, by the way, 72 isn't very old—that's how old Bob Dole will be when we elect him president in 1996), I marvel that there is a place for people who really don't want to work for big companies. But there is.

Wayne, your career has been an inspiration for many of us who would rather not work for anyone but ourselves and I hope that you realize that what you do has an influence far beyond the field of telecommunications.

I hope to read your editorials—fine print and all—well into the future.

Jonathan Walter, Prince Rupert, BC, Canada I've found out personally about the mess in the school system you've been writing about in your editorials. Although I graduated last year, I still am involved with my school. A couple of my friends are teachers there and I am tutoring grade 12 math students. One of those teachers actually helped me in last year's guerrilla attack. He read Gatto's book and agrees with everything in it, but his hands are tied. A few nights ago we got to talking about the situation. I've seen firsthand that the worst damage has already been done by the time kids hit high school. My teacher friend was describing how he would bring in really neat stuff from outside the normal boring curriculum, such as videos and visitors . . . the head of a \$1,000,000-per-year project, for example. The kid's questions weren't about the exciting scientific work he was doing; they wanted to know, "How much money do you make?" While he was explaining about his work, the students talked among themselves and otherwise ignored him, except when he touched on sex, violence, or explosions, then he had their rapt attention. In my math tutoring, I've found they teach nothing but the most fundamental arithmetic in elementary school, so by the time students hit grade 12 they don't have a foundation for learning to understand and use the

new stuff. Grade 12 math is literally a whirlwind tour of all the topics that really need a couple years to soak in. I asked my former math teacher about the curriculum, and why so and so wasn't included, since it would make learning the other things easier. She reminded me why by taking me back to the trivial textbooks that are used in the previous high school years. In other words, those years had been wasted, so all she can really do is push stuff at her grade 12's to memorize so they can pass their provincial exams and she can look good.

In Surrey, a suburb of Vancouver, BC, parents have set up a traditional school, one with discipline and curriculum that go back decades. They did this in spite of intense opposition from the teachers' union. They do realize there's something wrong with the public school system.

Hmm, maybe it isn't just the code that's a barrier keeping kids away from hamming. Maybe the math is too tough. That Ohm's Law is a toughie, right? . . . Wayne

Richard Gillmann K17KJ, Issaquah WA Wayne, I enjoy reading your "Never Say Die" column every month in 73. You've often written about how the growth of amateur radio and school radio clubs stopped in the early 1960s. While, no doubt, incentive licensing had its effect, another factor influenced me at the time.

I was in a high school radio club in 1963, at Homewood-Flossmoor High School in Illinois. My friends and I were fascinated by electronics, and we were studying the code and theory for our Novice licenses.

One day, our school announced a weekend program that would let us use the computer lab at the Illinois Institute of Technology. We could run programs on their IBM 1620 and later IBM 7044 computers. All we had to pay for were blank punch cards. (Remember, this was the Stone Age of computers!)

We all jumped at the chance. We were down there every Saturday. Soon, we knew more than the teachers. It was exciting, it was the forefront of technology, and it turned into a career for me.

The radio club, neglected, went into a tailspin. The new computer technology was more interesting to us than the old radio technology. The generation of kids that followed us had teletypes connected to time-sharing systems, and the generation after that had personal computers, to make the experience even more enticing. Now they have the Internet.

I did eventually get my Novice license, but never operated. In the '80s, I got an Advanced ticket so that I could try packet radio. I built a TAPR TNC-2 kit, figured out how to wire a cable to

my Icom IC-2AT, and connected to all the PBBSs I could reach on 2m. I was disappointed to find out how dull the PBBSs were, compared to telephone BBSs and to the Internet. There weren't many callers, and what they had to say wasn't very interesting.

For amateur radio to thrive, we need to find a way to make it more appealing to computer hobbyists. You don't need a license to access the Internet; there are no restrictions on message content, and you can automatically forward anything. This is what we have to compete with. Recent FCC rulings have been in the right direction: no-code Techs, and relaxed rules for message content and automatic forwarding. I'd like to see the FCC go further in this direction.

Here's my proposal: For the ham bands above 500 MHz, eliminate the license requirement entirely, and remove all restrictions on message content and forwarding. These UHF/SHF bands could benefit from more activity. The originator of a message would be solely responsible for its content.

This would lead to a great expansion in wireless computer networking by amateurs. More participants gives you more people to write to and chat with, more varied postings, more files to download, and richer content in general. A bigger network works better in emergencies, too. We could have a big branch of the Internet over the radio, accessible for free to anyone with a computer, a radio and a TNC. Now, that would be exciting.

Tom Prentiss, Calvert City KY Wayne, I recall when 73 Magazine was about 5" x 8" in size, and the cover price was \$.37. I had always enjoyed your outlandish editorials, and was a particularly big fan of yours when you were trying to establish a counterpart to the ARRL. I even drove to Peterborough one summer to interview with you for the director's job of that fledgling organization.

Having the usual excuses for not keeping up with that hobby, (except for faithful renewal of the license) I've only recently begun to rekindle my interest, and for the first time in years I've bought a ham magazine (73 Amateur Radio Today, October 1994). I congratulate you, in your advanced age, for maintaining your sense of humor and provocative thought process.

I'm certainly aware that 73 is a ham magazine, and should mostly be oriented to that pursuit; however, since you are asking for the readership to submit ham projects and articles for publication, why not go one step further? Why not solicit features of any type for publication? After all, you are the one constantly admonishing others to get off their duff and do something productive. You also surely know that many ham readers simply do not have the expertise to write something of a technical nature. There may be a Hemingway in the wings, and for all the bureaucracy involved in the normal publishing merry-go-round, unable to get published. Enter Wayne Green, and 73 magazine.

Sure, there would be some costs involved, for logistics and compensating the author (me, pay?), but I can foresee the readership, and the number of subscribers, growing.

For more than 30 years I've been chiding myself to write to Uncle Wayne, and I've finally done it. I imagine your hope is that it will be another 30 before I do it again.

Tom, Thanks for the nice letter . . . glad you've been enjoying my editorials, even when they have little to do with amateur radio. Well, I can't help sharing my enthusiasms.

I would like to see ham-oriented stories, poetry, cartoons, photographs, and so on. But, if I get too far afield I'll get beefs. True stories, fiction, fantasy and humor will be welcome . . . Wayne

George Zimmerlee N4XDC, Marietta GA Some of us are wondering how you will respond to this letter. Everyone knows that you hate the League. Some also know you hate traditional values and Christians. It is anybody's guess how you're going to land on this one, but here goes: I have proof that the FCC and the FBI worked together to jam amateur radio service stations AB5LA and AB5KZ at EE Ranch Road, or RR7, Box 471-B, Waco, TX 76705. This is also known as Mount Carmel Center, the church/home of the Branch Davidian Church. Also in this same jamming operation, already admitted by an FBI special agent on April 17, 1993, was the jamming of radio and TV stations for political reasons, (this also has been admitted) as part of their psychological operations.

The amateur station was operating under sections 97.1, 97.11, 97.113, 97.301, 97.403, 97.405 of the Amateur Radio Service rules. This is the Communications Act of 1934. Also violated by Big Brother were Articles 44 and 45 of the International Radio Regulations, and Article 19 of the International Covenant on Civil and Political Rights.

Mark Wilson, Editor of QST, knows that the amateur service was a victim of this deliberate interference to a "station-in-distress" in the amateur service. Wilson just doesn't care about this war of the tyrants in government against the amateur service. This should not be any surprise to either of us, but I found it interesting that the League would put itself in jeopardy by refusing to print anything about the jamming. Not one word of it will be printed, not even the part already covered by the mainstream news media.

I have some hope that you will pull through and be consistent in your opposition to league Lunacy, but no one can be sure. If this story makes it to the pages of 73, you will scoop QST, CQ, Popular Communications, and Monitoring Times.

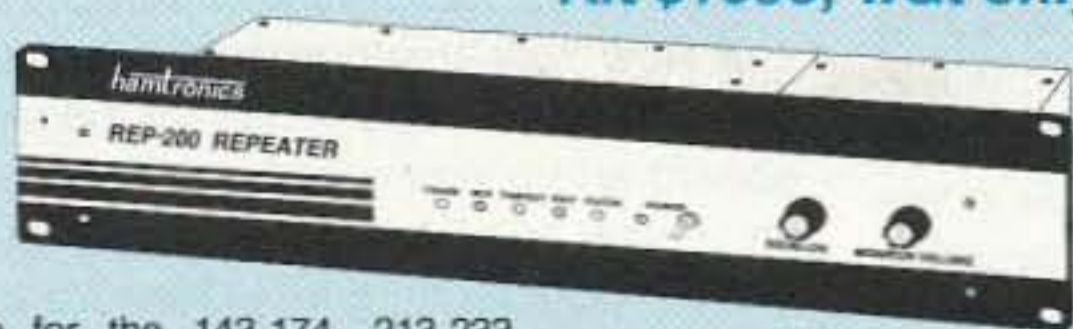
George—Sure, whatcha got? However, if your "everyone knows" information about my "hates" is as accurate as your Waco information, it isn't going to be of much value . . . Wayne

You get more features for your dollar with the

REP-200 REPEATER

A fully microprocessor-controlled repeater with autopatch and many versatile dtmf control features at less than you might pay for a bare-bones repeater or controller alone!

Kit \$1095; w&t only \$1295!



- Available for the 143-174, 213-233, 420-475, 902-928 MHz bands.
- **FCC type accepted** for commercial service in 150 & 450 bands.
- **Six courtesy beep types**, including two pleasant multi-tone bursts.
- **Open or closed access autopatch, toll-call restrict, auto-disconnect.**
- **Reverse Autopatch**, two types.
- **DTMF CONTROL:** over 45 functions can be controlled by 4-digit dtmf command, via radio or telephone.
- **Owner can inhibit autopatch or re-**

peater, enable either open or closed access for repeater or autopatch, and enable toll calls, reverse patch, kerchunk filter, site alarm, aux rcvr.

- **Change cw speed and tone, beep delay, tail timer, and courtesy beep type at any time** by owner password protected dtmf commands.
- **Auxiliary receiver input for control or cross linking repeaters.**
- **Color coded LED status indicators.**

NEW **REP-200T Voice Message Repeater.** As above, except includes Digital Voice Recorder. Allows message up to 20 sec. to be **remotely recorded off the air** and played back at user request by DTMF command, or as a periodical voice id, or both. **kit \$1145, w&t only \$1395**

NEW **REP-200C Economy Repeater.** Like REP-200, except uses COR-6 Controller (no DTMF control or autopatch). Features **real-voice ID**. **Kit only \$795, w&t \$1095**

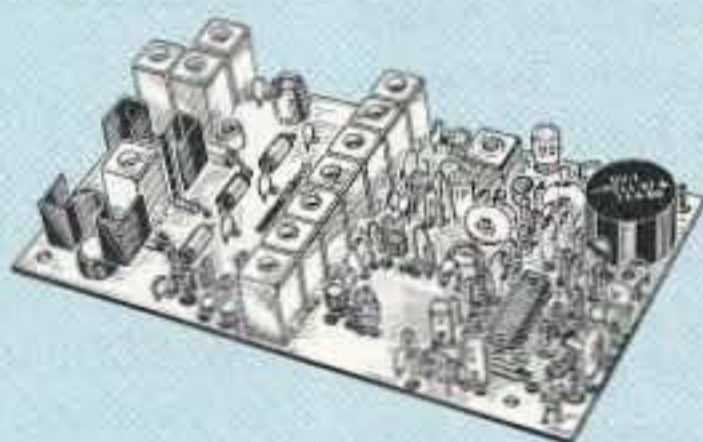
REP-200N Repeater. Want to use your ACC controller, etc.? No problem! We'll make you a repeater with rf modules only. **Kit only \$695, w&t \$995**

XMTRS & RCVRs FOR REPEATERS, AUDIO & DIGITAL LINKS, TELEMETRY, ETC.

Also available in rf-tight enclosures, and with data modems.

FM EXCITERS: 2W continuous duty. TCXO & xtal oven options. **FCC type accepted for com'l high band & uhf.**

- **TA51:** 50-54, 143-174, 213-233 MHzkit \$109, w&t \$189.
- **TA451:** 420-475 MHzkit \$109, w&t \$189.
- **TA901:** 902-928 MHz, (0.5W out); w&t \$219.



VHF & UHF AMPLIFIERS.

For fm, ssb, atv. Output levels from 10W to 100W. Several models starting at \$99.

FM RECEIVERS:

- **R144/R220 FM RECEIVERS** for 143-174 or 213-233 MHz. **Sensitive front end, 0.18uV, both crystal & ceramic if filters plus helical resonator front end for exceptional selectivity >100dB at ±12kHz (best available anywhere!)** Flutter-proof hysteresis squelch; **kit \$149, w&t \$219.**
- **R451 FM RCVR,** for 420-475 MHz. Similar to above **kit \$149, w&t \$219.**
- **R901 FM RCVR,** for 902-928MHz. Triple-conversion, ...\$169, w&t \$249.
- **R76 ECONOMY FM RCVR** for 28-30, 50-54, 73-76, 143-174, 213-233 MHz, w/o helical res, if selectivity >100dB at ±12kHz **Kits \$129, w&t \$219**



NEW **R76 MONITOR FM RCVR Kit** for 10M, 6M, 73 MHz, 2M, hi-band, or 220 MHz. IF selectivity 60dB at ±12kHz. Great for monitoring repeaters, amateur calling frequencies, or packet radio frequencies, and for listening to commercial two-way radio, police/fire frequencies, or weather forecasts. **Good starter kit, too; easy to assemble and align.** **Kit only \$59!**

- **R137 WEATHER SATELLITE RCVR** for 137 MHz. Special if filters tailored for wideband fm. Lowest cost receiver available **kit only \$89, w&t \$149.**
- We also have preamps and receiving converters for 137 MHz, and we carry the *Weather Satellite Handbook* by Ralph Taggart.

ACCESSORIES

COR-3 REPEATER CONTROLLER. Features adjustable tail and time-out timers, solid-state relay, courtesy beep, and local speaker amplifier. **kit \$49**

CWID. Diode programmable any time in the field, adjustable tone, speed, and timer. **kit \$59**

COR-4. Complete COR and CWID all on one board. CMOS logic for low power consumption. EPROM programmed; specify call. **kit \$99, w&t \$159**



COR-6. COR & Real Voice ID

on one board. Digital ic records up to 20 seconds of your voice. Can record multiple id messages. Tail and time-out timers, courtesy beep, solid-state relay to key transmitter. **kit \$99, w&t \$149**



Versatile DVR-1 DIGITAL VOICE RECORDER Module.

As a **voice ID'er for repeaters**, records your voice, using the built-in microphone or external mic. Just the thing for **fox hunt xmtr id!** May also be used as a **contest caller** to play back one or more messages through your transmitter at the press of a switch. Used as a **radio notepad**, it can record the audio output of a receiver — up to 20 sec. of anything you might want to recall later.



Play back as often as you like through a small external speaker. Extensive manual tells how to use multiple messages and adapt to many applications. **kit \$59, w&t \$99**

TD-4 SELECTIVE CALLING Module. Versatile dtmf controller with 1 latching output. Mutes speaker until someone calls by sending your 4-digit tt code. Or use it with a long tt zero digit to alert anyone in club. Also may be used to control autopatch or other single device. **kit \$49, w&t \$79**

TD-2 DTMF DECODER/CONTROLLER. 16 digits, programmable, toll-call restrictor. Can turn 5 functions on/off. **kit \$89, wired & tested \$149**

AP-3 AUTOPATCH. Use with TD-2 for repeater autopatch. Reverse patch and phone line remote control are std. **kit \$89, wired & tested \$149**

AP-2 SIMPLEX AUTOPATCH Timing Board. Use with above for simplex operation using a transceiver **kit \$39**

TD-3 SUBAUDIBLE TONE DECODER/ENCODER. Adjustable for any tone. Especially for repeaters, with remote control activate/deactivate provisions **kit \$29, wired & tested \$59**

DATA MODEMS

MO-202 FSK DATA MODULATOR & DE-202 FSK DEMODULATOR. Run up to 1200 baud digital signals through any fm transmitter & receiver. Radio-link computers, telemetry, etc. **kit ea \$49, w&t ea \$79**



9600 BAUD DIGITAL RF LINKS. Low-cost packet networking system, consisting of MO-96 Modem and special versions of our 144, 220, or 450MHz FM Transmitters and Receivers. Interface directly with most TNC's. Fast, diode-switched PA's output 15 or 50W. CALL.

Low Cost GaAsFET PREAMPS

LNG-(*)

ONLY \$59
wired&tested



FEATURES:

- **Very low noise:** 0.7dB vhf, 0.8dB uhf
 - **High gain:** 13-20dB, depends on freq
 - **Wide dynamic range** - resist overload
 - **Stable:** low-feedback dual-gate FET
- *Specify tuning range: 26-30, 46-56, 137-152, 152-172, 210-230, 400-470, 800-960 MHz.



LNW-(*) MINIATURE PREAMP

ONLY \$29 kit, \$44 wired&tested

- GaAs FET Preamp similar to LNG, except designed for **low cost & small size.** Only 5/8"W x 1-5/8"L x 3/4"H. Easily mounts in many radios.

*Specify tuning range: 25-35, 35-55, 55-90, 90-120, 120-150, 150-200, 200-270, 400-500 MHz.

LNS-(*) IN-LINE PREAMP



ONLY \$89 kit, \$119 wired&tested

- GaAs FET Preamp with features similar to LNG series, except **automatically switches out of line during transmit.** Use with base or mobile transceivers up to 25W. Tower mounting brackets incl.

*Tuning range: 120-175, 200-240, or 400-500.

HELICAL RESONATOR PREAMPS

GaAs FET preamps with helical resonators **reduce intermod & cross-band interference** in critical applications.

MODEL HRG-(*), \$80 vhf, \$110 uhf.
*Specify tuning range: 142-150, 150-162, 162-174, 213-233, 420-470.



RECEIVING CONVERTERS

Low noise converters to receive vhf and uhf bands on a 10M receiver.



- Input ranges avail: 50-52, 136-138, 144-146, 145-147, 146-148, 220-222, 222-224 MHz, 432-434, 435-437, 435.5-437.5, and 439.25 (to chan 3).
- **Kit less case \$49, kit w/case & BNC jacks \$74, w&t in case \$99.**

TRANSMITTING CONVERTERS



XV2 for vhf and XV4 for uhf. Models to convert 10M ssb, cw, fm, etc. to 2M, 220, 222, 432, 435, and atv. 1W output. **Kit only \$89.** PA's up to 45W available.

- Buy at low, factory-direct net prices and save!
- For complete info, call or write for free catalog.
(Send \$2 for overseas air mail.)
- Order by mail, fax, or phone (9-12 AM, 1-5 PM eastern time).
- Min. \$5 S&H charge for first pound plus add'l weight & insurance.
- Use VISA, Mastercard, check, or UPS C.O.D.

Our 32nd Year!
hamtronics, inc.
65-D Moul Rd; Hilton NY 14468-9535
Phone 716-392-9430 (fax 9420)

Reality Check

You have to wonder if it is more fitting to dignify false accusations by responding to them with the truth, or is it wiser to simply ignore them, to turn the other cheek? We offer this compromise: *Here is the issue of 73 that a certain few overzealous rumor-mongers said would never be printed!* And there will be many more issues to follow.

73 has been around for 34 years so far, and we feel our loyal supporters need to know we're here to stay. To those few who deliberately tried to put us out of business, and you know who you are; we hope you have a good lawyer.

73 Photo Search Finds Success

Dozens of the 73 faithful have blown the dust off their camera lenses and taken to the streets of hamdom in search of the perfect cover shot. We are certainly encouraged by the quality of the work being submitted in the 73 Photo Search, and we'd like more of you to give it your best shot.

Our first amateur photo appeared on last month's cover. It won notoriety and fame for Jose Rivera KP4FMD, as well as a free year of 73 magazine! Jose and his wife Maria WP4FRO faxed our office when they saw their photo. "We could not believe our eyes when we saw our picture on the cover of your magazine. This was really a wonderful surprise," they wrote.

So what's holding you back? Suitable subjects would include ham radio equipment, amazing antenna arrays, or better yet, catchy ideas of your own.

Our format calls for a color photo which is: 1. Vertically oriented; 2. Sharply focussed; 3. Leaves extra room at the top and left side; and is 4. Not too busy. We prefer 35mm prints.

Send your color prints to 73 Photo Search, 70 Route 202 North, Peterborough, NH 03458. Please include a brief description of your photograph, your full name and callsign, and your permission to publish. We cannot return photos without an appropriately-sized SASE. If we do not use your photo on the cover, perhaps we'll find a spot inside. We might even use it in our sister publication *Radio Fun*. Good luck and happy shooting!

FCC Slaps VEs, Cancels Upgrades

The Federal Communications Commission has begun proceedings against three suspended volunteer examiners and has downgraded fifty-one amateur licensees after an extensive fraud investigation in Southern California. According to the "Westlink Report," Extra

Class Licensees James B. Williams AA6TC of Wilmington, CA; Robert L. Flores N6WPQ, and his wife Rose Marie Flores N6WPR of Santa Monica, CA were ordered to turn in their licenses. The FCC believes all three conspired to commit fraud in at least one instance in violation of the rules and regulations governing participation in the volunteer testing system.

The FCC has also acted to punish 51 hams who either refused to take retests or failed their new exams as part of the agency's ongoing investigation. Investigators say at least one test session never actually took place. Indications are that this is just the tip of a very large iceberg, and more disciplinary actions by the FCC may be forthcoming. *TNX Westlink Report, No 682, October 13, 1994.*

Bye Bye BBS

The 73 BBS has been dead for several weeks now. It apparently caught a virus and croaked before the ambulance arrived.

We're considering upgrading to a faster, more powerful, Macintosh system but nothing is definite yet. Surprisingly few people have noticed that the old BBS has been down. Does anyone care? If so, drop us a line. We'd like to hear from you.

73 Staffer Wins Ozzie

73's Graphics/Production Manager Linda Drew has been awarded a Silver Ozzie Award for Publication Design Excellence for her work on Wayne Green Inc.'s "Cold Fusion" magazine.

Winning the coveted Ozzie is a major achievement in the publishing world. Entries were considered from many of the best-designed publications in North America. Linda has been on the staff at Wayne Green Inc. since 1978 and we enjoy the benefits of her work every month. Good going, Linda!

Dial FCC Toll-Free

The Federal Communications Commission has installed a new toll-free telephone service at Gettysburg, Pennsylvania. The 800-number is now available for customer service inquiries at the licensing division.

The number is (800) 322-1117 weekdays from 8 a.m. to 4:30 p.m. Eastern Time. It gives you access to an automated system which will record your requests for forms and records, complaints, and requests for information.

The commission instituted the new number after a presidential order that the federal government be "customer driven." The FCC conducted research to determine the need for the 800 line. Within the next year and a half, the FCC plans to institute other customer service improvements to comply with the White House directive. *TNX Florida Skip, Vol. 36, No 10, October, 1994.*

Ham's Project Takes Off

A New York amateur radio operator expects her scientific experiment to take off soon aboard an upcoming space shuttle flight. Dalina Steiner N2MIA is a researcher at the Hospital for Special Surgery in New York City. Her project is a study of cartilage mineralizing culture systems. This, she says, is crucial to the understanding and treatment of osteoporosis and other bone diseases.

Steiner recently spent a week at Cape Canaveral on a run-through with the NASA launch team. Her project is slated to fly aboard the Endeavour STS-66 by year's end. *TNX Westlink Report, No 682, October 13, 1994.*

Kid Power

Carole Perry WB2MGP is looking for good speakers under the age of 18 to be presenters at the Dayton '95 Youth Forum. Children should contact Carole for an interview. Her address is at the top of her column "Hams With Class" on page 60. Or phone Carole at (718) 983-1416.

Carole would also like to encourage adults to bring a child or young adult to the Hamvention. Support the future of ham radio!

DXpedition Needs a Hand

The South Georgia Island team of Al WA3YVN (VP8SSI), Jan WA4VQD, and Vince K5VT will operate for at least 15 days from South Georgia Island January 4-19, 1995. They will have three HF stations on all bands CW, SSB, and RTTY. They are well equipped for low band and new band operation.

The team will arrive in the Falklands on December 23, 1994, and will operate on the low bands and the new bands for about five days while awaiting the departure of the R/V Abel-J. This is the same ship that transported the VP8SSI team in 1992.

Donations are needed to support this DXpedition. For information contact SGI DXpeditions, P.O. Box 2235, Melbourne, FL 32902. QSL cards will be handled by INDEXA, c/o John Parrott W4FRU, P.O. Box 5127, Suffolk, VA 23435.

TNX . . .

. . . to all our contributors! You can reach us by phone at (603) 924-0058, or by mail at 73 Magazine, 70 Route 202 North, Peterborough, NH 03458. Or you can FAX us at (603) 924-9327. News items not published in 73 often find their way into our sister publication, *Radio Fun*, a special monthly magazine for new hams. We welcome news and interesting photographs from the world of amateur radio.



Now The Company That Takes You Around The World Lets You Take The World Around With You.

The Drake SW8 – Finally, Professional Desktop Performance In An Affordable, Portable World Band Shortwave.

The company that has been setting the standards in premium-quality world band shortwave performance now puts top-of-the-line features and technology at your fingertips with the SW8... wherever you want to take it. Designed for both desktop use and easy portability, the

Drake SW8 includes many of the same features that have made Drake a perennial favorite of experts – superb audio, versatility, and the unique combination of professional quality and functional simplicity. So tune in the world and get the best of all worlds – quality and affordability, desktop

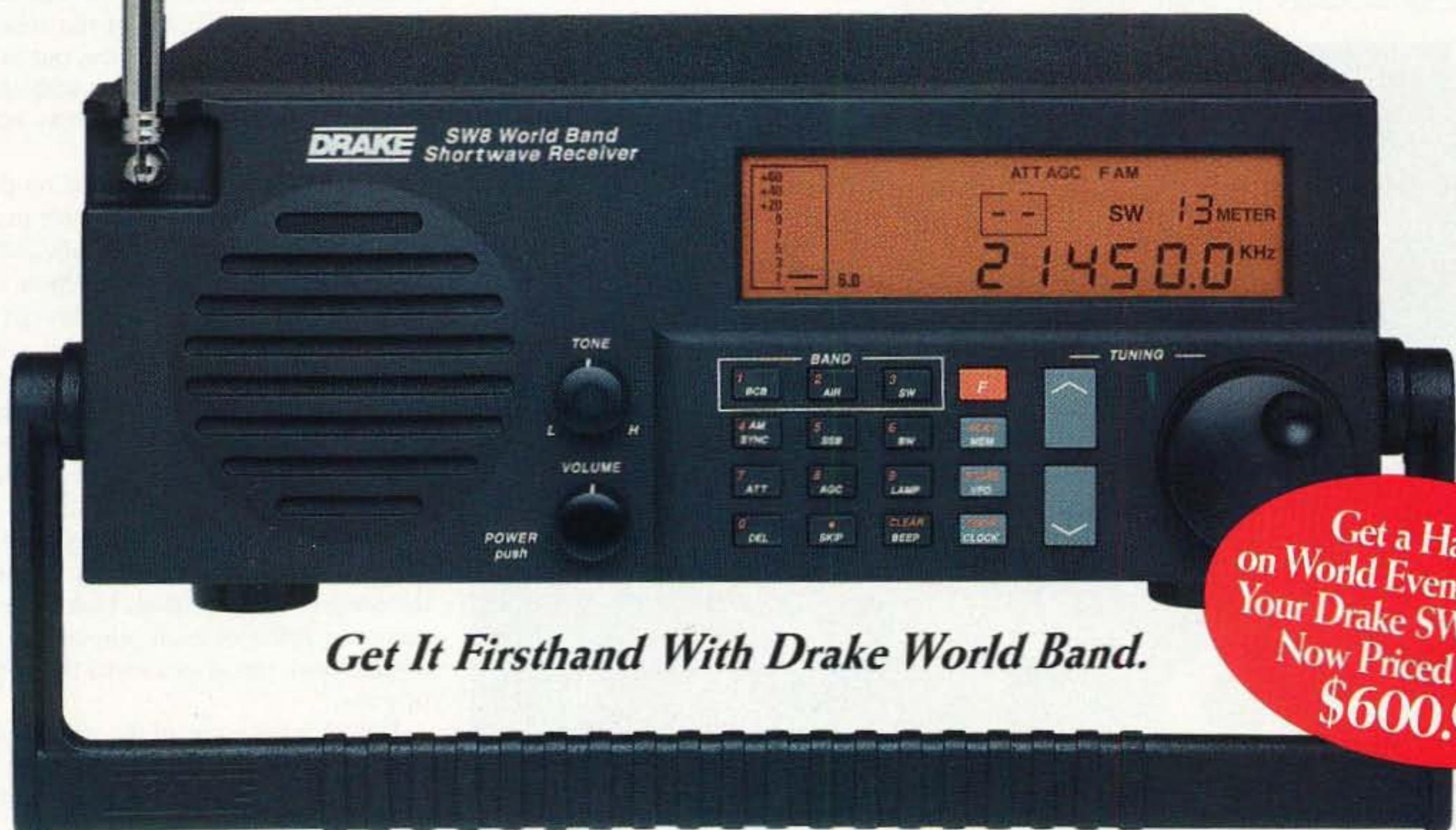
technology and portability.

The Drake SW8.

To order your SW8 direct, for more information, or for the dealer nearest you call:

1-800-968-7753

DRAKE



Get It Firsthand With Drake World Band.

Get a Handle on World Events... Order Your Drake SW8 Today. Now Priced under \$600.00

Kit Builders' Primer

Yeah, I built that.

by Mike Bryce WB8VGE

Nothing brings a smile to my face faster than the smell of molten solder. In fact, I really enjoy building my own equipment. A Friday night, a 10-pound bag of Oreos, two cases of Diet Coke, a new PC board and whoa! An all-night building binge is underway! Throw in some CW coming from the ARK-40 with a dash of the *X-Files* running on the TV in the background and you have my idea of ham heaven. Even if the project I'm working on does not work when it's done, I still have fun building and then troubleshooting the circuit. And when I'm all done, I take a deep breath and say, *Ooooo, let's do it again!*

If you've never heated up a soldering iron before, this is the time to get going. In the past, many of the projects in magazines like *73*, *Radio Fun*, and *QST* required several parts orders to gather all the pieces parts together before solder touched copper. Now, there's a flock of people putting kits together for some of the more interesting projects.

Electronic kits are an easy way to start yourself on building your own ham gear. Usually all the necessary PC board compo-

nents are supplied, as well as a PC board. Sometimes you can even get a nice-looking case to house your project in.

Hail to the Heath

Mention kits, and everyone thinks of Heathkit. They are still the standard by which every kit produced will be compared. That's saying a lot since Heathkit is no longer making electronic kits. What set Heathkit apart from everyone was their manuals. The manuals were clear, concise, with plenty of drawings at every step of assembly. It took a lot of labor and time to produce a manual for Heathkit.

Today's Kits

You won't see a Heathkit-type manual today, although some of the kits I've assembled are getting close. Many of the kits I've run across are known as BOPs. A BOP? Yup! A Baggie Of Parts. Throw in a sheet or two of instructions or guidelines, a PC board overlay, and there you go! A BOP kit usually makes the Friday-night building binge interesting.

The Fine Art of Kit Building

Before you open up the kit, you need a place to work. Pick a place where you can let the kit just sit if need be. Don't use the family dining-room table. Besides the mess, a misplaced soldering iron will really cook a tabletop.

Next, the work area should be uncluttered. In my workshop, cleaning the top of the workbench is a job in itself—I know I could build a CAT scanner just from the parts laying around! There's nothing worse than finding an extra 6.2k resistor and not knowing if this part is for the kit or just laying around. A clean, well-lighted work area is a must-have for any kit building.

Most people will tell you to sort and count off all the parts in your kit against the parts list. I don't. To me that's a waste of time. You'll know if you're missing a part when you come to it.

While you're putting together your kit, you may find a part missing. I never panic, but simply mark on the overlay that a part is missing and continue on with the assembly. I've found in the past that the missing part shows up. Never, ever throw out any of the packing material that came with the kit. A missing diode or connector may be lurking inside a foam peanut.

I lay a sheet of paper down on the workbench, then place all the resistors in one pile, all the capacitors in another pile, and all the semiconductors in another. When a 10k resistor is called for, I wade through the pile until I find one. The paper adds contrast so you can see the color codes of the parts easier. It's especially helpful with resistor color codes. The paper will also reflect light up so you can read the markings on the diodes and transistors much easier. And, if you mislay a part, it is much easier to spot on the paper. Depending on the complexity of the kit and the amount of parts used, I take a pencil and mark the name of each pile on the paper. A small drawn arrow points to the correct pile of parts.

If the kit has some of the parts in small envelopes or bags, never open them up until that part is called for. This way, you'll never risk installing U3 instead of V3.

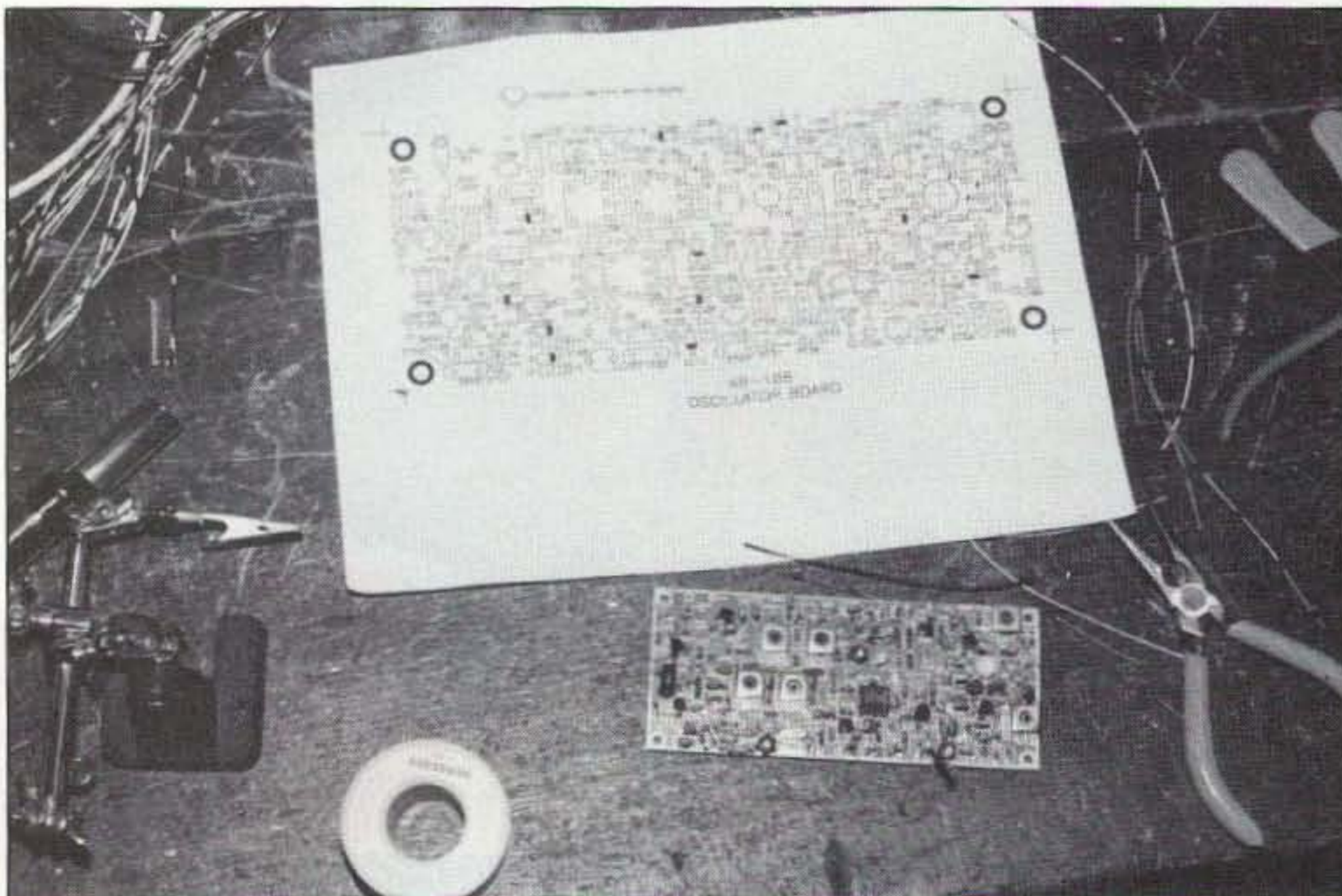


Photo A. The complexity of the instructions typically increase as the complexity of the kit increases. (Photo by Jeff Gold AC4HF.)

MFJ ACCESSORIES

Compact Speaker/Mics

Here's a Compact Speaker/Mic that fits comfortably in your hand and has a full size speaker for crystal clear audio.

No need to remove your handheld from your belt to talk or monitor calls. Clip it near your ears so you can easily hear every call with the volume turned down.

First-rate electret mic element and full size speaker gives superb audio on transmit and receive. Earphone jack, PTT, lightweight retractable cord. Gray. 1 1/4 x 2 x 3 in.

MFJ-284 fits Icom and Yaesu.
MFJ-286 fits Kenwood.



MFJ-284 or MFJ-286
\$24.95

Mini Speaker/Mics

These tiny MFJ Speaker/Mics are so small and so lightweight you'll forget they're there -- until you get a call.

Excellent audio from electret mic element and speaker. Has swiveling lapel/pocket clip, PTT button with transmit LED, earphone jack, lightweight retractable cord. Available with L or regular connector. Tiny 2 x 1 1/4 x 1/4 in.

Order MFJ-285/MFJ-285L for ICOM, Yaesu, Alinco; MFJ-287/MFJ-287L for Kenwood; MFJ-283 for split plug Alinco; MFJ-285W for IC-W2A.



MFJ-283, MFJ-285, MFJ-285L, MFJ-285W, MFJ-287 or MFJ-287L
\$24.95

L Connector also available - order L model.

MFJ Artificial RF Ground

MFJ-931
\$79.95

Creates artificial RF ground that eliminates or reduces RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding.

Greatly improves your signal if you're using a random wire or longwire antenna with an ineffective ground.

Electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire.

20 Meter CW Transceiver

MFJ-9020
\$179.95

Throw this tiny MFJ 20 Meter CW Transceiver in a corner of your briefcase and enjoy DXing and ragchewing wherever you go. You get a high performance superhet receiver, crystal filter, RIT, AGC, vernier tuning, sidetone, speaker, up to 5 watts output, semi/full break-in, much more. Free manual. See free MFJ catalog for 40, 30, 17, 15 Meter versions, keyer, audio filter, power pack, tuner, antennas.

Super Active Antenna

"World Radio TV Handbook" says MFJ-1024 is a "first rate easy-to-operate active antenna...quiet...excellent dynamic range...good gain...low noise...broad frequency coverage...excellent choice."

Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz - 30 MHz.

Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED. Switch two receivers and aux. or active antenna. 6x3x5 in. Remote has 54 inch whip, 50 ft. coax. 3x2x4 in. 12 VDC or 110 VAC with MFJ-1312, \$12.95.

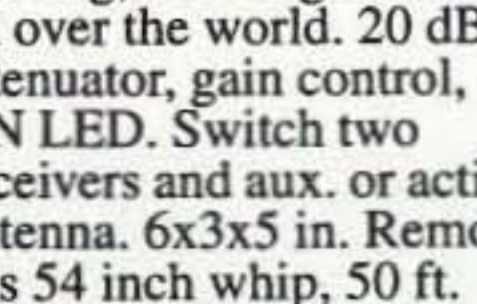
Cross-Needle SWR Meter

MFJ-815B
\$69.95

Peak/average Cross-Needle SWR/Wattmeter. Shows SWR, forward/reflected power in 2000/500 & 200/50 watt ranges. 1.8-60 MHz.

Mechanical zero. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

"Teflon" is a registered trademark of Dupont



MFJ Coax Antenna Switches



'34" MFJ-1701



'21" MFJ-1702B



'59" MFJ-1704

Select any of several antennas from your operating desk with these MFJ Coax Switches. They feature mounting holes and automatic grounding of unused terminals. One year unconditional guarantee.

MFJ-1701, \$34.95. 6 position antenna switch. SO-239 connectors. 50-75 ohm loads. 2 KW PEP, 1 KW CW. 10x3x1 1/2 in. DC-60 MHz.

MFJ-1702B, \$21.95. 2 positions plus new Center Ground. 2.5 KW PEP, 1 KW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 ohm. 3x2x2 in. MFJ-1702BN, \$31.95, N connectors, DC-1.1 GHz.

MFJ-1704, \$59.95. 4 position cavity switch with lightning/surge protection. Center ground. 2.5 KW PEP, 1 KW CW. 50 dB isolation at 500 MHz. 50 ohm. 6 1/4 x 4 1/4 x 1 1/4 in. MFJ-1704N, \$69.95, N connectors.

Dry Dummy Loads for HF/VHF/UHF

MFJ has a full line of dummy loads to suit your needs. Use for tuning to reduce needless (and illegal) QRM and save your finals.

MFJ-260B, \$29.95. VHF/HF. Air cooled, non-inductive 50 ohm resistor. SO-239 connector. 300 Watts for 30 seconds, derating curve. SWR less than 1.3:1 to 30 MHz, 1.5:1 to 150 MHz. 2 1/2 x 2 1/2 x 7 in. MFJ-260BN, \$34.95, N connectors.

MFJ-264, \$59.95. Versatile UHF/VHF/HF 1.5 KW load. Low SWR to 650 MHz, usable to 750 MHz. 100 watts/10 minutes, 1500 watts/10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 in. MFJ-264N, \$69.95, N connector. MFJ-5803, \$4.95, 3 ft. coax/PL-259.



'29" MFJ-260B



'59" MFJ-264

MFJ Low Pass Filter

Suppress TVI, RFI, telephone and other interference by reducing unwanted harmonics going to your antenna. 9 poles, MFJ's exclusive Teflon[®] Dielectric Technology[™] capacitors, hi-Q inductors, ground plane shielding, RF tight cabinet gives excellent TVI/RFI protection. Full legal power 1.8-30 MHz. Mounting tabs.

MFJ-704
\$39.95



Full Color FAX

Use your computer and transceiver to receive, display and transmit brilliant full color news photos and incredible WeFAX weather maps with all 16 gray levels. Also receive/transmit RTTY, ASCII and CW.

MFJ-1214PC
\$149.95



MFJ Iambic Paddles

MFJ Deluxe Iambic Paddles feature a full range of adjustments in tension and contact spacing, self-adjusting nylon and steel needle bearings, contact points that almost never need cleaning, precision machined frame and non-skid feet on heavy chrome base. For all electronic CW keyers.

MFJ-564
\$49.95



MFJ/Bencher Keyer

The best of all CW worlds -- a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle!

MFJ-422B
\$134.95



Iambic keying, speed (8-50 wpm), weight, tone, volume controls. Automatic keyer or semi-automatic ("bug")/tune mode. RF proof. 4 1/8 x 2 5/8 x 5 1/2 in. MFJ-422BX, \$79.95, keyer only for mounting on your Bencher paddle.

12/24 Hour LCD Clocks



'19" MFJ-108B



'24" MFJ-112

MFJ-108B dual clock has separate UTC and local time displays. Huge 5/8 inch LCD digits are easy-to-see. Brushed aluminum frame.

MFJ-112 shows hour/minute/second, day, month, date, year at any QTH on world map. 12 or 24 hour display. Daylight saving time feature.

VHF SWR/Wattmeter

MFJ-812B
\$29.95
Covers 2 Meters and 220 MHz. 30 and 300 Watt scales. Relative field strength 1-250 MHz, SWR above 14 MHz. 4 1/2 x 2 1/4 x 3 in.



Code Practice Oscillator



MFJ-557
\$24.95

MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable. 9-volt battery or 110 VAC with MFJ-1305, \$12.95.

Earphone jack for private practice, tone and volume controls for a wide range of sound. Speaker. Adjustable key. Can be hooked to transmitter. Sturdy. 8 1/2 x 2 1/4 x 3 3/4 in.

MFJ Multiple DC Outlet



MFJ-1118
\$64.95

Use your rig's 12 VDC power supply to power two HF/VHF rigs and six or more accessories with this MFJ high current multiple DC outlet.

2 pairs of 30 amp 5-way binding posts separately fused for rigs. 6 switched, fused pairs for accessories. DC voltmeter, "on" LED, RF bypassed, 6 ft. of 8 gauge power cable. See free MFJ catalog for more DC outlets.

Write or call... 800-647-1800
Free MFJ Catalog

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH (8324)
• 1 year unconditional guarantee • 30 day money back guarantee (less s/h) on orders from MFJ • Free catalog

MFJ MFJ ENTERPRISES, INC
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon-Fri
FAX: (601) 323-6551; Add \$6 s/h

MFJ... making quality affordable
Prices and specifications subject to change © 1993 MFJ Enterprises, Inc

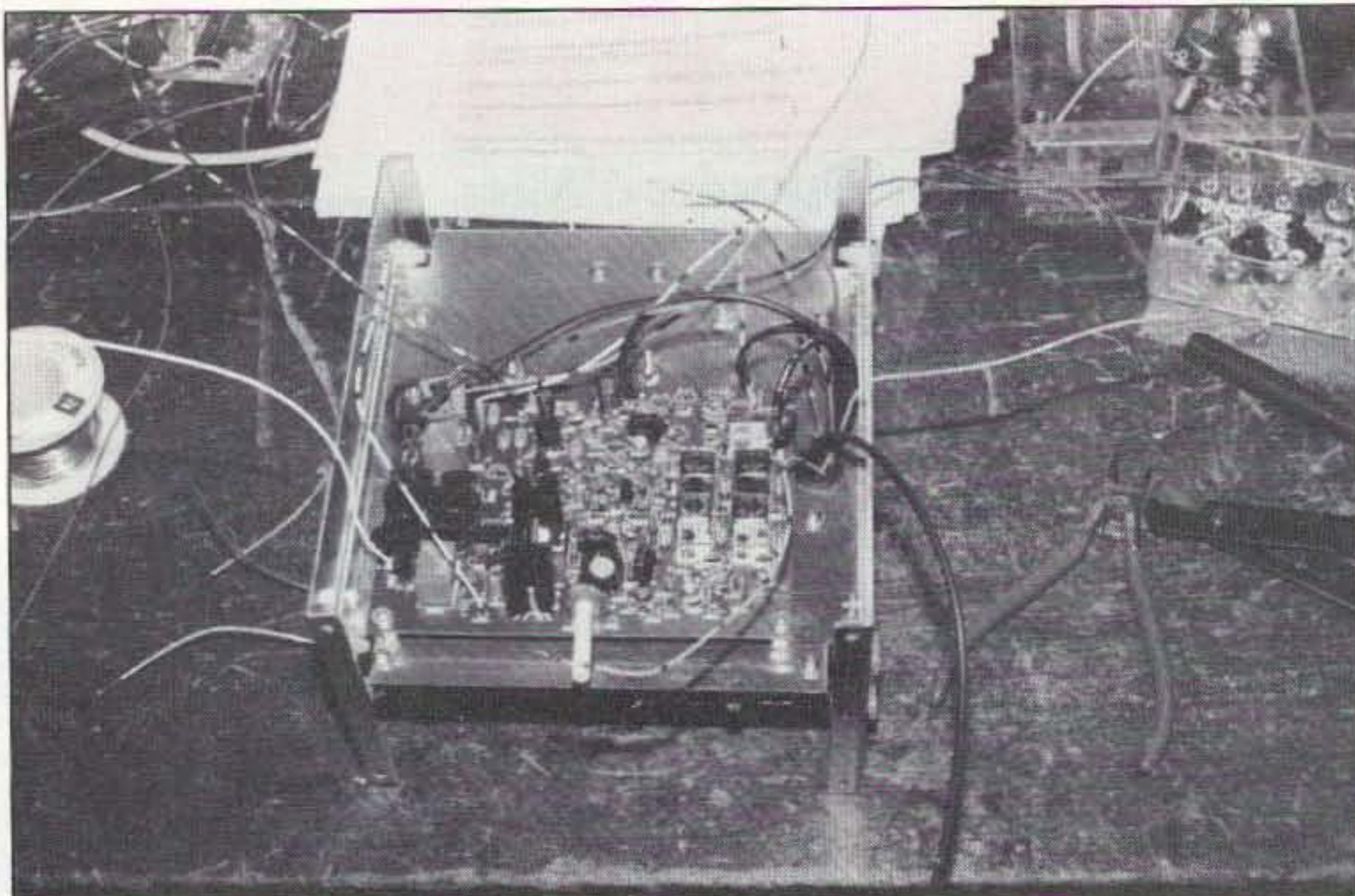


Photo B. Here we see the Oak Hills Classic QRP rig kit starting to take shape. Check out the review on page 14. (Photo by Jeff Gold AC4HF.)

Before any solder hits the PC board, I always look over the PC board for any signs of damage or under-etched copper. A tiny spot of copper between two pads is all it takes to cause trouble. When stuffing the PC board with parts, I make a mental note of the traces and pads. Pads that are supposed to be connected can look like a solder bridge. This way, I avoid the hassle of desoldering a good joint. Depending on the kit, a PC board foil pattern may be included. This really helps you to find and detect solder bridges as you assemble your kit.

Because there are so many resistors in any given circuit, they go on the PC board first. Just because the leads on resistors are long does not mean you have to use the whole lead. Unless directed otherwise, resistors mount flat against the PC board, and not up in the air an inch or two. The same goes for diodes and axial capacitors. Push them both down against the board. Although not really necessary, I like to place all the resistors with the color codes all pointing in one direction. It makes troubleshooting a bit easier if you don't have to constantly flip the PC board from side to side. Besides, a PC board is a piece of artwork!

I do the same for capacitors, too, as long as they are not polarity sensitive. By inserting the capacitor with the lettered side out, you can check your work much easier.

When installing diodes, resistors or axial capacitors, bend the leads slightly away from each other after you have passed their leads through the holes in the PC board. Don't bend the lead flush to the board—doing so will almost guarantee a solder bridge.

I mount IC sockets, trimmer capacitors and pots with one or two leads, check the mounting, and then solder in the remaining leads. Again, be sure you have everything down flush on the board.

Semiconductors are in a class by themselves. They must be installed the right way

or the circuit won't work. There is also the possibility of toasting the semiconductor. I mount TO-92 style transistors about 1/4" above the board. This leaves me enough room to get a test probe on the leads, but short enough to prevent critters from developing because of excessive lead length.

Unless the instructions say otherwise, don't use IC sockets in circuits using high-speed or high-frequency ICs. The extra lead length will cause havoc with the circuit. Phase-locked loops are especially touchy about IC sockets. However, sockets are a good idea, especially when using a double-sided plated-through-hole PC board. If you have any doubts, a call to the kit's manufacturer should clear things up.

Take breaks. There's no rush, this is not a contest to see how fast you can assemble a circuit board. Kit building is supposed to be fun, not a race to see who gets done first. Take time out to rest your eyes.

I always leave a radio cooking in the background, listening for CQs. When I hear one, I roll my chair over to the rig, and with a bit of luck, I'll have a QSO. And, you'll have something to talk about besides "The rig here is Kenwood and the weather is warm!" If nothing else, get up and add some ice to the Diet Coke and grab another fistful of Oreos.

Surplus Parts and Parts Substitutions

You'll find a lot of surplus parts in kits. There's nothing wrong with the practice. Most of the surplus parts are prime number-one-grade components. Most are made for the military or consumer market. Surplus parts are usually better than the honest-to-goodness parts. This is especially true if you end up with mil-grade goodies.

Let's say our kit calls for a 2N2222 transistor. Instead, you find inside your kit a XCX345/SXC. What you got is a surplus NPN transistor made by who knows who. It

will work in the kit. There's a good chance it was made for the military, costs the government (you and I) \$34 each and now the military can't use this part anymore because of design changes. A parts broker purchased three tons of them and is selling them off for a dollar a pound. That's how you and I end up with surplus parts in those BOPs.

Surplus semiconductors are not bad, but surplus capacitors can be a real pooper! A 0.1 capacitor is a 0.1 capacitor for almost all projects. But if the PC board is laid out for a lead spacing of 0.2 inches and the surplus capacitor has 0.7 lead spacing, whoa! It's not going to fit! Just like a fat lady with a pair of tight jeans, with a lot of pushing, shoving, pulling, you can get the part to fit the board, but it's not going to be a pretty sight!

There may be a part or two that the kit supplier has substituted. There's no need to panic, as most substituted parts will cause no noticeable difference in the way the project performs. If the original article called for a 1.1 μF cap, and the kit has one that's 1.5 μF , that's just fine. As long as the working voltage of the capacitor is as high or higher than needed, you'll have no trouble. Most of the electrolytic capacitors have a working voltage of 16, 25, or 35 volts. Of course, there are many more values to pick from but these are the ones you'll see the most. If the schematic calls for 4.7 μF at 16 volts and your kit has 4.7 μF at 35 volts, that's just fine. Solder him in and move on to the next component. (I've found that active parts like transistors and ICs are female, resistors and capacitors are male.)

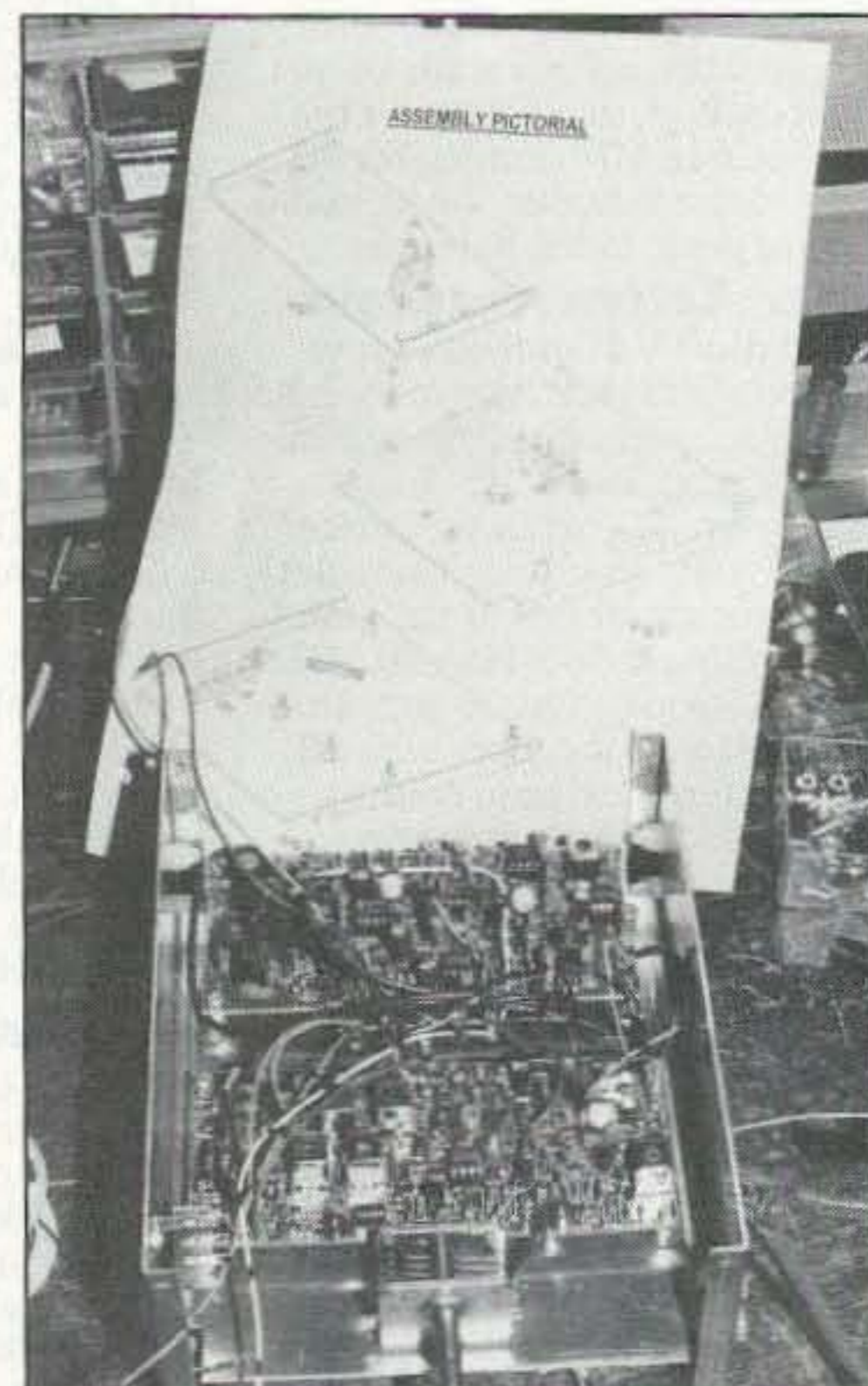


Photo C. You'll want to work in a comfortable location where you can leave the partially-assembled kit undisturbed. Don't use the kitchen table! (Photo by Jeff Gold AC4HF.)

Instructions and Manuals

BOP kits are not noted for their instructions. Most BOPs consist of a photocopy of the original article, a parts overlay for the PC board and a sheet or two of additional instructions. Most of the assembly work must be done by the builder! If the instructions say to "install the resistors," that's what you do. Usually, as the complexity of the project increases, so do the instructions—unless it's a Kanga kit. Then you're on your own!

Before you do any soldering, it's a good idea to look over the instructions of the kit and do a dry run through. Make a note to yourself of any part of the instructions you're not clear on. A good dose of common sense is your best weapon. If it sounds really stupid, it probably is. Double-check this step before you move on. I can look past most errors in a kit's instructions. If you're told to install an RCA jack on the PC board and there's no way it will fit, then there's an error in the instructions.

Locate the proper part and install it on the board. Make a note of the error on the instruction sheet.

Soldering

I've melted a lot of solder in my time. I think I'm fairly good at the task, but every now and then I screw up royally. Over 90 percent of the kits returned to Heath did not work because of poor soldering.

I use two different soldering irons for kit building: An 18-watt Antek iron for small work, and a larger 45-watt iron with a big tip for heavy-duty work for soldering in connectors and such. Keep a spool of desoldering braid handy to clean up any mistakes.

Don't try to cook the PC board with an iron that's not hot enough. Soldering is a lot like kissing your aunt—you have to be quick, do a good job, and leave no slobber. All your solder connections should be bright and shiny.

Troubleshooting

The odds are in your favor, but every now and then one of the kits I finish up with won't work. I start by looking at every solder joint. I especially check any odd-looking *clump* of pads for solder bridges.

If I find none, then I look at a misplaced resistor. It's so easy to put in a 470-ohm resistor in place of the 47k resistor. Equally useful, but hardly interchangeable! I check for like values, as in the example above, in case I have mistaken them during assembly. After I check the resistors, I move on and do the same for the capacitors. If I don't find any problems, I move on to the semiconductor, and so on until I'm sure there is no problem with the way the kit went together. Usually, the problem can be located and fixed without too much trouble.

Kit building is a lot of fun. For me, it's solder fume therapy, as I get totally involved with a kit. Why, who knows, maybe you'll soon be saying, "Ooooo, let's do it again!"

For High Performance in Repeater Technology, Go with the Leader—

SPECTRUM

S-7R Basic Repeater

- "Stand Alone" or use with your controller



- 10–40 Watt Units
- 2M, 222, 440 MHz
- Super Sensitive/Selective Receivers
- Unusually Good Repeat Audio
- Proven Performance throughout the World!

For that new Machine—Spectrum makes 2 lines of Repeaters—the Deluxe SCR1400 and the new basic low cost S-7R line.

The S-7R Repeaters maintain the quality of design, components and construction which have made Spectrum gear famous *throughout* the world for years.

However, all of the "bells & whistles" have been eliminated—at a large cost savings to you! The S-7R is a real "work-horse" basic machine designed for those who want excellent, super-reliable performance—but *no frills!* For use as a complete "stand-alone" unit, or with a controller.

Of course, if you do want a Full Featured/Super Deluxe Repeater with Full panel metering and controls, and a complete list of 'built-in' options, then you want our SCR1400—the new successor to the "Industry Standard" SCR1000/4000.

Available with Autopatch/Reverse Patch/Landline Control; TouchTone Control of various repeater functions; 'PL'; "Emergency Pwr./ID; High/Low TX Power; Tone & Timer Units; Sharp RX Filters; Power Amps, etc.



SCR1400 REPEATER W/150 WT. 2M Amp & 30A POWER SUPPLY.
(All items available separately)

Shown in optional cabinet.

Call or write today for details and prices!
Get your order in A.S.A.P.
Sold Factory Direct or through Export Sales Reps. only.

■ Complete Line of VHF/UHF Rcvr. & Xmtr. Link Boards & Assemblies also available. Plus ID, COR, DTMF Control Bds., Antennas, Duplexers, Cabinets, etc. Inquire.



SPECTRUM COMMUNICATIONS CORP.

1055 W. Germantown Pk, S4 • Norristown, PA • (610) 631-1710 • FAX: (610) 631-5017
CIRCLE 51 ON READER SERVICE CARD

by Jeff M. Gold AC4HF and Daniel Wee

Oak Hills Research
20879 Madison Street
Big Rapids MI 49307
Telephone: (616) 796-0920,
FAX (616) 796-6633.
Price Class: Kit—\$219.95;
Optional keyer—\$39.95

The Oak Hills Classic

Dual-band QRP kit.

I like to build all levels of projects, but sometimes I really like to sit back and just enjoy building up a project that I know will not have any surprises for me in the way of unclear directions, or directions filled with mistakes or poor performance of the kit when it is completed. I have built many of the Oak Hills' kits. I have enjoyed building every one and they all worked well when completed. Oak Hills takes great care in providing top quality parts and clear and easy-to-follow directions.

The Oak Hills Spirit that I built for 20 meters was one of my favorite rigs to build and operate. When I heard that Oak Hills was going to sell a kit that was designed as well as the Spirit and was a 20/40 meter rig, I got excited—I spend most of my time on 20 and 40 meter CW/QRP. Having one rig that I could build myself, that would operate on both bands, and would run off a gel cell really appealed to me.

The Parts

I usually build larger projects in stages. I open the parts for one section at a time and separate out the various types of parts. Then, for example, I will put all the resistors on a piece of paper labeled with their parts numbers and do the same for the rest of the parts. This helps me check to make sure all the parts are included and also helps avoid one of the biggest pitfalls in building: putting a part in the wrong place.

The parts for each section of the Classic are bagged separately. The boards are about the clearest silk-screening I have come across and they have plated-through holes. The back of the board is coated over to help avoid the second big pitfall of building kits: solder bridges. All the coils are pre-wound to help the kit go together quicker and avoid problems that many builders have with winding their own coils. The instructions are excellent; Oak Hills employed an illustrator who used to work for Heathkit. The case is nicely screened and is really good quality. After seeing how easy the kit looked to put together (the parts are fairly close together on the board, but this shouldn't present much of a problem), I decided to separate out the parts into little plastic parts bins and not take the time to label every part.

Assembly

My wife does beautiful needlepoint and other crafts of this type. I always ask her why she doesn't enter some of them in the County Fair. She says she can't do that because although they look great from the front, the back side of the work isn't perfect. This is the way I usually operate with my building. If I am building a lot of kits, the kits usually work well, but may not be the prettiest things you have ever seen. My goal for this project was to be able to enter it in the County Fair and have anyone look at the bottom of the board and say how pretty it was. I knew I was going to keep this rig for a long time if it worked the way I thought it would, so I decided to really take my time building it.

I found the kit went together very quickly, even though I really took my time. I had no problems with the directions and never found a case where the instructions were ambiguous. I would rather just have a parts overlay and schematic than ambiguous directions.

With the optional iambic keyer there are four printed circuit boards to build. There are separate boards for the oscillator, receiver, transmit/receive, and a small board for the keyer. Each section comes with separate bagged parts, and overlays, which makes the kit much easier to build.

Alignment

The alignment procedure was

fairly straightforward and didn't take much time. It is recommended that you have a frequency counter to adjust the oscillators. Separate adjustments are made for the 20 and 40 meter band sections.

After I knew the rig was working well I went back and readjusted the coils in the oscillator section a little differently than the instructions called for. I found that following the instructions gave me the full bandwidth on both bands, but the analog meter that is silk-screened on the case was a little off. By readjusting the coils and playing with them I was able to get the rig so that the panel frequency indication was right on the money. This is one of the only rigs on which I have been able to get the reading to be accurate for the whole bandwidth. I would suggest that you follow



THE PATCOMM PC-1610

THERE IS NO OTHER RADIO LIKE IT



**ALL THIS
FOR ONLY
\$1,295⁰⁰**

(Keyboard Not
Included)

The PC-1610 has begun to revolutionize CW & RTTY/ASCII operation on the HF bands. The "Plug-in & Operate" concept is making digital operation a snap, with only a standard IBM* type AT keyboard required for RTTY/ASCII operation. Received data is displayed on the built in LCD display or an external RS-232 serial device such as a "Dumb Terminal." The PC-1610 offers the following features:

- Built-in AT keyboard interface (keyboard optional)
- 160-10M ham band coverage
- USB/LSB/CW/FSK modes
- 75W output power
- Built in digital power/SWR meter
- DDS VFO with 1Hz step size
- Selectable variable speed/fixed 10Hz step VFO tuning
- Built-in 24hr clock
- 90 tunable memories
- 1 scratchpad memory
- 9 (256 character) keyboard data buffers
- Built-in 5-75 wpm IAMBIC keyer
- Built-in 2.4KHz, 1.8KHz, 500Hz, 200 Hz & RTTY filters
- Notch filter
- Select 1 of 3 antennas from front panel

Specifications are subject to change without notice.
* IBM AT is a registered trademark of the IBM Corporation.

<ul style="list-style-type: none"> ■ Basic display lets you know exactly where you are. 	<ul style="list-style-type: none"> ■ Standard Display shows RX/TX VFO freq's, time and current memory
<pre>14.03510-T 0930 14.03510-R 1000</pre>	
<ul style="list-style-type: none"> ■ Send & Receive in: CW / RTTY(BAUDOT) / ASCII 	
<pre>TNX FER QSO, 73</pre>	<p>← Incoming data</p> <p>← Outgoing data appears here</p>
<ul style="list-style-type: none"> ■ Store up to nine 256 character messages. 	<ul style="list-style-type: none"> ■ Messages can be: edited, sent & appended to outgoing message
<pre>14.03510-T 0930 3> CANNED MSG █</pre>	<p>← Format & Edit stored MSG's here</p>
<p>PC-1610 =</p>	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin: 0 5px;">HF XCVR</div> <div style="margin: 0 5px;">+</div> <div style="border: 1px solid black; padding: 2px 5px; margin: 0 5px;">PC</div> </div> <div style="text-align: center; margin: 5px 0;">+</div> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin: 0 5px;">DATA CNTLR</div> </div> <div style="text-align: center; margin: 5px 0;">+</div> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin: 0 5px;">○</div> </div>
<ul style="list-style-type: none"> ■ The PC-1610 Performs the functions of an HF Transceiver, Computer, Data Controller and Control Software all in one package. 	

The PC-1610 has too many features to adequately describe in one ad... call or write for a detailed brochure—Major Credit Cards Accepted.

patcomm
corporation

Designed and manufactured in the U.S.A.
Phone: (516) 862-6512 ■ Fax: (516) 862-6529
7 Flowerfield, St. James NY 11780

CIRCLE 321 ON READER SERVICE CARD

the alignment procedure first—you may find that it works out correctly for you if you follow the provided instructions.

Circuit and Design

The OHR Classic dual-bander is invariably one of the best receiver designs I have seen on the kit market. Part of the strength of the circuit lies in its use of extensive filtering in the front end and IF stages. The use of the diode-ring mixer (the TUF-1) also results in a good dynamic range and the receiver is essentially a low noise one.

Looking at the circuit, you will find that all the switching is solid-state, including the T-R switching. This is a good scheme and you won't hear any relays clattering away as you send code. All the switching diodes are biased at a common rail. Another area where diode-switching is employed in this circuit lies in the band-changing circuitry. Essentially, the band switch uses the diodes to switch in one of two band crystals for the LO and to switch in the appropriate band-pass filter. (It would have been nice if they had used hot-carrier diodes for this).

The circuit itself is a classical one (no pun intended). It comes with an RF-preamplifier stage to provide some front-end gain to compensate for the filter insertion loss. This is a standard negative feedback broadband preamp and is unconditionally stable. The 2N5179 is also a low-noise device so that helps somewhat. The diode-ring mixer is then terminated in a diplexer and a post-mixer amplifier before going through the standard four-pole crystal ladder filter. The use of the MC1350 permits IF AGC, which is audio-derived.

The product detector uses an NE602AN, which seems to work fine at this stage (after the AGC) since overloading can be easily controlled, and provides some conversion gain (12 dB or so) as well.

There is an audio preamp stage before the audio is fed into a permanently wired audio bandpass filter. This is not a very narrow one and I suspect that its purpose is to get rid of wideband IF noise products. Finally, there is an LM-380N-8 final audio amplifier which is under-driven for low THD figures.

The VFO/LO is built on a separate board which helps isolation and stability. It is well-buffered before being fed into the diode-ring mixer, but a drawback here is that the mixer injection signal is sometimes on the low side and is not constant for the two bands. LO signal levels should be +7 dBm (ballpark) for good performance. The problem here lies in the oscillator, which does not perform too well at the higher crystal frequency (18.000 MHz). Perhaps the MPF102 could be replaced with a 2N4416.

As you can see, this is a very straightforward design and its strength lies in the fact that OHR did not skimp on filtering and matching impedances.

The TX side of the board is cleverly designed to reuse the RX mixer section so there is no additional mixer for the TX side. Similarly, the bandpass filter for receive is also reused for transmit. A good scheme, really, and economical too. After the bandpass filtering there is a two-stage driver, which is essentially Class-A amplifiers, before the final Class-C amplifier (2SC2075). This is followed by the mandatory low-pass filter. The switching is all solid-state, of course, as I have mentioned before, and looks very well implemented.

Performance

The performance of the rig attests to the soundness of the design. My one gripe is the permanently fitted audio filter which is used to filter out wideband IF noise. I would have been much happier if this noise (6 dB) could be prevented in the first place, or to have some pre-product detector filtering. Ah, well, you just can't always have the cake and eat it as well, can you? A very good design and performer (as many will tell you), overall.

There are two aspects to every kit building experience. The first is the building experience. With the Classic, this phase was a clear winner and rated at the very top of its class. The second aspect is how it performs. I have found that even with all the rigs I have hooked up on my operating bench, I end up using the Classic a lot. I really am impressed with the smooth solid-state QSK. I hate relay switching. I find that even though I really like my expensive Kenwood 850S, the relay QSK bothers me. I prefer the switching on the Classic a lot better. I find the receiver to be both sensitive, so that if the signal is out there—I am hearing it—and selective—I am easily able to separate out signals except during the most crowded band conditions. I have also found the VFO to be stable. I don't like having to chase signals across the band while I am in the middle of a QSO.

The RIT has a center detent, which makes it easier to use. The tune/operate switch comes in real handy for me. I have a resonant quad for 20 meters, but find that on 40

my vertical needs an antenna tuner to get the SWR down. I find this a lot easier to use—having the tune switch so that I don't have to have a manual key to keep the rig keyed. I also like the fact that you can change the transmit power easily without having to take the cover off the rig. This makes it easy to experiment with different power levels. My rig puts out about 5 watts on 20 meters and about 7 watts on 40 meters. This means that you may have to use the rear panel power adjustment to keep the power level the same when you switch bands.

The keyer is the newer Curtis keyer chip and works very well. It is also very nice to have the straight key jack in addition to a jack for paddles. I often like to operate with straight keys and this rig needs no modifications to be able to do this.

The Classic uses an LM-380-based audio amplifier which is better than the LM-386. There is plenty of audio to drive headphones, but the rig doesn't have enough drive for a speaker. This is one of my only complaints. I don't like headphones except during Field Day, and would have liked to install a small speaker. My other complaint is that I find the rig a little on the large size for portable backpacking operations. I like to take a rig and a gel cell on long hikes and would have preferred having a smaller rig. I really like the case for the rig and find it a little too pretty to throw in a backpack, so it would have to wait for a while anyway. There is plenty of space inside the case to add custom accessories, such as a digital display or a speaker (with some additional amplification).

On the air is where the rig really shines. This transceiver is good enough to make quality contacts. Since my first contact on the rig I have continually received good signal reports. This first contact was during a contest, with PI4COM in the Netherlands. He was a 599 with high power and my signal report was a 564 with 4 watts. I next talked to Marty KW1C in Maine. He reported "your new rig doing FB." Next, I had a nice long QSO with Gary WB0DBW/AE in Columbia, Missouri. It was his first contact with his new Extra Class

license. We had a nice long QSO. He said the rig sounded great on his end. I have since had many long QSOs, both US and DX, and have worked some contests with the rig. One of the highlights of testing the Classic was having a sked set with Ted VA3TAR. The Classic was Ted's first kit. We arranged to meet on 40 meters. Even though conditions were poor, we had a great conversation. It was exciting to hear what the rig sounds like over the air in actual use. The rig sounded great. I think this attests to both the quality of the kit and its design. I really enjoy operating this rig, especially since it covers my two favorite bands. 73

Features: The Oak Hills Classic Dual-Band Transceiver Kit for the 20M and 40M Bands

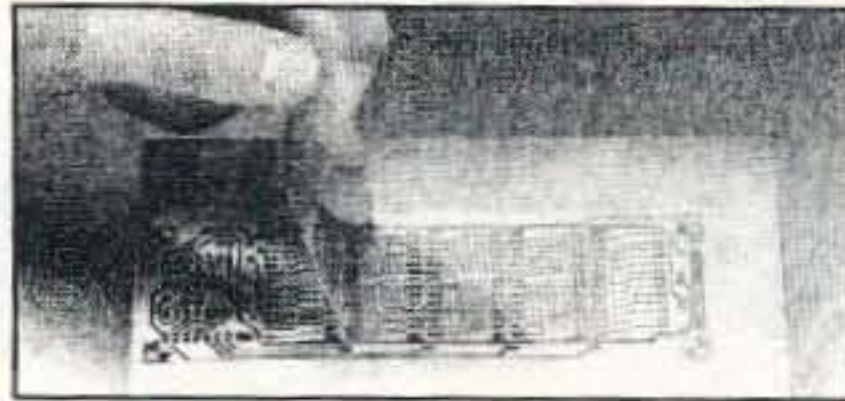
Superhet receiver design with diode ring mixer and RF preamp.
High side LO injection on both bands for a cleaner signal.
Four-pole crystal ladder filter.
Four-pole audio filter.
AGC circuit.
VFO tuning with 8:1 vernier dial covering 100 kHz on both bands.
RIT with center detent control providing +/-1 kHz.
Sidetone oscillator with level control.
Smooth solid-state QSK.
4-6 watts of RF power on both bands.
TX power adjustable from 0 to full power on rear panel.
Both iambic and manual key jacks provided.
12 VDC operation—current drain 290 mA on RX and 1.2 A on TX.
Measurements: 4" x 6-1/4" x 6-7/8".
Weight: 48 oz.
100% complete, all coils prewound.
All panels prepunched for optional iambic keyer.

FEEDBACK

In our continuing effort to present the best in amateur radio features and columns, we recognize the need to go directly to the source—you, the reader. Articles and columns are assigned feedback numbers, which appear on each article/column and are also listed here. Please rate each feature or column as "Great," "OK," or "No Way." Mail your responses to: 73 Magazine Feedback, 70 Routh 202N, Peterborough, New Hampshire 03458.

- 1 Never Say Die
- 2 Letters
- 3 QRX
- 4 Kit Builders' Primer
- 5 Review: The Oak Hills Classic
- 6 Review: S & S Engineering's ARK-4
- 7 Review: The Kenwood TH-22AT
- 8 Review: The Ameritron ALS-500M
- 9 Stretched Vertical Gain Antenna for 6 Meters
- 10 CW Operator's Friend
- 11 Polarity Protection Plus
- 12 DTMF Computer Interface
- 13 Ham Help
- 14 Dealer Directory
- 15 Review: The Bencher Chrome Straight Key
- 16 RTTY Loop
- 17 Packet & Computers
- 18 Carr's Corner
- 19 QRP
- 20 Hams with Class
- 21 Homing In
- 22 ATV
- 23 Above and Beyond
- 24 Ask Kaboom
- 25 73 International
- 26 Special Events
- 27 Propagation
- 28 Barter 'n' Buy
- 29 New Products

MAKE CIRCUIT BOARDS THE NEW, EASY WAY



WITH TEC-200 FILM

JUST 3 EASY STEPS:

- Copy circuit pattern on TEC-200 film using any plain paper copier
- Iron film on to copper clad board
- Peel off film and etch

convenient 8 1/2 x 11 size
With Complete Instructions

SATISFACTION GUARANTEED

5 Sheets for \$4.95 10 Sheets only \$6.95
add \$1.50 postage

The MEADOWLAKE Corp.
Dept. A P.O. Box 1555
Oneco, FL 34264

HUGE 100 PAGE CATALOG

- Communications Receivers
- Portable Receivers
- Scanners
- Amateur HF Transceivers
- VHF-UHF Transceivers
- HT's and Mobiles
- Amateur and SWL Antennas
- Accessories and Parts
- RTTY and FAX Equipment
- Books and Manuals

This catalog includes prices!

Send \$1 to

Universal Radio
6830 Americana Pkwy. 73
Reynoldsburg, OH 43068
Tel. 614 866-4267

VHF UHF MICROWAVE

Transverters:

6 M, 2 M, 222 MHz, 70 cm, 902, 1296, 2304, 3456, 5760 MHz, 10 GHz

Receiving Converters:

1691 MHz, 2400 MHz

Antennas:

Loop Yagis 902 - 3456 MHz
Rutland Arrays Yagis: 6M - 70 cm

Low Noise Preamps and Kits:

144 MHz - 10 GHz

Linear Power Amps:

70 cm - 2304 MHz

Components, Cable, Antenna Relays

FREE Catalog Available

DOWN EAST MICROWAVE

Bill Olson W3HQT

RR 1, Box 2310

Troy, ME 04987-9721 USA

Phone (207)948-3741

Fax (207)948-5157



Factory Authorized Dealer & Service For

**KENWOOD
YAESU
ICOM**

Call Us For
Great Prices & Great Service

TOLL FREE ORDER LINE 1-800-344-3144
Continental U.S. & Texas

COMM. INC. SAN ANTONIO TEXAS
THE HAM CENTER
SALES AMATEUR RADIO SERVICE

5730 Mobud San Antonio, TX 78238 (512) 680-6110
FAX (512) 647-8007

THE FAMED 2 METER

Also the ultimate for scanners bcb to 1300 MHz.

A. S. A. 9209

+9 db Co-Linear "MultiWave" Base Station Double 5/8 over 1/4 wave delivers up to +9 db gain. All fiberglass & solid aluminum construction. Fits masts up to 1-1/2". 2 Meter Base Station 10' length.

\$36.73

+ \$6.00 S&H

(SC RES. 5% SALES TAX)

CHECK IN ADVANCE OR C.O.D.

ALSO AVAILABLE IN 220 & 440



ASA



"Service is the Reason For Our Success"

Model 9209
+9db

Tel: (803)293-7888 P.O. Box 3461
Watts: 1-800-722-2681 Myrtle Beach, SC 29578

CIRCLE 18 ON READER SERVICE CARD

HamCall CD-ROM

US & International Callsign Lookup

Over 1,000,000 listings and 100 Countries

Includes U.S. Clubs & Military Stations.

ICALL program looks up: name, address,

expiration date, birth year, license class,

county, lat/long, area code, time zone, &

elevation. Retrieve by any data element

on PC, call, name and zip on the MAC.

Hundreds of new programs are on this

disc- see the Electronics Software Compendium

CD-ROM for a larger collection of software.

•No hard disk required • Print Labels • Export to hard/disk

or floppy • TSR runs from text window • Updated every

April & Oct • Standing orders accepted • Dealer discounts

for 6 or more • Latest public domain PC & MAC software.

Same low price of \$50.00 plus \$5.00 shipping.



New CD-Rom

Electronics Software Compendium

The Electronics Software Compendium

is a collection of programs and data files

that pertain to electronics, broadcasting,

amateur radio and SWL activity.

Over 15,000 files in total. The disc is updated and issued

semi annually in April & Oct. Over 200 megabytes of

material is resident on this CD-ROM, for MAC & PC. Send

your order to Buckmaster Publishing, \$25.00 plus \$5.00

shipping.

BUCKMASTER

Route 4, Box 1630 • Mineral, VA 23117

703:894-5777

800:282-5628

703:894-9141(Fax)

Internet: info@buck.com



CIRCLE 56 ON READER SERVICE CARD

Slow Scan TV

doesn't have to be expensive anymore!



Every day more hams are enhancing their communication by using images. Join the fun and see what you've been missing.

Quality Color SSTV is easy and affordable with **Pasokon TV**. \$239.95

Requires IBM PC-compatible, 786 or better CPU, 1 Megabyte of memory, color VGA display, MS-DOS. Shipping: \$5 to U.S.A. and Canada, \$15 for others. Write or call for complete details.

Absolute Value Systems
115 Stedman St. # 7
Chelmsford, MA 01824-1823
(508) 256 6907
e-mail: johnl@world.std.com

CIRCLE 351 ON READER SERVICE CARD

by Michael Bryce WB8VGE

S & S Engineering's ARK-4

A 40 meter transceiver kit.

S & S Engineering
14102 Brown Road
Smithsburg MD 21783

Telephone: (301) 416-0661; Fax (301) 416-0963
Price Class: \$199.95 kit; \$269.95 assembled and tested.

Some of the buzzwords in today's politically correct world are "smaller," "faster," "cheaper" and "better." Well, that's exactly what S & S Engineering created when they introduced their new ARK-4 40 meter transceiver kit.

The ARK-4 is a fully synthesized QRP transceiver for 40 meters. It's a CW-only rig; there is no SSB on the ARK-4. But, you do get full QSK break-in keying and the 40 meter CW band. It's ideal for the Novice ham, too. In fact, it's one of the few rigs in kit form I'd recommend for a Novice. Thanks to its fully synthesized transmitter, the Novice operator will know exactly where he or she is. This is very important to Novices, who have only a small slice of the 40 meter CW band to begin with.

The ARK-4 comes in a wide variety of configurations. Depending on your budget, you can get just the transmitter or the receiver components with the kit. Later on, as your budget allows, you can add on the goodies until you have a complete 40 meter rig. Why, you can even install a Curtis-based keyer inside your ARK-4. And, if you just can't stand the smell of molten solder, the ARK-4 comes assembled, tuned and tested. Most people will find building the kit the way to go.

If you plan on building the kit, and I hope you do, this is one of the few kits I'd say a beginner can handle. Yes, there are hundreds of parts in the ARK-4. Yes, there is a double-sided plated through-hole PC board. But, you build the ARK-4 in steps, checking each section as you go to make sure you've assembled it correctly. The assembly manual is

quite extensive and offers tips on soldering and proper placement of components, and features several large fold-out sheets. And if that is not enough, provided you assembled the ARK-4 in good faith, you can always get the ARK-4 repaired. There's no reason why a beginner in home-brew should not consider the ARK-4 as their first kit.

A Look Inside

The ARK-4 is really a departure from most of the QRP rigs I've built. When you slide the rig out of its TNC-style cabinet, you'll notice there are no wires of any kind inside. Yup! You read that correctly: There are no wires inside the ARK-4. Every part mounts on one double-sided PC board. I know, I've always disliked making up my own interconnection wiring harness. No wiring harness means fewer mistakes during assembly.

There are no mounting screws holding the PC board down, either. The PC board slides inside the case. The end caps of the case hold everything together. You can open up and inspect the ARK-4 in a matter of seconds!

The signal path is very much like that of the ARK-4's bigger brother, the ARK-40. There's a slight difference in the way the signal is handled in the IF stage: The IF frequency of the ARK-4 is based on a crystal filter made up of color-burst crystals. This is also the reason why you won't be seeing an ARK-2 or ARK-3.

The synthesizer and a PLL make up the heart of the ARK-4. I won't get into the details

of how they both work together, as this is very clearly explained in the manual. It's must reading for the builder as it makes the operation of the PLL and translation oscillators very clear.

The manual that comes with the ARK-4 is different from what you may have seen in the past. Whatever features you purchase with your ARK-4 will shape the size of the manual. The manual has a pull-apart binding to allow you to add pages of assembly text as you order options for your ARK-4. For example, if you only order the transmitter, that's all the instructions you'll receive. Order the transceiver and you'll get transmitter and receiver text.

Although I did not have the pleasure of building this kit, the kits I have built in the past from S & S Engineering are first class. Only the best prime components are used in the kits; there are no surplus or *hamfest special* parts used.

On the Air with the ARK-4

There's not much to do to put the ARK-4 on the air. All you need is a power supply capable of 3 amps, an antenna, and a key. The front panel is nicely laid out, with all the important controls centered. There's the usual on-off volume control, RIT, and transmitter fine-tune control. The options you order for your ARK-4 will determine the amount of control you have over the rig.

Just like the ARK-40, you tune the ARK-4 by push-buttons. However, in the case of the ARK-4 you can use the fine-tune control to put your transmitter exactly where you want it.

The fine-tune control is *not* the RIT—that's a separate control on the ARK-4. I found the best way for me to tune the rig was to set the frequency control buttons to one location and use the fine-tune control to hunt for stations. When a station answers me, I then use the RIT to center him in the middle of the crystal filter. This is how I used the ARK-4 during Field Day, with very good results. I worked just about everything I could hear while using a center-



ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •



MODEL VS-50M

SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-3A, RS-4A, RS-5A, RS-4L, RS-5L
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD except for RS-3A
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)

SL SERIES



• LOW PROFILE POWER SUPPLY

MODEL	Colors		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
SL-11A	•	•	7	11	2 5/8 x 7 5/8 x 9 3/4	12
SL-11R	•	•	7	11	2 5/8 x 7 x 9 3/4	12
SL-11S	•	•	7	11	2 5/8 x 7 5/8 x 9 3/4	12
SL-11R-RA	•	•	7	11	4 3/4 x 7 x 9 3/4	13

RS-L SERIES



• POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RS-4L	3	4	3 1/2 x 6 1/8 x 7 1/4	6
RS-5L	4	5	3 1/2 x 6 1/8 x 7 1/4	7

RM SERIES



MODEL RM-35M

• 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RM-12A	9	12	5 1/4 x 19 x 8 1/4	16
RM-35A	25	35	5 1/4 x 19 x 12 1/2	38
RM-50A	37	50	5 1/4 x 19 x 12 1/2	50
RM-60A	50	55	7 x 19 x 12 1/2	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5 1/4 x 19 x 8 1/4	16
RM-35M	25	35	5 1/4 x 19 x 12 1/2	38
RM-50M	37	50	5 1/4 x 19 x 12 1/2	50
RM-60M	50	55	7 x 19 x 12 1/2	60

RS-A SERIES



MODEL RS-7A

MODEL	Colors		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
RS-3A	•	•	2.5	3	3 x 4 3/4 x 5 3/4	4
RS-4A	•	•	3	4	3 3/4 x 6 1/2 x 9	5
RS-5A	•	•	4	5	3 1/2 x 6 1/8 x 7 1/4	7
RS-7A	•	•	5	7	3 3/4 x 6 1/2 x 9	9
RS-7B	•	•	5	7	4 x 7 1/2 x 10 3/4	10
RS-10A	•	•	7.5	10	4 x 7 1/2 x 10 3/4	11
RS-12A	•	•	9	12	4 1/2 x 8 x 9	13
RS-12B	•	•	9	12	4 x 7 1/2 x 10 3/4	13
RS-20A	•	•	16	20	5 x 9 x 10 1/2	18
RS-35A	•	•	25	35	5 x 11 x 11	27
RS-50A	•	•	37	50	6 x 13 3/4 x 11	46
RS-70A	•	•	57	70	6 x 13 3/4 x 12 1/2	48

RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4 1/2 x 8 x 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 x 9 x 10 1/2	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 3/4 x 11	46
RS-70M	57	70	6 x 13 3/4 x 12 1/2	48

VS-M AND VRM-M SERIES



MODEL VS-35M

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

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

RS-S SERIES



MODEL RS-12S

• Built in speaker

MODEL	Colors		Continuous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
RS-7S	•	•	5	7	4 x 7 1/2 x 10 3/4	10
RS-10S	•	•	7.5	10	4 x 7 1/2 x 10 3/4	12
RS-12S	•	•	9	12	4 1/2 x 8 x 9	13
RS-20S	•	•	16	20	5 x 9 x 10 1/2	18
SL-11S	•	•	7	11	2 3/4 x 7 5/8 x 9 3/4	12

fed Zepp at 25 feet. A 24 amp/hr. gelled battery provide the power. After the weekend, the battery seemed untouched.

The ARK-4 does not have enough audio to drive a speaker. It's a headphones-only rig. You can use an amplified speaker if you want. Radio Shack sells an amplified speaker for about \$20. I also found out that the audio output stage of the ARK-4 is very sensitive to the kind of headphones you attach to it. I used a pair of "walkthing" phones and had so-so results. Later on I changed over to a pair of mono headphones from Radio Shack. These worked better, but I still found the audio to be a bit fuzzy. I measured the impedance of the headphones and discovered they were about 16 ohms for the pair and 32 ohms for each earpiece. I finally hooked up my old 8-ohm Telex 'phones and had much better-sounding audio. I also got a much nicer sidetone when using the telex phones. You may have to play around to find the proper set of headphones for your ARK-4 as well. However, I must add that the rig I was using was one of the first prototypes made by S & S Engineering.

My review unit also came with a built-in audio filter. This filter really improves reception when the QRM is running high, although I found the CW bandwidth just about right for me without the audio filter. I must mention, however, that I never was one for super-tight bandwidth when it comes to my receivers. I like to hear those HW-7 users calling me off

frequency by a kHz or so. You'll never work 'em if you can't hear 'em.

With no antenna connected, you'll notice a high-pitched tone in the audio. The tone all but vanishes when you attach your antenna. I also noticed the sidetone in the background. This is because the sidetone runs continuously and the T/R logic gates it on and off as needed. Again, once you connect an antenna up, you'll not notice the sidetone in the background. I did find that the sidetone changed levels, depending on the type of phones you connect to the ARK-4. In fact, when I attached my Telex phones, I found the sidetone to be way too loud for me. There is no internal sidetone level adjustment, although you can change resistor values to reduce the sidetone level to suit your liking.

The AGC action is very smooth, with no popping or pumping that I could detect. The AGC time constant seems *just about right* for the way I operate CW. You can also listen in on the VEs on SSB without much trouble.

The Transmitter

The ARK-4 provides a healthy 3 watts of output on 40 meters. That's more than enough to work the world, without killing your battery pack in the outback. The review rig produced a tad more than 4 watts into a 50-ohm load at 13.8 volts, a bit over 3 watts RF at 12.6 volts.

With full QSK, the ARK-4 provides for some exciting fun on CW. The relay used for

antenna switching is loud. You can hear the relay clicking in time with your keying. With a slide-on cabinet in place, you won't notice the relay as much.

The ARK-4 is not as robust as its bigger brother, but I'm sure the ARK-4 would hold up quite well in the field. I'm not sure I would take it white-water rafting, but for casual hamming at your campsite it's going to be a hard act to follow. It would be just my luck to stumble upon Elvis and Bigfoot playing cards at a UFO landing, with the Loch Ness monster swimming past in the background, and not have a radio in my backpack!

It's an ideal rig for a hamvacation! Of course, my idea of roughing it is staying at a Holiday Inn while their restaurant is being remodeled. The ARK-4 will fit quite nicely inside a briefcase. Throw in a battery pack and you're on the air from your hotel room. Thanks to the synthesized frequency control, making that schedule with your buddy is no problem.

Last Word

I feel the ARK-4 will provide the ham with a better-than-basic QRP transceiver. You get frequency control that is unmatched by anything on the QRP market. That's a real plus on today's crowded bands. Was there a downside to the ARK-4? Yup! I had to send it back! Yes, I do believe that the S & S Engineering ARK-4 is politically correct. It's faster, smaller, cheaper, and better. 73

Look What You Could Be Missing... DSP Noise Reduction Products From JPS



NIR-10 Noise/Interference Reduction Unit

The NIR-10 allows reception of difficult to read signal and reduces listener fatigue. Operates on radio receiver audio outputs. NIR mode reduces or eliminates heterodynes, white/ignition noise, RTTY interference, and power line noise. PEAK function reduces white noise interference. The Notch Filter mode removes multiple heterodynes and acts in 3 milliseconds. Band Pass mode is continuously adjustable center frequency.



NRF-7 General Purpose Noise Remover and Filter Unit

The NRF-7 reduces atmospheric noise through dynamic peaking. Removes multiple tones from voice signals. High performance CW and Voice Filters. CW filters have selectable center frequency. State-of-the Art Digital Signal Processing.



NTR-1 Wide Band Noise and Tone Remover

The NTR-1 provides wide band operation for AM or FM reception. Narrow band operation for SSB, CW or data reception. State-of-the-Art Signal Processing in "Real Time." Rapidly removes multiple tones from voice signals and operates on receiver audio output.

Also Available:

NF-60 Notch Filter - for removal of multiple tones.

SSTV-1 - DSP Filter for Slow Scan TV - clears up noisy and distorted SSTV pictures.

115 VAC to 12 VDC Power Supply (1 A) - works with all JPS Amateur products.

"First and Finest in DSP Noise Reduction Products"



JPS Communications, Inc.

P.O. Box 97757, Raleigh, NC 27624

(919)790-1011 FAX:(919)790-1456 TECH:(919)790-1048

TOLL FREE ORDER LINE: 800-533-3819

We accept Mastercard, VISA, checks, money orders in US\$.

Free shipping within the continental U.S.

Contact JPS Communications for a dealer near you

CIRCLES 285 ON READER SERVICE CARD

ORDER NOW 1-800 4 HOBBY KITS

AIRCRAFT RECEIVER



Hear exciting air-craft communications—pick up planes up to 100 miles away! Receives 110-136

MHz AM air band, smooth varactor tuning superhet with AGC, ceramic filter, adjustable squelch, excellent sensitivity and lots of speaker volume. Runs on 9V battery. Great for air shows or just hanging around the airport! New 30-page manual details pilot talk, too. Add case set for "pro" look.

AR-1 kit.....\$29.95 Matching case set, CAR...\$14.95

FM RECEIVERS & TRANSMITTER

Keep an ear on the local repeater, police, weather or just tune around. These sensitive superhet receivers are fun to build and use. Tunes any 5 MHz portion of the band and have smooth varactor tuning with AFC, dual conversion, ceramic filtering, squelch and plenty of speaker volume. Complete manual details how the rigs work and applications. 2M FM transmitter has 5W RF out, crystal control (146.52 included), pro-specs and data/mike inputs. Add our case sets for a nice finish.

FM Receiver kit Specify band: FR-146 (2M), FR-6 (6M),

FR-10 (10M), FR-220 (220MHz).....\$34.95

CFR Matching case set.....\$14.95

FT-146 Two Meter FM transmitter kit.....\$99.95

MICRO-MIKE

World's smallest FM wireless mike. Smaller than a sugar cube - including battery and mike. Two sets of SMT parts supplied in case you are clumsy! Terrific audio pick-up (pin drop at 5 ft) and transmit range of 300 ft. We include the battery (watch style), electret mike and even a tuning tool! Be a James Bond and learn SMT too!



FM-5 Micro mike kit.....\$19.95

FM WIRELESS MIKES

Pick the unit that's right for you. All units transmit a stable signal in the 88-108 MHz FM band up to 300' except for High power FM-4 and PB-1 Phone bug that go up to 1/2 mile.

FM-1 Basic unit.....\$5.95

FM-2, as above

but with added mike pre amp.....\$7.95

FM-4, long range with

very sensitive audio pickup.....\$14.95

PB-1, Phone bug needs no battery,

hooks to phone line.....\$14.95

MC-1, Micro size sensitive mike cartridge

for FM-1,2,4.....\$2.95

SURROUND-SOUND/REVERB

Add concert hall realism to your stereo, TV or even 2-way radio! Easily synthesize a stereo effect from mono sources or richly enliven regular music. Add a big-voice reverb to your radio voice that others will envy! Our reverb/surround sound kit uses a Bucket Brigade IC Device for reliable solid-state performance. Adjustable reverb, delay and mix controls to customize your sound. Easily connected to radios, stereos, CB's and TV's. Plenty of audio to drive a small speaker for stand-alone operation too. Experience the fun and realism that surround sound provides - without spending hundreds! Add our case set for a neat, pro look.

RV-1 Surround Sound/Reverb kit.....\$59.95 CRV Matching case set.....\$14.95

RV-1WT Assembled RV-1 and case.....\$99.95

TOUCH-TONE REMOTE CONTROL

Control virtually anything by Touch-Tone remote control. The URC-1 has 16 switched outputs, 4 adjustable voltage outputs (20 mV steps 0 to 5 VDC), two 10K digital pots (for volume, squelch, etc.) and 3 timers adjustable from 10 mS to 40 hours! Two level password control allows secure control and multi-level access. Six digit LED display shows currently entered codes and a crystal controlled touch-tone decoder provides reliable operation. There's nothing else like this unit, be in complete control of remote radios, thermostats, hi-fi's, homes or even factories with the URC-1. Add our matching case set for a handsome finish.

URC-1 Remote control kit.....\$129.95 CURC Matching case set.....\$14.95

URC-1WT Fully assembled URC-1 and case.....\$189.95

FM SUBCARRIER DECODER

Tap into the world of commercial-free music and data that is carried over many standard FM broadcast radio stations. Decoder hooks to the demodulator of FM radio and tunes the 50-100 KHz SCA subcarrier band. Many radios have a demod output, but if your radio doesn't, it's easy to locate, or use our FR-1 FM receiver kit which is a complete FM radio with a demod jack built-in. These "hidden" subcarriers carry lots of neat programming - from stock quotes to news to music, from rock to easy listening - all commercial free. Hear what you've been missing with the SCA-1.

SCA-1 Decoder kit.....\$27.95 CSCA Matching case set.....\$14.95

FR-1 FM receiver kit.....\$24.95 CFR Matching case for FR-1.....\$14.95

L-C METER

Measure inductors from 10 uH-10mH and capacitors from 2 pF-2uF with high accuracy by connecting the LC-1 to any digital multimeter. Two pushbutton ranges for high resolution readings and we even give you calibration components to assure proper accuracy of your kit! Active filters and switching supplies require critical values, no one should be without an accurate LC meter. For a pro look, add our matching case set.

LC-1 LC meter kit.....\$34.95 CLC case set.....\$14.95

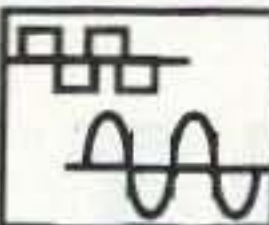
MOTOR CONTROLLER

Control the speed and direction of any motor. Use our SMD-1 for those nice steppers you see surplus, and our MSC-1 for DC motors. The stepper driver features variable speed, half step rotation, direction and power down mode, can drive most any stepper motor. Our DC driver features pulse width modulation control allowing full motor torque even at low speeds and can drive motors up to 50 VDC @ 10 Amps! Add our case set for a professional assembly.

SMD-1 Stepper kit.....\$24.95 MSC-1 DC motor kit.....\$24.95

CSMD SMD-1 case.....\$14.95 CMSC MSC-1 case.....\$14.95

SYNTHESIZED AUDIO GENERATOR



DDS (Direct Digital Synthesis) technology brings you a terrific audio generator at a fantastic price! Generates from 0.01 Hz to 50 KHz with five digit LED display of frequency. Sine and square wave output adjustable 0-5

volt p-p. Frequency selected by direct keyboard entry and with handy continuous tune tuning knob. Crystal controlled accuracy of 10 ppm and two memories for rapid frequency changes. Retire that jury-rigged old generator and treat yourself to the pleasure of using a new state-of-the-art SG-550!

SG-550 Kit ..\$199.95 SG-550WT assembled.....\$269.95

SHORTWAVE RECEIVER

Fantastic receiver that captures the world with just a 12" antenna! Can receive any 2 MHz portion from 4-11 MHz. True superhet, has smooth varactor tuning. AGC, RF gain control, plenty of speaker volume and runs on a 9V battery. Fascinating Scout, school or club project, provides hours of fun for even the most serious DXer. For the car, consider our shortwave converter. Two switchable bands (in 3-22 MHz range), each 1 MHz wide—tunable on your car radio dial. Add some interest to your drive home!



Shortwave receiver kit, SR1.....\$29.95

Shortwave converter kit, SC1.....\$27.95

Matching case set for SR1, CSR.....\$14.95

Matching case set for SCI, CSC.....\$14.95

AM TRANSMITTER

High quality, true AM broadcast band transmitter is designed exactly like the big commercial rigs. Power of 100 mW, legal range of up to 1/4 mile. Accepts line level inputs from tape and CD players and mike mixers, tunable 550-1750 KHz. Complete manual explains circuitry, help with FCC regs and even antenna ideas. Be your own Rush Limbaugh or Rick Dees with the AM-1! Add our case set for a true station look.

AM-1 Transmitter kit.....\$29.95

CAM Matching case set.....\$14.95

SCANNER CONVERTER

Tune in on the 900-950 MHz action using your existing scanner. Frequencies are converted with crystal referenced stability to the 400-550 MHz range. Instructions are even included on building high performance 900 MHz antennas. Well designed circuit features extensive filtering and convenient on-off/bypass switch. Easy one hour assembly or available fully assembled. Add our matching case set for a professional look.



SCN-1 Scanner converter kit.....\$49.95

SCN Matching case set.....\$14.95

SCN-1WT Assembled SCN-1 and case.....\$89.95

STEREO FM TRANSMITTER

Run your own Stereo FM radio station! Transmits a stable signal in the 88-108 MHz FM broadcast band up to 1 mile. Detailed manual provides helpful info on FCC regs, antenna ideas and range to expect. Latest design features adjustable line level inputs, pre-emphasis and crystal controlled subcarrier. Connects to any CD or tape player, mike mixer or radio. Includes free tuning tool too! For a pro look add our matching case set with on-board whip antenna



FM-10A Stereo transmitter kit.....\$34.95

CFM Case, whip ant set.....\$14.95

DR. NI-CAD CONDITIONER/FAST CHARGER

Quit spending big bucks for replacement battery packs, rejuvenate and condition your batteries for peak capacity. Advanced circuitry has optimized discharge before charge to eliminate memory effect and to condition batteries that have been poorly cared for in the past. Quick charge rapidly brings battery to full charge in less than an hour—just 15 minutes for some types! And "top-off" charge mode squeezes every last bit of energy into each cell for the absolute most capacity. Switch-mode regulator controls constant current charge while being monitored by a negative delta-V system that cuts off the fast charge at the exact point of full charge—batteries are charged, not cooked! Charges NiCads or NiMH packs from 2 to 10 cells (easily expanded) and current capacities up to 10 Amp-hours. Runs on 12 to 15 VDC. Quit cooking your batteries, buying new packs, waiting hours for recharge, get a Dr. Ni-Cad today! Available in money saving kit form or wired and tested with case at a special price. Kit builders: add our matching case set for a snazzy finish.

DN-1 Dr. Ni-Cad conditioner/fast charger kit.....\$49.95

CDN Matching case set.....\$14.95

DN-1WT Fully assembled Dr. Ni-Cad with case.....\$89.95

SPEED RADAR

New low-cost microwave Doppler radar kit "clocks" cars, planes, boats, horses, bikes or any large moving object. Operates at 2.6 GHz with up to 1/4 mile range. LED digital readout displays speed in miles per hour, kilometers per hour or feet per second! Earphone output allows for listening to actual Doppler shift. Uses two 1-lb coffee cans for antenna (not included) and runs on 12 VDC. Easy to build—all microwave circuitry is PC stripline. ABS plastic case with speedy graphics for a professional look. A very useful and full-of-fun kit.



SG-7 Complete kit.....\$99.95

STEREO PEAK HOLD BARGRAPH

Finally a dual LED bar graph with a peak hold display! Bar graph displays are neat and eye catching but their speed is their downfall - they just can't capture the peaks. Our kit is like two units in one, a fast display to show the signal and a long persistence display to capture peaks, similar units go for hundreds of bucks! We offer 3 models: Linear for general use, Semi-Log for audio VU meters, and Log for power displays. Dual - for stereo! - 10 segment multi-colored LED display for snazzy, eye grabbing display and easily set ranges for virtually any signals, from voltmeters to audio VU meters to audio power amps to SWR meters. Complete instructions for easy hook-up to most any device. Add our matching case set for a sharp looking unit.

PH-14 Dual Linear bargraph kit.....\$39.95 PH-15 Dual Log bargraph kit.....\$39.95

PH-16 Dual Semi-Log bargraph kit.....\$39.95 CPH Matching case set.....\$14.95

SPEECH SCRAMBLER

Descramble most scramble systems heard on your scanner radio or set up your own scrambled communication system over the phone or radio. Latest 3rd generation IC is used for fantastic audio quality - equivalent to over 30 op-amps and mixers! Crystal controlled for crystal clear sound with a built-in 2 watt audio amp for direct radio hook-up. For scramble systems, each user has a unit for full duplex operation. Communicate in privacy with the SS-70. Add our case set for a fine professional finish.

SS-70 Scrambler /descrambler kit.....\$39.95

CSSD matching case set.....\$14.95

SS-70WT Assembled

SS-70 and case set.....\$79.95

CRYSTAL RADIO

Relive the radio past with a crystal set like your grandfather built. Uses genuine Galena crystal and catwhisker. Several different types of radios are built, including standard AM broadcast, shortwave and even WW II foxhole style. To compare modern semiconductor detectors, we include a diode for comparison. No soldering required and we even give antenna ideas. Radio for free, get it now before Clinton taxes it!

CS-1 Crystal set kit.....\$19.95

TOUCH-TONE DECODER

Grab Touch-Tone numbers right off the air, phone or tape. A simple hook-up to any radio speaker or phone line is all that is required to instantly decipher touch-tone phone numbers or codes. A 256 digit memory stores decoded numbers and keeps its memory even in the event of power loss. An 8 digit LED display allows you to scroll through the memory bank to examine numbers. To make it easy to pick out number groups or codes, a "dash" is inserted between sets of digits that were decoded more than 2 seconds apart. A "central-office" quality crystal controlled decoder is used allowing rapid and reliable detection of numbers at up to 20 digits per second! For a professionally finished look, add our matching case set. Start cracking those secret codes tomorrow with the Tone Grabber!

TG-1 Tone Grabber kit.....\$99.95 CTG Matching case set.....\$14.95

TG-1WT Fully assembled TG-1 and case.....\$149.95

DIGITAL VOICE RECORDER

Chatterbox digital voice storage unit will record your message of up to 20 seconds. Time is split up into four 5 second blocks which can be played separately or cascaded for longer messages. An LED display shows message location and current mode for easy operation. Nifty built-in interfaces allow simple connection to transmitters for automatic keying when the PTT is initially closed or after it is released. You can even loop your rig's mike through the Chatterbox. For contest or fun use, the CB-1 can drive an external speaker. Includes a built-in electret mike. For that finishing touch, add our matching case set.

CB-1 Voice recorder kit.....\$59.95 CCB Matching case set.....\$14.95

ORDERS CALL 1-800-4 HOBBY KITS (446-2295) ORDERS ONLY
TECH/ORDER/INFO (716)924-4560 FAX (716)924-4555



TERMS: Satisfaction guaranteed. Examine for 10 days. If not pleased return in original form for refund. Add \$4.95 for shipping, handling and insurance. For foreign orders add 20% for surface mail. COD (U.S. only) add \$5.00. Orders under \$20 add \$3.00 NY residents add 7% sales tax. 90-day parts warranty on kit parts. 1-year parts & labor warranty on wired units.

RAMSEY ELECTRONICS, INC 793 CANNING PARKWAY VICTOR NY 14564

Kenwood TH-22AT Hand-Held Transceiver

Meet the latest in little HTs from Kenwood.

Running a 2 meter handheld used to be a pretty straightforward affair—on/off, volume, a squelch control, and a frequency switch. Of course, when things were synthesized we got a few more buttons, but all in all we could figure it out with a little time to play around. Things got more complex, however, as manufacturers packed even more features into every radio. Of course, that meant more buttons and knobs. Once manufacturers noticed that most hams had above-average consumer electronics skills (after all, we could program our own VCRs), high-tech radios appeared everywhere. This increase in the number of features came at the same time as a change in size—electronics were getting smaller. This shrinking meant that fancier features were coming in smaller and smaller packages. If you remove the battery and antenna from this radio you'll find that it weighs just two ounces more than the instruction manual. Where will it all end?

A grand finale may be the Kenwood TH-22AT. This hand-held radio fits right into the current trend. It's small—about the size of a mobile mike—and it performs a range of neat tricks. At first glance, the radio fills the bill of a general-purpose 2 meter handheld with all the usual specs. It puts out 3 watts with the standard battery pack in the normal mode, uses a dual conversion receiver with 0.16 μ V sensitivity, and offers 200 mW of audio output. The fun starts beyond the solid basics, where the neat features begin.

Special Features

One particularly nice function for a radio of this size is a *variable power level*. As we all know, the FCC requires that we always use only the minimum power level that will sustain reliable communications. Most of us detune our handhelds to lower the power when we operate near the repeater location. (You don't???) On the TH-22AT, the power level is keyboard-selectable to high power, which is normally 3 watts and battery dependent; low, which is 1/2 watt; or "economic low," which is 30 milliwatts. Fifty milliwatts will get you around the house, around the hamfest, and even into the repeater if you're close. Of course, for those scofflaws who bypass the FCC regulations, the variable power setting has a side benefit: Using only the minimum power required

greatly extends battery life. It's always surprising to see how far you can get on the low power settings!

Once you get over that kilowatt mentality and use the QRP settings, you might want to kick in the *battery saver*. This special function lets the radio sleep if it doesn't hear anything for five seconds. While not usable when scanning, a combination of battery saver and low power operation could bring a lot of use out of a single battery charge. In addition to the battery saver, the radio offers an *automatic power off* feature. The radio shuts itself off after an

hour of no keystrokes.

The TH-22AT offers transmit features that are similar to those found on commercial two-way units. A *time-out timer* is available with periods of 30 seconds all the way up to 900 seconds—for serious one-sided conversations. Time-out timers can be particularly useful if that TNC you bought at the flea market is stuck in PTT—you won't tie up the channel while figuring out what's wrong. A *busy channel lock-out* feature prevents you from doubling with someone—the radio won't transmit if it hears activity on the channel. It would also prevent jamming, but it does need to be enabled by a responsible operator first. The entire transmitter can also be *disabled*—a good feature to have when you loan the handheld to an unlicensed friend. If you don't want to bother with frequency displays or you want to make things easier during emergency drills, the *channel display function* lets the display be configured to show only channel numbers rather than frequencies.

Memory functions allow a total of 40 channels—each with its own split, PL tone, dual-tone squelch codes, and more. Non-standard offsets can be programmed in addition to the usual ± 600 . A *call channel* can also be entered—easily recalled with the tap of a button, it's also used in some scan functions. The call channel will probably be used to store your "home" repeater. The *DTMF keypad* allows telephone patch or repeater controller operation with five memory locations for storing frequently used calls. Up to 15 digits may be stored in a single memory location.

The TH-22AT offers a variety of *subaudible tone* and *paging functions*. The subaudible CTCSS functions are usable only with the optional TSU-8 decoder. They are similar to what one would find in the commercial market. On transmit, using one of the 38 standard CTCSS, or "PL," tones allows the operator to access tone-operated repeaters. On the receive side, however, the TH-22AT lets you enable *tone-coded squelch*. This is a feature that allows the receiver to remain muted until it hears the proper tone on the



WE SHIP WORLDWIDE

Barry Electronics Corp.

WORLD WIDE AMATEUR RADIO SINCE 1950

Your one source for all Radio Equipment!

For the best buys in town call:

212-925-7000

Los Precios Mas Bajos en Nueva York

WE SHIP WORLDWIDE!

Export orders expedited.

IC-R71A, R72A, R100, R7000A, R7100A, R9000A, IC-725, 728, 729, 735, 737, 765, 781. IC229H, IC3230A, IC901A, GPS Receiver: GP-22



Wherever I go, I take my radio. Specialist in **RADIOS**; Business marine aviation, ham radios and scanners.

KITTY SAYS: WE ARE OPEN 7 DAYS A WEEK

Saturday 10-5pm/Sunday 11-4 pm

Monday-Friday 9 to 6:00 PM

Come to Barry's for the best buys in town



CONTACT US FOR THE LATEST IN BUSINESS AND HAM RADIOS, SHORTWAVE RECEIVERS & SCANNERS, MOTOROLA, YAESU, ICOM, KENWOOD, ALINCO, STANDARD, MAXON, RELM, BENDIX KING, SONY, SANGEAN.



ICOM

"YAESU Ham and Business Radios"

FT-767GX, FT-890, FT-747GX, FT-990, FRG-8800, FRG-100B FT-736R, FT-1000D, FT-416/816, FT-530, FT-5200, FT-2400, FT-470, FT-530- FT-411E

KENWOOD



ANTENNAS
A-S, AES, Cushcraft, Hy-Gain, Hustler, KLM, METZ, Urban, MODUBLOX, TONNA, Butternut, Multi-Band

"TS-50S", TS450S/AT, R-5000, TS-850S, TM 241/A/441A, TR-751A, Kenwood Service Repair, TS140S, TS690S, RZ-1, TS-790A, TS950SD, TH-78A, TH28/48A, TM-941A, TM-741A, TM-732A, TM-641A, TM-742A.

MARINE RADIOS
ICOM M7, M11, M56, M700TY, M800 AVIATION PORTABLE ICOM A-21 MOTOROLA MARINE KING KX 99

SCANNERS

AOR:
900, 1000, 1500, 2500, 2800, 3000A
ICOM:
R-1, R100, R71A, R72A, R7000, R7100, R9000
Bearcat



Landmobile HT's
ICOM: U16, H16, V100, U400
MAXON, MOTOROLA, YAESU: FTH 2008/7008
UNIDEN, REGENCY, KING, MARINE ICOM: M7, M56, M700 AVIATION ICOM: A21 A200 H.T., TAD

Budwig ANT. Products
FLUKE 77, 83, 85, 87 Multimeters

Linear Amplifier
Ameritron, Icom, Kenwood, Yaesu

ICW2A
W2IAT
P2AT/4AT

IC-H16/U16
IC2IA

MOTOROLA RADIOS
COMMERCIAL RADIOS

TH-78A FT-530



MFJ-989C
8L8H, AT300, etc.

Covercraft/Coaxseal Stocked

SHORTWAVE RECEIVERS STOCKED

Shortwave Receivers

- SONY • GRUNDIG
- SANGEAN • ICOM

Call 212-925-7000

Satellite telephone in suitcase for worldwide use. WRITE.



MOTOROLA



Antenna Tuners:
MFJ, AEA AT-300, ICOM, KENWOOD, YAESU.

COMMERCIAL & HAM REPEATERS STOCKED. WRITE FOR QUOTES

Kantronics
KAM PLUS, KPC 2/3/4, KPC2400, SUPER FAX II, KPC IV, Data Engine, D4-10, etc.

Computer Interfaces
Stocked: MFJ-1270B, MFJ-1274, MFJ-1224, AEA PK-88, MFJ-1278T, PK-900, PK-232 MBX W/FAX, DRSI PRODUCTS DSP 2232

MOTOROLA AUTHORIZED DEALER
KACHINA COMMUNICATIONS DEALER

AUTHORIZED DEALER

SONY

Shortwave Radios Stocked
DIGITAL FREQUENCY COUNTERS

OPTOELECTRONICS model 1300 H/A, 0-1300MHz
2300, 2210 H, 0-2200 MHz, 2600H, UTC-3000, 2810

Long-range Wireless Telephone for export in stock

BENCHER PADDLES, BALUNS, LOW PASS FILTERS IN STOCK

MIRAGE/RFC Amplifiers
ASTRON POWER SUPPLIES
Belden Wire & Cable, Int'l Wire
OPTO KEYERS STOCKED

STANDARD.



JRC Short-wave radios
JST135, NRD-535D

Ameritron Amplifiers

AMERITRON

HEIL EQUIPMENT IN STOCK

Hy-Gain Towers will be shipped direct to you FREE of shipping cost.

ALINCO DJ580T, 120T, 162T, 460T, 180T, F1TH, DR570T, etc.

Wide selection of SW & Amateur Publications

Telephone scramblers for cellular and regular phones. \$299.00 each

CAR Stereo with Shortwave
Phillips DC-777 @ \$499.95 in stock

BIRD Wattmeters & Elements In Stock



ANTENNAS:
AEA, AlphaDelta, ANLI, Antenna Specialist, Barker & Williamson, Comet, Cushcraft, Diamond, GAP, Hy-Gain, Hustler, Larsen, Etc.



EIMAC
3-500Z
572B, 6JS6C
12BY7A & 6146B

BIRD
Wattmeters & Elements In Stock

(144, 220, 440 MHz), Isoloop.

MAIL ALL ORDERS TO: BARRY ELECTRONICS CORP., 540 BROADWAY, NEW YORK, NY 10012 (FIVE BLOCKS NORTH OF CANAL ST., BETWEEN SPRING & PRINCE ST.)

New York City's LARGEST STOCKING HAM DEALER
COMPLETE REPAIR LAB ON PREMISES

"Aqui Se Habla Espanol"

BARRY INTERNATIONAL

FAX 212-925-7001 Phone 212-925-7000

For Orders Call 1-800-990-2929

Monday-Friday 9 A.M. to 6:00 P.M.
Saturday 10-5pm /Sunday 11-2pm

IRT/LEX-"Spring St. Station". Subways: BMT-"Prince St. Station". IND-"F" Train-Bwy Station"

Bus: Broadway #6 to Spring St. Path-9th St./6th Ave. Station.

COMMERCIAL RADIOS STOCKED: ICOM, Motorola, MAXON, Standard, Yaesu. We serve municipalities, businesses, Civil Defense, etc. Portables, mobiles, bases, repeaters...

ALL SALES FINAL

Technical help offered upon purchase

FAX: 212-925-7001

We stock: AEA, Alinco, Ameco, Ameritron, Antenna Specialist, ARRL, Astatic, Astron, B&K, Belden, Bencher, Bird, Butternut, CES, Cushcraft, Daiwa, Elmac, Henry, Heil, Hustler, Hy-Gain, Icom, KLM, Kantronics, Kenwood, Larsen, Maxon, MFJ, Mirage, Motorola, Nye, Palomar, RF Products, Shure, Standard, TUBES, Uniden, Yaesu, Vibroflex, Duplexers, Repeaters, Scanners, Radio Publications

WE NOW STOCK COMMERCIAL COMMUNICATIONS SYSTEMS

HAM DEALER INQUIRES INVITED PHONE IN YOUR ORDER & BE REIMBURSED

COMMERCIAL RADIOS stocked & serviced on premises.

Amateur Radio Courses Given On Our Premises, Call

Export Orders Shipped Immediately.

carrier. It is used mainly in shared repeater operations in the commercial world so that you don't have to listen to other fleets on the repeater. It could be useful in ham radio as a way to avoid listening to anyone until your buddy calls with the right tone. Either of the PL functions is easily enabled from the keypad on a per-channel basis.

The Kenwood also offers a *dual-tone squelch system*. This is a receive-only function that uses a three-digit DTMF code to unmute the receiver. This feature provides a total of 1,000 discrete addresses, and it supports selective paging of specific subgroups. There is another advantage of DTSS over CTCSS for selective paging—DTMF tones will be easily passed over a repeater. CTCSS tones may or may not be retransmitted.

Taking yet another step, Kenwood offers *page operation*. This is similar to *dual-tone squelch system*, but with "Caller ID" added. When paged, the DTMF code of the calling station will appear on the display. In other words, if you're not right at the radio when the page comes in, the display will tell you who paged you and whether it was an individual or a group call. Page operation allows eight codes to be stored for ease of use—two for the system use and six for your convenience. With some imagination, a local repeater group can work out a series of emergency plans that would allow different groups and subgroups to be paged at will. Since the page mode uses DTMF tones, the system supports existing equipment, and also radios other than Kenwood's. Hams will use this feature primarily for selective calling between buddies. It's a great feature to have built right into the handheld.

Any of the above features can be used in conjunction with *tone alert*, which adds a beep tone when the radio receives any of the above tone sequences. Once the unit is paged, the radio starts beeping and a 100-minute timer starts. The timer resets itself after 100 minutes or each time a new page is received.

Scan Functions

Perhaps one of the most used features of a handheld in this class is the *Scan function*. The receiver in the TH-22AT covers 136 to 174 MHz. Most hams will probably have a police frequency or two plugged into a memory slot. (No, you can't transmit on 155.250, even if you do know something relevant to the conversation.) As per most features on this versatile radio, there are several options to choose between. To begin with, there are four basic types of scan:

Memory scan scans those channels in the memory list that you've designated as scan channels.

VFO scan scans VFO limits and lets you easily change directions with the channel select control.

Call/VFO scan lets you monitor the call channel plus any single VFO frequency.

Call/memory scan lets you monitor the call channel plus the last memory channel used.

The *call channel* is usually your "home" repeater, so either of the last two modes would be useful during a public service event. You could monitor the event frequency and the local repeater—or perhaps the event frequency and the local police department—at the touch of a button. Once you have determined the type of scan you need, you also need to select either time-operated or carrier-operated scan. Time-operated scan puts the radio in the "channel surfing" mode: scan along until you hear a QSO, listen, wait five seconds, scan some more, listen, wait five seconds, and so on. Five seconds may be too short to determine if you have any interest in a QSO, but this time length is fixed.

Alternatively, carrier-operated scan is the basic home scanner mode: Scan along until you hear a QSO and listen to it until they finish talking, even if this means listening to it forever. Both systems have their downsides, but the system you choose will depend on the personality of your local radio universe.

Startup and Operation

One of the classic tests of a product of this type is to see how far the operator can get without resorting to the manual. In the case of the feature-filled TH-22AT, the answer is—not all that far. Most of the obvious functions are easily accessible: The radio can be easily put on channel for a QSO. But some of the more advanced features are stumbers.

The reason for the difficulty is mainly that Kenwood decided to use very few buttons to perform a lot of tasks. Not counting the usual buttons like the DTMF pad and PTT button, the radio uses just six buttons to perform all of the other features. With just three different ways to push a button, the Kenwood engineers squeezed quite a few functions out of their options. The three possible modes for a button on a radio are: 1) just push it; 2) push it for an extended time; and 3) push it in combination with another button. The TH-22AT makes use of all three modes.

The display is also somewhat challenging. It doesn't provide much direction to the user when entering some of these functions. For example, say you'd like to lock out a member of the scan list. This would be handy if you had your normal scan list in the radio, but it kept stopping on these same two guys on the local repeater. The scan lock-out feature lets you leave the channel in its normal memory location and mark it as a channel to be skipped during the scan process. (You know, sort of like hitting LOCKOUT on your scanner.) On the TH-22AT, you simply: 1) tap the MR/LOCK button; 2) hold the F button down for more than one second; and 3) tap the LAMP button. Voilà! The channel is locked out. A small star pops up on the display under any locked out channels. The only problem with this is that neither the MR/LOCK (memory recall/keyboard lock), nor the F (function), nor the LAMP (display backlight) buttons are labeled in any manner that would hint at scan functions, let alone

scan lock out. The solution is to practice and use the radio. You can memorize all of the keystrokes, or carry the five-page "Quick Reference Guide" found in the back of the manual. It seems like only a matter of time before some aftermarket vendor will start selling tiny plastic keyboard overlays, just like you get for WordPerfect, so we can figure out how to use our radios without lugging the book along.

In addition to the basic day-to-day features, the Kenwood TH-22AT also has a separate menu system accessible through a "hold the button while turning on the radio" mode. This allows access to the lesser-used functions, such as the *time-out-timer delay*, *transmit inhibit*, and *battery saver*. Once again, you may need the book. All things considered, the user is much better off having access to all of the functions available through these tricky key combinations, compared with no access at all. Could it be we're just spoiled by being able to hit the F1 key for context-sensitive help whenever we feel like it?

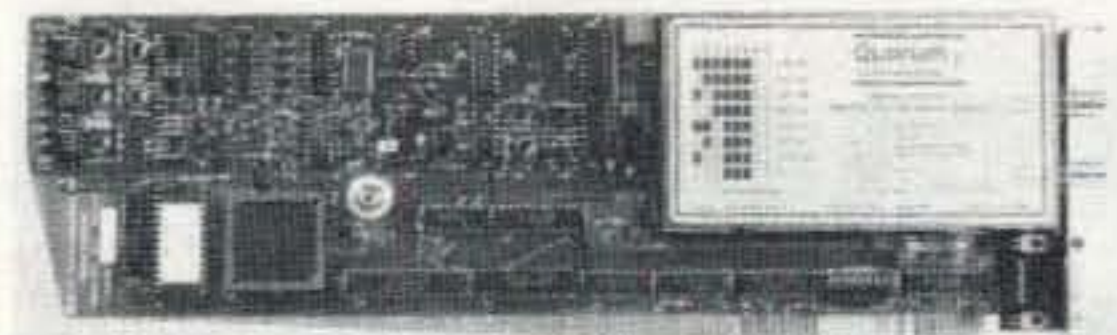
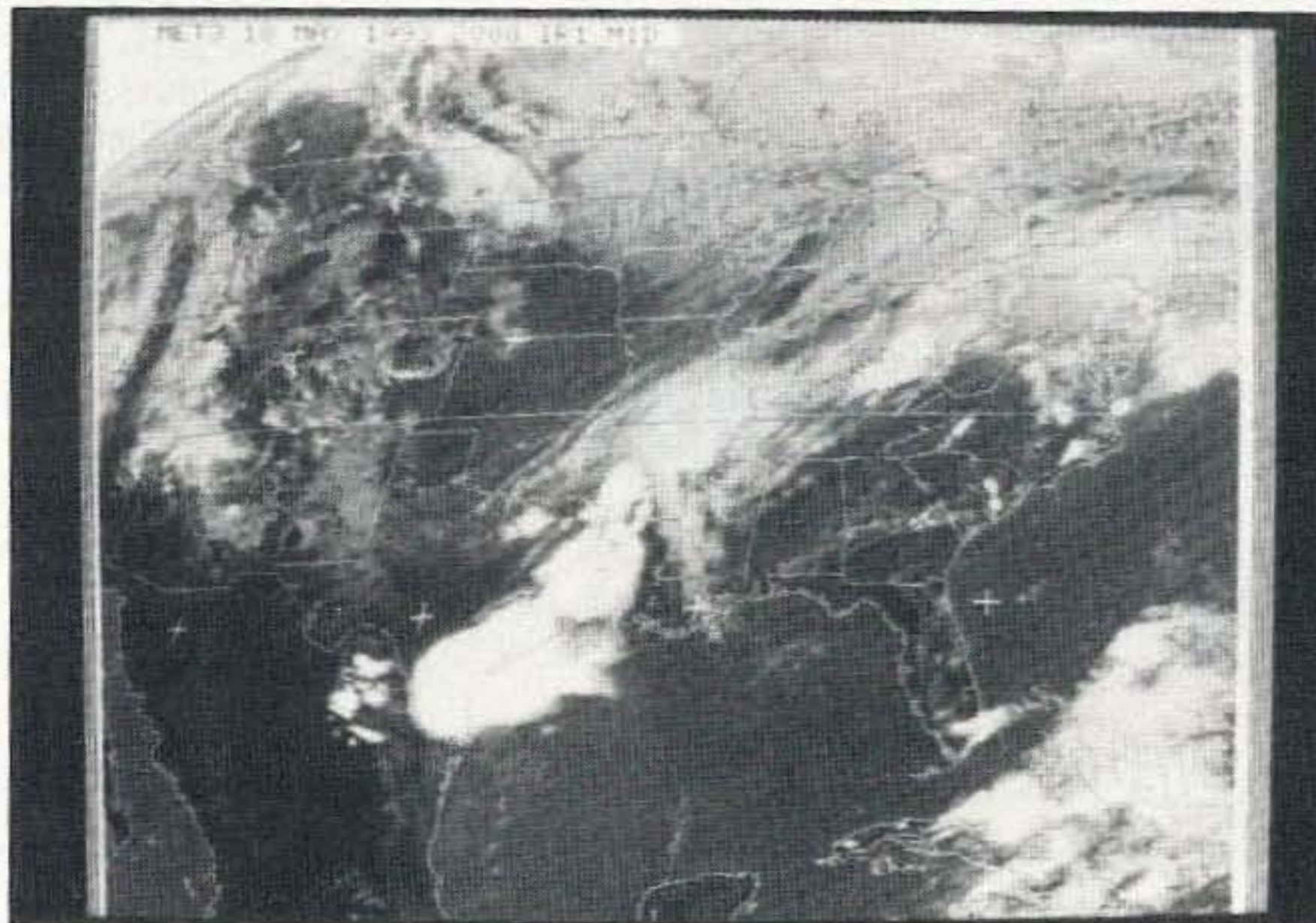
The Manual

The operator's manual, even though loaded with button combinations, is actually very well written. Everything is very clear and concise, and there are several sections devoted to ensuring a successful session with the radio—especially for the inexperienced operator. One section, "Your First QSO," gives just the basic steps necessary to fire the rig up enough to kerchunk the local repeater. A "Packet Operation" section gives hints on TNC hookup. The "Troubleshooting" section offers some help for possible problems. Not just the usual "check the battery if it doesn't work" type of advice, the list of symptoms consists of possible ways that the operator might inadvertently confuse the radio. For instance, you're in the PAGE mode, or the CTCSS mode, and you can't hear anything. You've accidentally locked the keyboard and none of the buttons work. The list of symptoms addresses both common and uncommon problems, and their solutions.

The manual is suitable for all levels of users, and seems to be written with the beginner in mind. At some points the explicit instructions can be amusing: "If an abnormal odor or smoke is detected coming from the transceiver, turn OFF the power immediately. Contact a KENWOOD service station or your dealer." Good advice. Or how about "Functions requiring the keypad cannot be used if no keypad is installed." Most of the manual is not quite this carefully worded, and most necessary information is easy to locate with the very complete table of contents.

The Kenwood TH-22AT fills a very important niche. Small enough to be easily carried in a coat pocket, the unit has all the power and more features than many much larger units. Use it often enough to get used to all the different commands—or carry a handy cheat-sheet in your wallet—and the Kenwood will make a very talented and versatile day-to-day companion.

Explore The World of Quorum Wefax



Wefax Explorer

Integrated Wefax / APT Receiver and Scan Converter with Qfax software.

\$695.00 complete

shipping and taxes not included

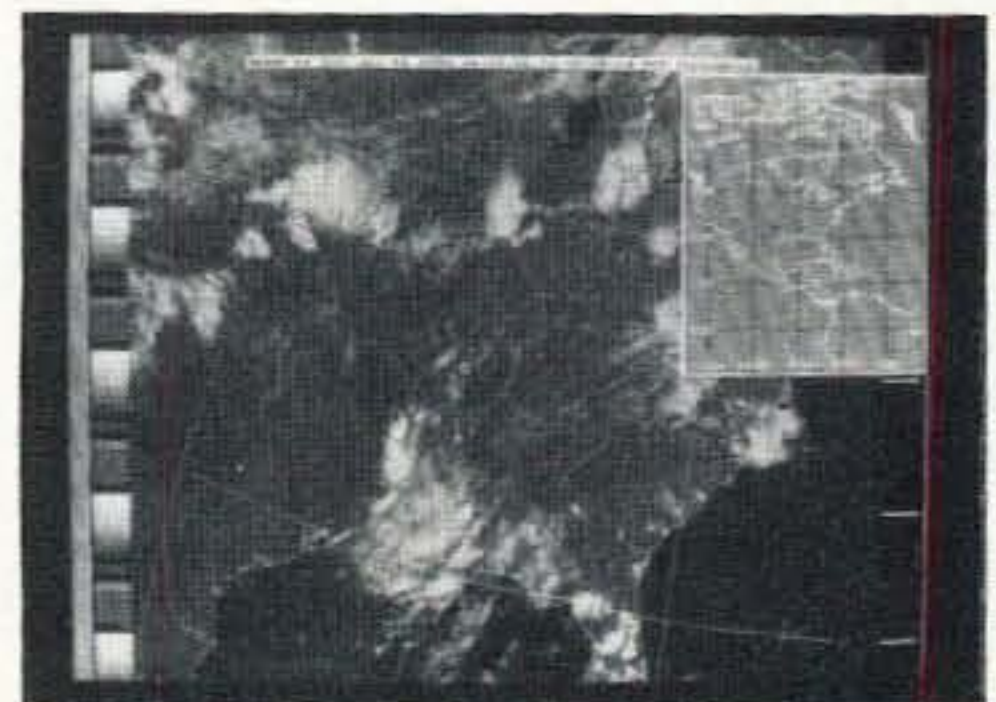
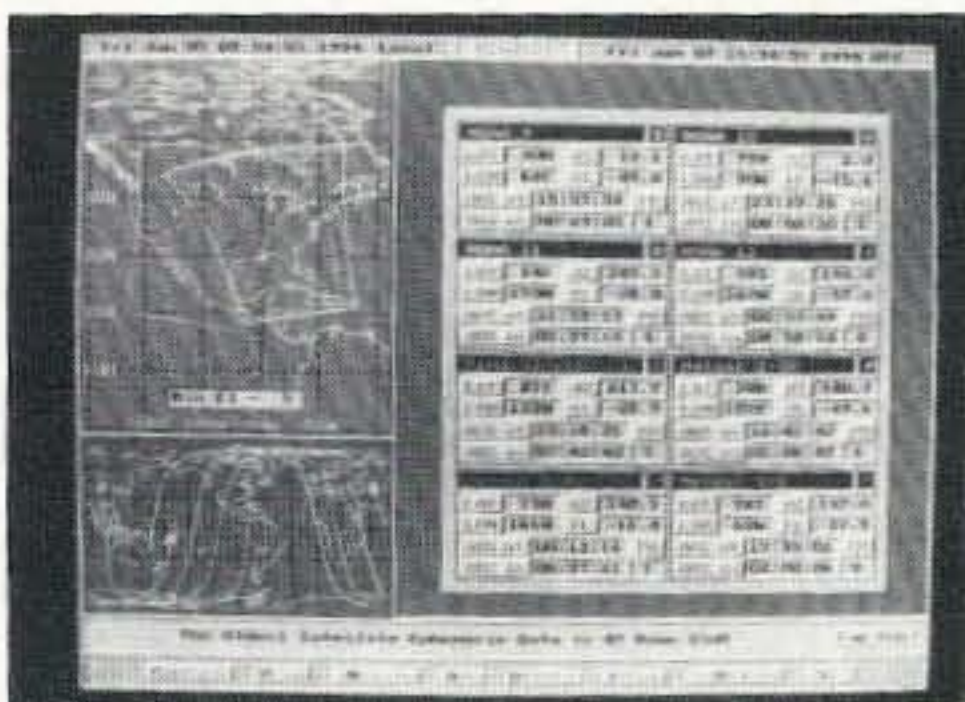
The Best Price / Performance. Period!

Construct a Wefax / APT reception system from individual component receivers, scan converters and image processing software and you'll spend more money for fewer features, poorer performance, no automation and a jungle of wires. With the Wefax Explorer, simply connect an antenna and a few mouse clicks later you're receiving the highest quality images possible. The Explorer is backed by a 1 year limited warranty and the extensive experience of the leading Wefax hardware manufacturer. Quorum equipment is used by virtually all wefax suppliers in worldwide amateur, commercial and military systems.



QFAX Features

- GOES / Meteosat Wefax Reception
- NOAA / Meteor APT Reception
- HF Nafax Reception
- Dual RF ports for geosync and polar reception under software control
- Integrated preamp and down converter power inserters
- 50 user definable configurations
- Software controlled receiver with 2 UHF, 10 VHF memories and scan
- On board audio amplifier and speaker with software controlled volume, squelch and mute
- Automatic Unattended Animation works continuously
- 8 bit data for up to 256 gray levels
- View at up to 1280 x 1024 256 color
- Use TIFF, GIF or PCX file formats and convert to BMP, JPEG, EPS and binary
- Contrast, Brightness, 3D effect, Sharpen, Smooth, Noise, Histograms and other image processing



- Integrated Satellite visibility prediction with automatic capture for up to 8 satellites simultaneously
- Automatic time and ephemeris stamping for navigation
- 2 7 day programmable schedulers
- Automatic digital gain lock in ALL modes, PLL clocking
- Ephemeris based NOAA APT navigation with geo-political and Lat-Lon overlays
- NOAA Tools show satellite path, Lat-Lon of cursor, distance and bearing to reference point
- Automatic Temperature Calibration
- Color Palettes and NOAA curves

Quorum Communications, Inc. FAX (214) 915-0270
8304 Esters Blvd. - Suite 850 - Irving, Texas 75063 (214) 915-0256 BBS (214) 915-0346

CIRCLE 257 ON READER SERVICE CARD

by Dave Martin W6KOW

Ameritron
116 Willow Road
Starkville MS 39759
Telephone: (601) 323-8211
Fax: (601) 323-6551
Price Class: \$799;
High-band kit—\$29.95

Ameritron ALS-500M Solid-State Mobile HF Amplifier

The long-awaited linear lives up to its promotion.

Kicking and screaming—after 40 years of hamming while managing to avoid owning an HF amplifier—I recently bought an Ameritron ALS-500M linear designed for mobiling . . . and I'm delighted with the purchase. Details follow, but first, for hams with similar leanings, the sequence that led me to the ALS-500M might be worth revealing.

I Like Low Power

Maybe it's the thought of sticking it to the power conglomerates or of getting the most kick for the buck, but I'm the guy whose first solo was in a glider, not an airplane . . . who bought a sailboat, not a power boat, when living in a yachting paradise . . . and who designed a little voltage-divider network so my Icom 735 could get *under* the 8-watt power control minimum for less-than-5-watts QRP.

But circumstances change. About a year ago I joined a net scattered all over the country, and my linear-less shack and mobile rig condemned my 100-watt signal to the bottom of the heap; everyone else had power available to combat the latest decline of HF propagation that we can blame on the nadir of the current sunspot cycle.

Everybody recommends maximizing antennas before buying an amplifier, and I did. But there's not much chance of significant

gain from a vertical whip on a small car. And my tiny California city lot—blessed with power lines on two sides and many nearby neighbors—pretty well precludes adding to the HF antenna farm, which includes a three-band, three-element yagi at 40 feet; a seven-band vertical on the house; and an inverted V fed with ladder wire.

Because of my long commute, a mobile amplifier seemed most desirable, but the home QTH signal could use a boost too. What to do? The idea came from a friend who travels between homes in Southern California and Montana: He runs a mobile linear in the car and uses the same box in his summer house, powered with a hefty 12V marine battery and an automatic battery charger.

The Order

After months of vacillating (and checking on the back-order status of the Ameritron ALS-500M at various ham stores), I ordered from the outfit with the fewest units on back-order. No strings were pulled; no mention was made of writing a review on this unit. Less than a week later, a large box appeared on the front stoop, and a quick trip to a nearby automotive store for a 108-ampere/hour, deep-discharge marine battery and a 10-amp automatic charger had the new rig on the air that day.

Initial Reports

The results were gratifying: First contact was with a station in Florida on 20 meters. He reported a barely readable S2 signal barefoot . . . and a plainly legible S7 with the Ameritron cooking. I know the numbers defy the laws of physics (indicating his S-meter calibration is off); using 50 watts barefoot and assuming peaks of 500 watts powered up, that's 10 dB of gain, which is just under two S-units, not five. But the importance is *readability*, which improved from *marginal* to *easily copyable*. QSOs over the next few days—while I waited for a second power plug from Ameritron to finish the mobile setup—confirmed a 2-S-unit improvement and a lot more punch through the reluctant ionosphere and QRM. That's why people spend hundreds of dollars on these things.

The Technical Side

The Ameritron ALS-500M is a compact (3.75" x 9" x 15"), light (7.5 pounds), solid-state HF linear with continuous no-tune coverage from 1.5 to 22 MHz (and to 30 MHz with presentation of an appropriate license and purchase of the \$29.95 extender kit). Four 2SC2878 power transistors provide output of 500 watts PEP on SSB and 400 watts on CW. My measurements indicated full peak power was available with 60 watts of drive. Ameritron warns not to drive the ALS-500M with more than 100 watts continuously. DC power required for full output is 13.8V at 80 amperes on peaks. More on this shortly.

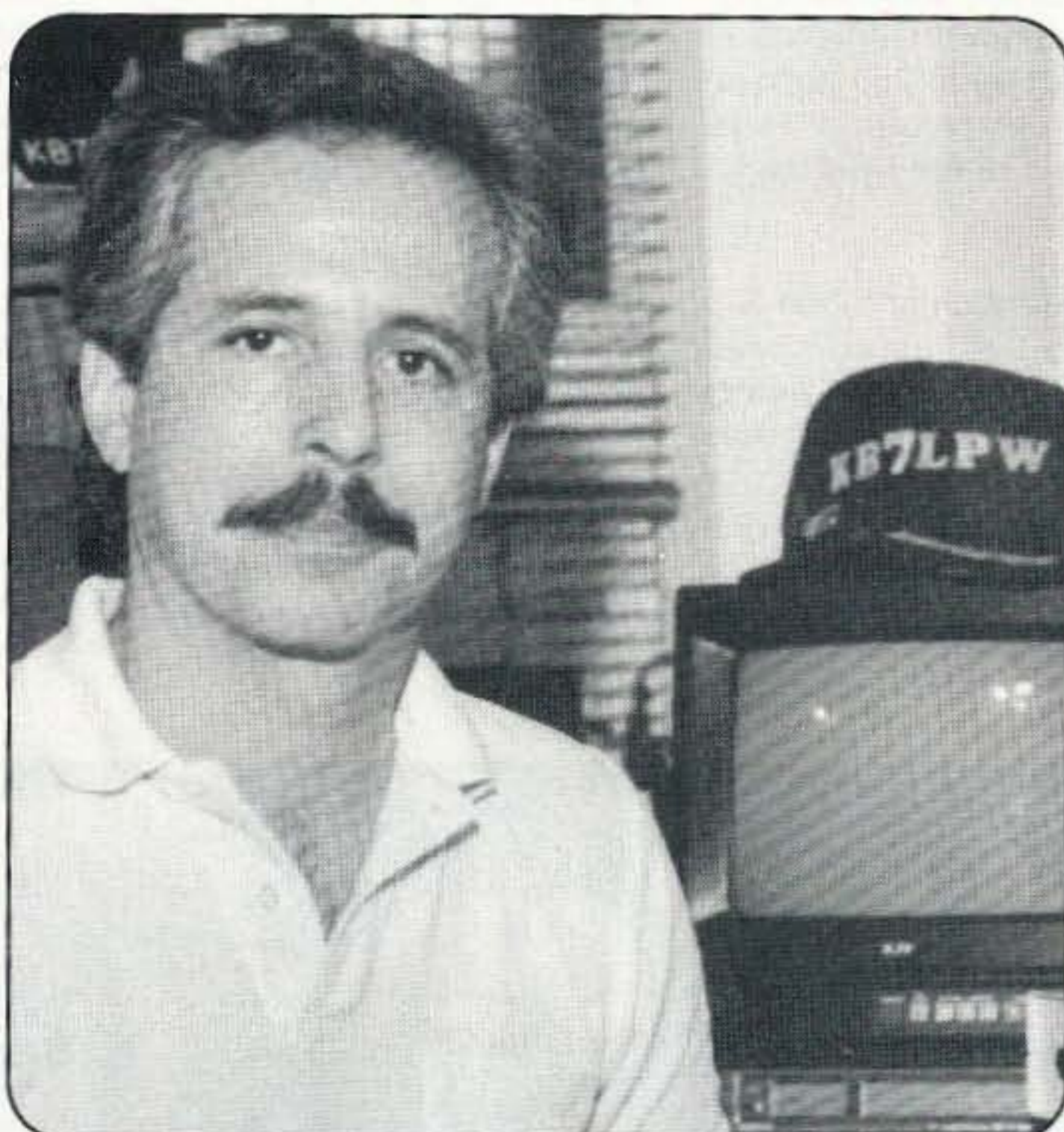
Load fault protection disables the amplifier if too much power is reflected from an antenna with high SWR (more than 2:1). An LED lights if this occurs. So far, I am operating without the benefit of a tuner in the antenna circuits, both mobile and fixed, and the Load Fault LED has remained off.

Thermal overload also disables the amplifier, and an LED warns when this happens. The unit operates cool and silently; a heat-triggered 3" fan that sucks air through a 6" x



HAM RADIO & MORE

National Talk Radio Show With Len Winkler, KB7LPW



**America's Only
Ham Radio
Show On The
Broadcast
Bands!**

**Sundays
6:00 pm EST**

Weekly Co-Host, John Moore, NJ7E – Weekly DX Update With Lee Finkel, KY7M

Tune in each week for national ham radio news, FCC news, weekly guests from the amateur radio community, ham trivia contests, prizes, listener call-in and more!

Sponsored in part by Radio City, Inc. and *73 Amateur Radio Today*.

Ham Radio & More Affiliates

AZ: KFNN 1510 PHOENIX	KY: WMTA 1380am CENTRAL CITY	WCRY 1460 RALEIGH
CO: KBCO 1190 DENVER/ BOULDER	MA: WKPE 1170 ORLEANS	WNCT 1070 GREENVILLE
CT: WATR 1320 HARTFORD	WSSH 1510 BOSTON (GREAT AREA COVERAGE)	NE: KICS 1550 LINCOLN
IL: WKTA 1330 CHICAGO	MO: WBGZ 1570 ST. LOUIS	OK: KTMC 1400 MCALESTER
WBGZ 1570 ALTON	MS: WVMJ 570 BILOXI III	OR: KBNT 1410am PORTLAND
WPDJ 1300 HUNTINGTON	NC: WEEB 990 FAYETTEVILLE	UT: K26DI CH.26TV CASTLEDALE

**Ham Radio & More is also available on Satellite!
Spacenet 3, Transponder 9, 6.8 Audio for Home Dish (Analog).**

Find out what radio station airs "Ham Radio & More" in your local area by calling the originating station, KFNN, at 602-241-1510.

For sponsorship information contact Ron Cohen at 602-241-0482.

MFJ WINDOWS SOFTWARE

MFJ station automation software finds DX, tunes your rig and does your logging

With a few "point and clicks" of your mouse, this powerful MFJ WINDOWS software helps you... find and identify on-the-air DX you need from PacketCluster networks... search your log to see if you've worked him before... automatically set up and tune your transceiver... and work him with pre-stored messages.

And while you're working him, you can... log him... print his QSL card... search and update your awards and contest files.

Logview Windows™, Packet Windows™ and Rig Windows™ are powerful ham radio automation software programs that makes operating fun, DXing competitive and not-so-fun details effortless.

You can use them together as a fully integrated package that unifies your transceiver, packet TNC and logging functions into a fully automated station.

Or you can use them individually as stand alone programs and add other modules as you need them.

Here's an overview of each program...

Logview Windows™



Logview Windows™ screen

Logview Windows™ is a live real time computerized logbook that gives you instant access to your data.

When you enter a call sign, Logview Windows™ automatically checks to see if you've worked him... if you need him for DXCC or an award... calculates distance and bearing so you know where to point your beam... for contests it checks for dupes, tells you where you need to make a QSO and its score.

You can scroll through your log in familiar logbook format in either call sign order or date and time order.

For each contact you make, Logview Windows™ lets you simultaneously update and keep up with dozens of awards such as DXCC, WAZ, OBLAST and WPX. You can attach award identifiers to QSOs for tracking awards.

The Contest Mode gives you fast dup checking and automatic time/serial number stamp. It tells you how many contacts per hour you're making, time past since your last QSO, point score, multiplier score and total score.

Even as you're making your contact, you can be printing a QSL card.

You can choose who to send QSL cards to based on QSOs not confirmed or not sent.

You can print cards or labels in standard format or customized them to suit you. You can print in time or bureau order.

Hundreds of QSO and award reports can be generated. Data from CT and other popular logging programs can be imported.

You can "click on" the built-in keyboard keyer and let Logview Windows™ help you make QSOs with 8 pre-stored CW messages.

You can set weight and speed and adjust element, character and word spacing. You get a convenient keyboard buffer with on-screen text display for sending perfect CW.

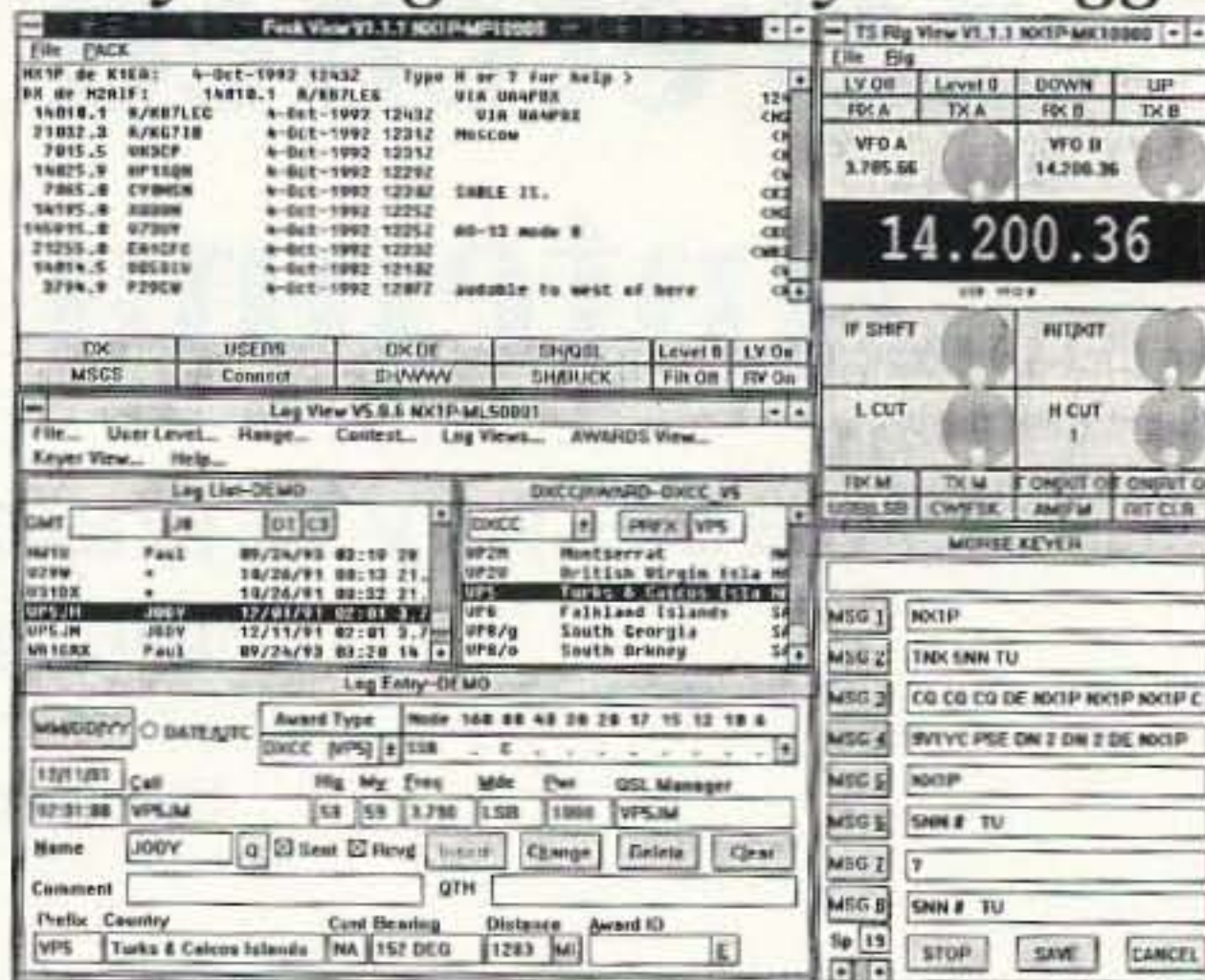
Logview Windows™
MFJ-1681
\$69.95

Packet Windows™
MFJ-1682
\$29.95

Rig Windows™
MFJ-1683K/Y/I
\$29.95 each

SAVE \$20
Complete Package
includes all 3
programs above

MFJ-1680K/Y/I
\$109.95 each



Typical real time logging, packet and rig control windows

You can automatically add the active call to selected messages -- such as a routine exchange of RST, QTH and name.

You can use beginner levels to get going quickly. When you're ready for more advanced features you can use the expert levels.

MFJ-1681 Logview Windows™, \$69.95.

Packet Windows™



Packet Windows™ screen

Using Packet Windows™ and your TNC to access DX PacketCluster™, you can display a list of current on-the-air DX stations.

You can scroll through these DX stations and select one with your mouse. Your rig is automatically tuned through Rig Windows™ and your logbook is automatically set up through Logview Windows™ to log your rare DX -- all you have to do is work'em.

You can select only the DX you need. When they occur, an alarm sounds or you can have their call sent in CW -- you'll know about band openings even if you're in the next room.

For true "hands off" operation, turn on AutoSpot™. When DX you need appears, your rig automatically tunes to his frequency and your logbook automatically sets up to log.

Operating your TNC or PacketCluster™ can be as easy as "point and click" when you use Macro buttons for commonly used commands.

MFJ-1682 Packet Windows™, \$29.95.

Rig Windows™



Rig Windows™ screen

Rig Windows™ gives you full computerized control of your transceiver. Data from Packet Windows™ automatically tunes your transceiver to the DX station you want. Frequency and mode is sent to Logview Windows™ for automatic logging.

Unique mouse operated tuning

knobs make tuning as natural as your real tuning knob. You get fine and coarse tuning, separate knobs for VFO A and VFO B plus, frequency and rig status displays.

With 48 command macro buttons, you can define and chain them to create complex transceiver control by clicking your mouse.

Separate Rig Windows™ programs are available for Kenwood, Yaesu and ICOM radios. Each program is customized to make use of features unique to that manufacturer.

For Rig Windows™, order MFJ-1683K for Kenwood, MFJ-1683Y for Yaesu and MFJ-1683I for ICOM, \$29.95 each.

Requires MFJ-5383K/Y/I transceiver-to-computer interface cable below.

Transceiver-to-Computer Interface Cable has RS-232 serial interface built-in!



MFJ-5383K (Kenwood)
MFJ-5383Y (Yaesu)
MFJ-5383I (Icom)

\$49.95 each

Convenient pre-wired Transceiver-to-Computer interface

cable has RS-232 serial interface built-in! Each cable has connectors wired for your transceiver and IBM compatible computer.

Just plug a pre-wired cable into your transceiver and computer serial ports and you're ready for computerized control of your rig through Rig Windows™.

MFJ-5383K for Kenwood, MFJ-5383Y for Yaesu, MFJ-5383I for ICOM, \$49.95 each.

Enjoy World Band radio in your car

MFJ-306 **\$79.95** Hear late breaking news as it happens from all over the world! This MFJ-306 adds World Band shortwave reception to your AM car radio. Covers 19, 25, 31 and 49 Meter bands. Plugs between your car radio and antenna.

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH (8324)

• 1 year unconditional guarantee • 30 day money back guarantee (less s/h) on orders from MFJ • Free catalog
MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon-Fri.
FAX: (601) 323-6551; Add s/h



MFJ... making quality affordable

Prices and specifications subject to change © 1994 MFJ Enterprises, Inc.

Stretched Vertical Gain Antenna for 6 Meters

Here's a way to dramatically improve your 50 MHz operating capabilities.

by John Sehring WB2EQG

At one time I lived in a rather deep valley and wanted to increase my operating range on 6m FM simplex (52.525 MHz), as well as use repeaters scattered over a 100-mile radius. So I was looking for an omnidirectional, vertically polarized antenna with as much gain as possible.

Because of the surrounding terrain, I could barely work stations only 20 miles away in some directions when using a 1/4-wavelength ground-plane antenna mounted about 25 feet off the ground. Many signals from not very far away were weak, had lots of QSB, and sometimes sounded distorted on FM.

The QSB and signal distortion was due to signals coming in from a variety of directions (multipath propagation) because of knife edge diffraction and various kinds of reflections and scattering over the surrounding hills.[1]

Omnidirectional Gain

With a unidirectional antenna such as a yagi, gain is achieved by concentrating the antenna's main lobe in both the azimuth (horizontal) and elevation (vertical) axes. However with an omnidirectional antenna, we can't compress the beamwidth in azimuth because we want to keep it non-directional.

The only way to achieve gain in this case is to narrow the antenna's pattern in elevation (the vertical direction). The lobe is then (usually) concentrated at as low an elevation angle as possible. The resulting radiation pattern looks like a squashed doughnut.

However, this would place the maximum gain lobe at the horizon (0 degree elevation) which would run it right into the hills around my QTH. Looking at the elevated visible horizon at my location, I wondered how much this kind of gain would help. But, I decided to give it a try.

So I put together a 1/2-wavelength vertical antenna to replace the 1/4-

wavelength ground-plane I'd been using. I used a discarded 11m Citizen's Band 1/2-wavelength vertical antenna for materials (there are a lot of these around not being used!), including the insulated base and mounting bracket. Since the end of a 1/2-wavelength dipole is "hot" (a point of high impedance and therefore high RF voltage), it needs to be well insulated from ground. I installed four 1/4-wavelength radials (each 51 inches long and 1/2" in diameter) at the base of the antenna underneath the matching section.

Matching Network

To end-feed the antenna I used a large, single-turn, tapped LC matching network at its bottom end (see Figure 1).[2,3] This network transforms the high impedance of the dipole's end down to 52 ohms.

It also puts the antenna at DC ground. This is electrically safer, and it eliminates precipitation static, which can be very strong (from blowing dust or snow, for example). These particles sometimes have an electrical charge. When they hit an antenna, they are discharged. If the element is not DC-grounded (as with a 1/4-wavelength ground-plane or a center-fed 1/2 wavelength antenna), the discharge must flow through the input circuit of the receiver, thus generating noise.

The loop (L) and tap are made from soft, eight-gauge aluminum ground wire, which is easy to form. The loop is about 7" in diameter, giving an inductance of around 0.6 μ H. For the capacitor (C) I used a short piece of RG-58 coaxial cable. This cable has a capacitance of about 28 pF per foot. I cut it a bit at a time to get the right amount of capacitance. It required about five inches of cable (about 12 pF) to resonate the network at 52.525 MHz.

You could use a fixed or variable capacitor instead—but watch the voltage rating! The impedance at the end of a dipole is several thousand ohms, which means high RF voltage. Additional stray capacitance is supplied by the base bracket.

Rule of thumb: The inductance of the coil should be chosen to resonate the network at the operating frequency with a capacitor whose value (in pF) is from two to four times the operating wavelength in meters. This gives a sufficiently "high-C" (low loss) network.

I played with the length of the antenna (about 108 inches) to get it to resonance. Then both the network's capacitance and the position of the tap were adjusted for

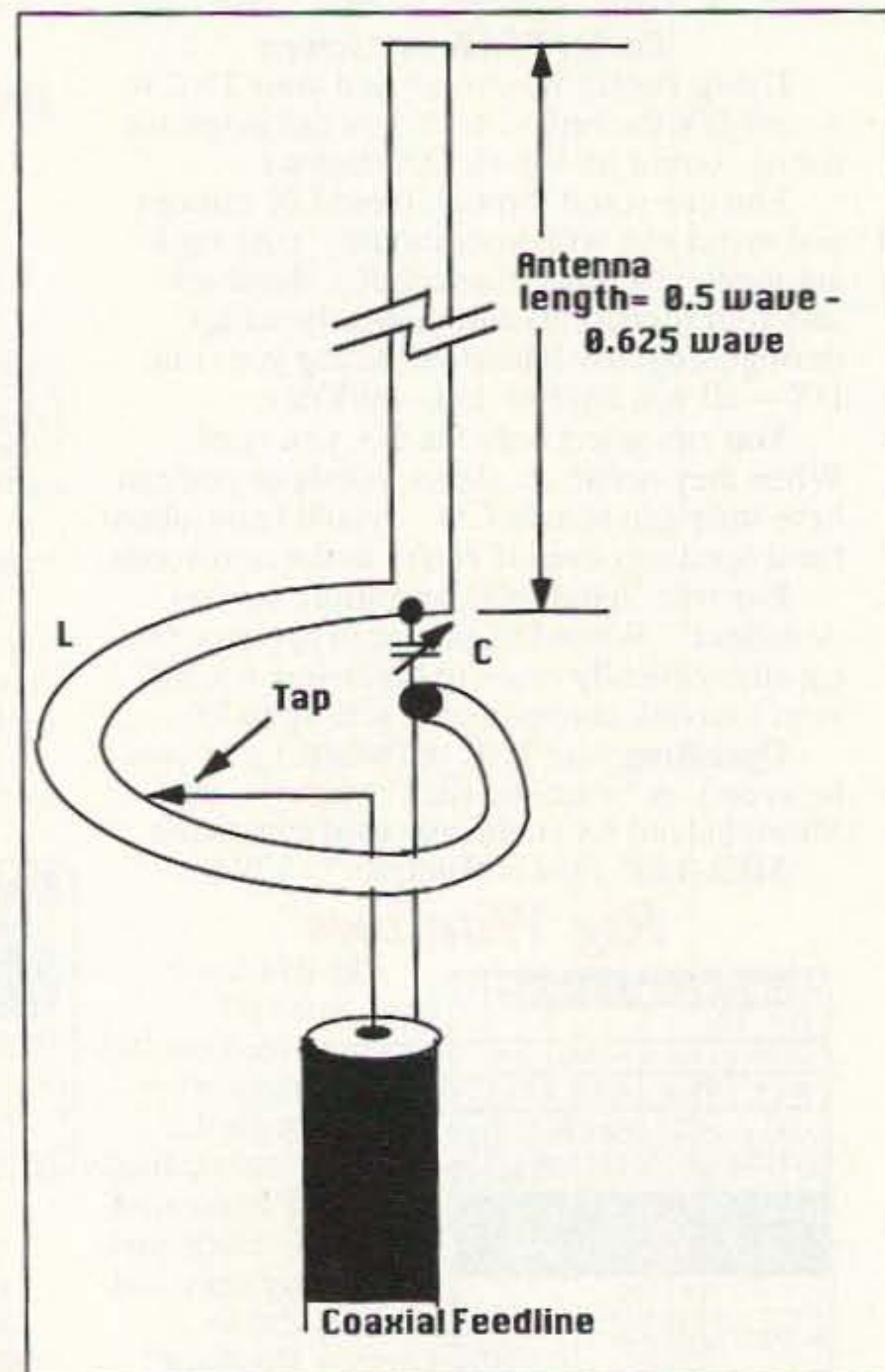


Figure 1. LC matching network for the Stretched Vertical Gain Antenna.

**EVERY ISSUE OF
73 Amateur Radio Today
on Microfiche!**

The entire run of 73 from October, 1960 through last year is available.

You can have access to the treasures of 73 without several hundred pounds of bulky back issues. Our 24x fiche have 98 pages each and will fit in a card file on your desk.

We offer a battery operated hand held viewer for \$75, and a desk model for \$260. Libraries have these readers.

The collection of over 600 microfiche, is available as an entire set, (no partial sets) for \$285 plus \$5 shipping (USA). Annual updates available for \$10.

Satisfaction guaranteed or money back!

BUCKMASTER

Route 4, Box 1630

Mineral, Virginia 23117

703:894-5777 • 800:282-5628

Internet: info@buck.com

Fax 703:894-9141



CIRCLE 168 ON READER SERVICE CARD

ICOM BATTERY INSERTS

BP-3	8.4v	270mah	\$14.00
BP-3	8.4v	400mah	\$21.00
BP-5	10.8v	600mah	\$20.00
BP-7	13.2v	600mah	\$23.00
BP-8	8.4v	800mah	\$19.00
BP-8	8.4v	1400mah	\$24.00
BP-22	8.4v	270mah	\$21.00
BP-23	8.4v	600mah	\$17.00
BP-24	10.8v	600mah	\$19.00

KENWOOD BATTERY INSERTS

PB-21	7.2v	200mah	\$11.00
PB-2400	9.6v	800mah	\$19.00
PB-25/26	8.4v	600mah	\$21.50

YAESU BATTERY INSERTS

FNB-2	10.8v	600mah	\$19.95
FNB-4/4A	12v	600mah	\$26.00
FNB-10	7.2v	600mah	\$15.00
FNB-12	12v	600mah	\$25.00

MORE BATTERY INSERTS

Tempo S1 Early		270mah	\$19.00
Tempo S2/4/5 Late		600mah	\$21.00
Standard BP-1		270mah	\$21.00
Ten-Tec BP-1		600mah	\$21.00
San-Tec #142#144 Tabs		600mah	\$15.00
Uniden Bearcat		600mah	\$15.00
Uniden Bearcat		800mah	\$19.00
Regency MT1000 Tabs		600mah	\$15.00



* Add \$4.00 Shipping * FL residents add 7% Sales Tax

TNR The Battery Store
279 Douglas Ave., Suite 1112
Altamonte Springs, FL 32714
1-800-346-0601 FAX (407) 682-4469

CIRCLE 374 ON READER SERVICE CARD

**Why buy a TNC?
PC HF FAX + PC SWL \$179.00**

SPECIAL COMBINATION OFFER

For a limited time, if you order PC HF FAX \$99 (see our other ad in this issue), you can add our new and improved PC SWL 3.0 for \$80.00 instead of our regular low price of \$99.00.

PC SWL contains the hardware, software, instructions and frequency lists needed to allow you to receive a vast variety of digital broadcasts transmitted over shortwave radio. All you need is any IBM PC or compatible computer and an SSB shortwave receiver. The product consists of:

- Demodulator
- Digital Signal Processing Software
- 200 Page Tutorial Reference Manual
- World wide Utility Frequency List
- Tutorial Audio Cassette with Samples

PC SWL automatically decodes Morse code, RTTY, AMTOR, SITOR, NAVTEX and ASCII.

PC SWL lets you tune in on world press services, meteorological broadcasts, ham radio operators, coastal shore stations, aviation telex and much more digital action on the shortwave bands. Why pay for another expensive box when a simple interface and your PC can do the job?

ADVANCED FEATURES:

- Tuning Oscilloscope
- Digital Waveform Presentations
- Auto Calibration and Code Recognition
- Continuously Tunable Filter Frequencies
- Variable Shift
- Adjustable CW Filter Sensitivity
- Unattended Capture and Printing
- Integrated Text Editor
- Integrated Log and Database
- Shell to DOS applications
- Seamless Integration with PC HF Facsimile

Call or write for our complete catalog of products. Visa & MasterCard welcome.

Software Systems Consulting

615 S. El Camino Real, San Clemente, CA 92672
Tel:(714)498-5784 Fax:(714)498-0568

CIRCLE 244 ON READER SERVICE CARD

TOLL FREE 1-800-666-0908 PRICING AND ORDERS ONLY

YAESU

FT-11R



FT-840



FT-900AT
Compact HF Transceiver
Remote Front Panel Design

NEW!

FT-2200
NEW!



FT-1000

FT-530



FT-2500M



FT-990



FT-5100
FT-5200



FT-890AT

CALL FOR ALL YAESU RADIOS & ACCESSORIES

NEW EQUIPMENT PRICING AND ORDERS 1-800-666-0908 OUT OF STATE
TECHNICAL, USED GEAR, INFO 203-666-6227 24HR FAX 203-667-3561

Hours:

LENTINI COMMUNICATIONS INC.

M-F 10-6,
SAT. 10-4

21 GARFIELD STREET, NEWINGTON, CT 06111



C.O.D.s
OK Same Day
Shipping

CIRCLE 234 ON READER SERVICE CARD

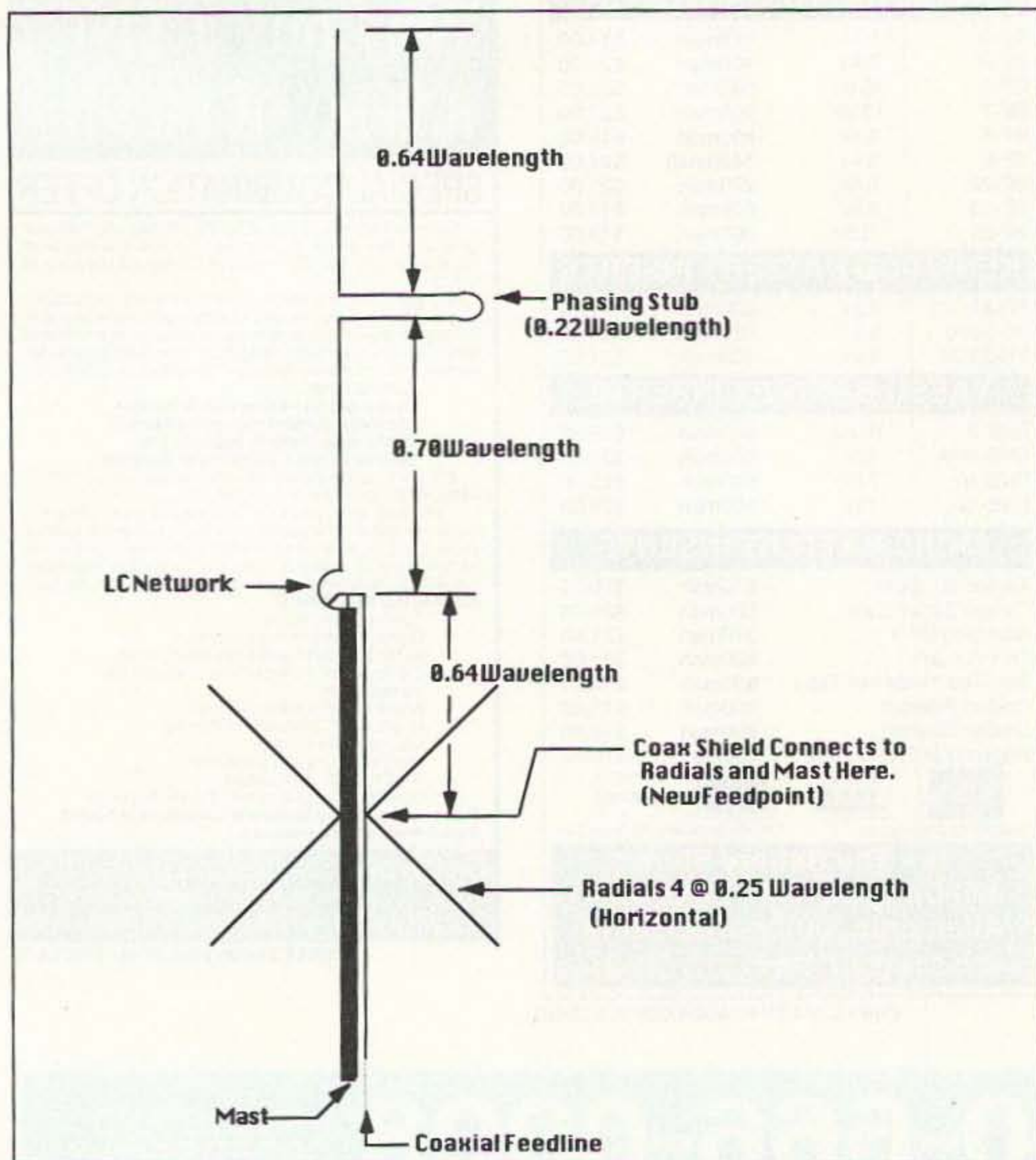


Figure 2. A look at the Stretched Vertical Gain Antenna's overall design.

the best match to the 52 ohm feedline. There is interaction among the antenna length and the network adjustments. I could achieve very nearly a 1:1 standing-wave ratio. A good match is important as feedline losses on 6m are more strongly affected by SWR

than at lower frequencies. This is because feedline has more loss to begin with at higher frequencies.

The longer antenna produced definite increases in signal strength and quality as a 1/4-wavelength ground-plane antenna actually shows a slight loss relative to a dipole.

Longer Yet

I next lengthened the antenna to 0.64 wavelength, about 139 inches long. This length gives the maximum theoretical gain for a single element working against its electrical image (the image needs to be provided by a ground-plane—the earth, a metallic surface, counterpoise, or radial system).

I used the same matching network, with adjustments. I saw slight further improvements in signal strength. Emboldened by success, I went for broke. What about using a pair of 0.64-wavelength sections in a two-element, vertical collinear array, like an extended double Zepp antenna?

Now, I don't claim originality

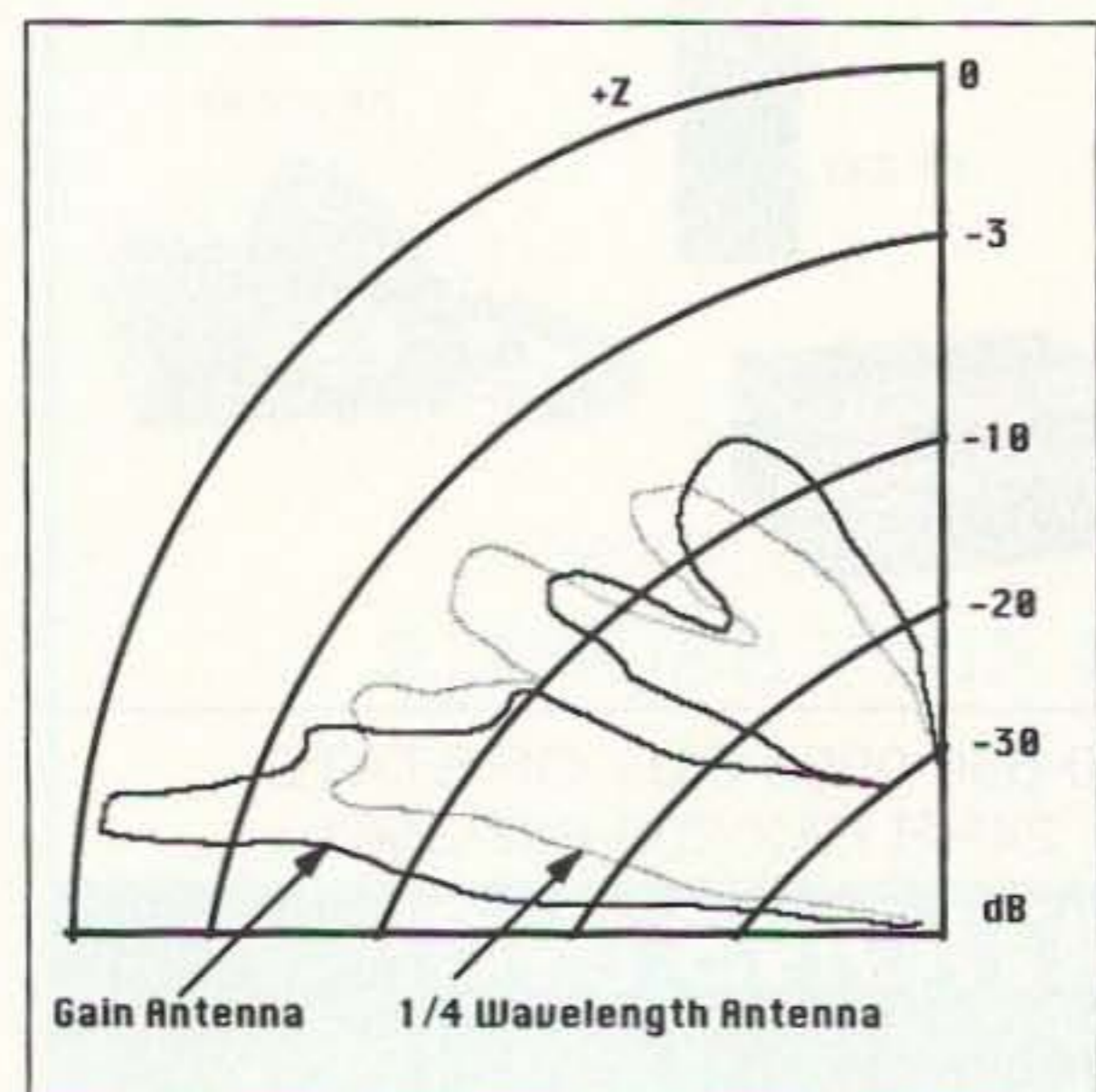


Figure 4. Elevation pattern comparison (see text).

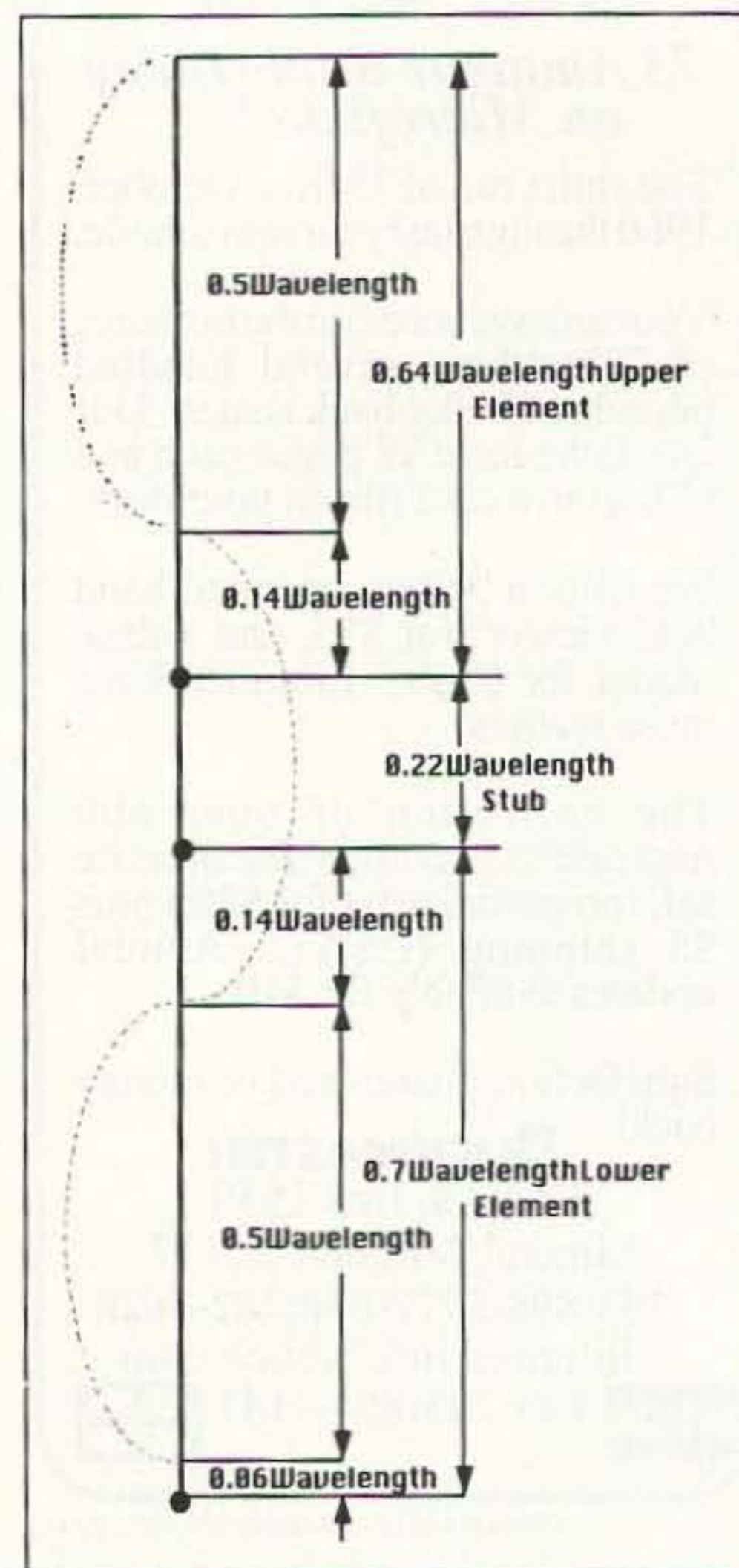


Figure 3. Electrical schematic and current distribution of the Stretched Vertical Gain Antenna.

for the design of the final version of this antenna. The inspiration came from the Cushcraft Ringo Ranger series of vertical VHF antennas.[4] My plan was simply to scale up the dimensions of this design from the 2m to the 6m band. The basic design consists of two roughly five-eighth wavelength sections in a vertical collinear array, separated by a phasing stub, and bottom-fed (see Figure 2) at the LC matching section.

When a stub of the correct length is placed between the upper and lower elements, it provides just the right amount of electrical delay (phase shift) to keep element currents in the correct relationships for maximum gain. Also, if the stub and element lengths are correct for each other, the current in the stub will be balanced and it will not radiate. See Figure 3 for the current distribution on the antenna.

Feedline Decoupling

Interaction between the antenna and the coaxial feedline is a frequent problem with end-fed vertical antennas. Unwanted current is caused to flow on the *outside* of the shield of the coaxial cable.

Coaxial cable is shielded and does not normally radiate. When it is correctly operated as a feedline, there is *no* current flow on the outside of the shield. That's why it

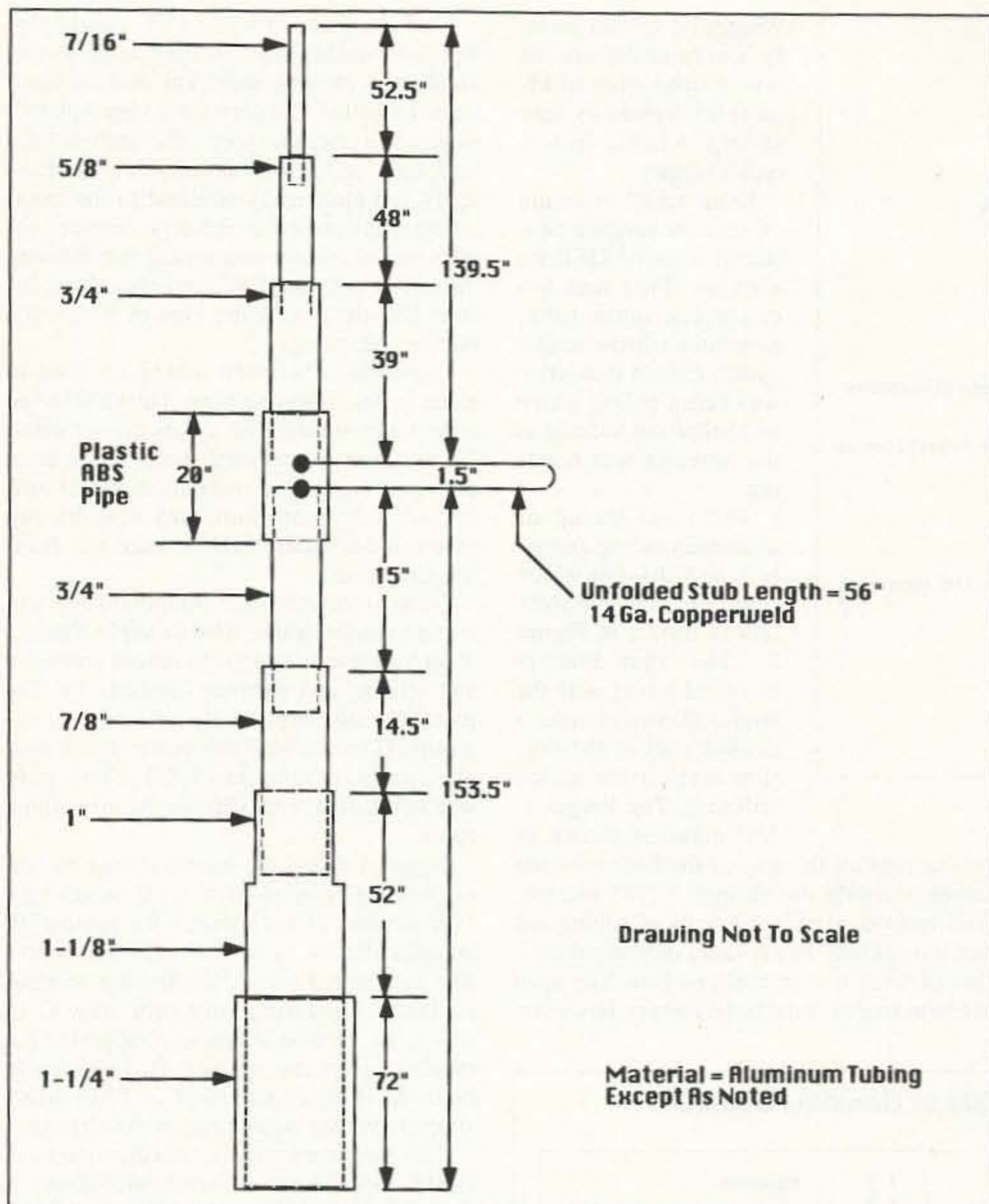


Figure 5. Sizes of aluminum tubing used in construction. Note that the stub connects through a section of white PVC pipe.

doesn't radiate! All of the current is then properly confined to the inside of the cable. It flows on the *inside* surface of the shield and in the center conductor, where it can't radiate. Currents on the inside and outside surfaces of the coaxial cable's shield can be different.

The extra current on the outside of the shield produces radiation from the feedline, which is unpredictable in effect due to differences in feedline installation (length and orientation). The strength and phase of this current flow is also unknown. Since current flow causes radiation, the outside of the coaxial cable will then radiate. This feedline radiation can interact with the wanted radiation of an antenna and spoil its pattern. A lot of work has been done on this effect.[5,6,7,8,9,10,11,12,13]

Some of the outside of shield current is induced by the antenna's own radiation field via mutual coupling between itself and the feedline. The amount of coupling in our case (vertical antenna and feedline oriented collinearly, end-to-end) is considerably less than it would be if, for example, the antenna

and feedline were parallel and broadside to each other.[14,15]

Another, stronger, source of this induced current is the connection at the feed point. See the Appendix for details of how this happens.

This outside of shield current has nothing to do with the presence or type of matching network used. It is *not* due to current "leaking" through the coaxial shield.

So, to help isolate the feedline from the antenna and reduce outside shield current, I wrapped the coaxial cable into a six-turn air core RF choke about 6" in diameter, just below the coaxial connector at the base of the antenna. Additional decoupling can be had by slipping suitable (lossy at 50 MHz) ferrite beads onto the outside of the coaxial cable to form a choke.[16]

Improvements

Changes to the antenna's original design by the manufacturer have improved feedline decoupling in the Ringo Ranger II. This is accomplished by installing a decoupling section (an extra piece of coaxial cable) be-

tween the original feed point and four 1/4-wavelength radials which are now located 0.64 wavelength below the antenna's feed point. See Figure 2 for the overall design.

I connected the radials (which are connected to the mast) to the shield of the coaxial feedline at that point using a double female coaxial connector adapter (make sure to weatherproof these connections). A 144" (about 0.64-wavelength) piece of coaxial cable was then run up, using TV-type mast standoff insulators to dress it away from the mast, to the original feed point. Do not tape this new section of coaxial to the mast. The coaxial choke from before was placed just below the radials (the new feed point) for added isolation.

Refinements

Originally, I had simply scaled up all the dimensions of the Ringo Ranger from 2m to 6m. It worked well, but I wondered if it was truly optimum. After all, I had ignored the effects of length-to-thickness ratios of the elements—this can throw a design off, especially at VHF.

I used MININEC[17] to model and optimize the antenna for maximum gain while holding down the strength of the sidelobes. These sidelobes (normal for use of a 0.64-wavelength element—it's the price of more gain) point upward at the sky, a source of cosmic noise on 6m. In fact, cosmic noise is *the* limiting factor in reception (it sets the ultimate noise floor) on 6m.[18]

I altered the element lengths slightly to find the best design. While the final gain was just slightly less, the sidelobe levels were reduced even more. In other words, I optimized the antenna's gain-to-noise ratio. Surprisingly, the new dimensions were only a few percent different.

Figure 4 shows the elevation pattern of the final design along with a 1/4-wavelength groundplane antenna for comparison. Only the lowest elevation lobe is useful for communication purposes. The other lobes only point at the sky and raise the noise level. Note that the gain antenna has the strongest lobe near the horizon (most gain for signals) *and* the weakest lobes point at the sky giving least noise pickup.

As a reality check, in free space, a pair of 1/2-wavelength, end-to-end, collinear dipoles should give 1.9 dB more gain than a single dipole. Stretching them to 0.64 wavelength each should yield an additional 1.1 dB, for a total of about 3 dB (= 5.1 dBi) of theoretical gain over a dipole.[19]

Computed gain of the antenna over real ground is about 4 dB (7.5 dBi) more, and it hears about 2.3 dB less sky noise than a 1/4-wavelength ground-plane. This gives a 6.3 dB improvement in gain-to-noise ratio over a ground-plane.

The discrepancy in computed gain (7.5 vs. 5.1 dBi) is due to ground reinforcement effects and possible computer modeling errors. As always, we need to take both theoretical and computer model predictions with a grain of salt!

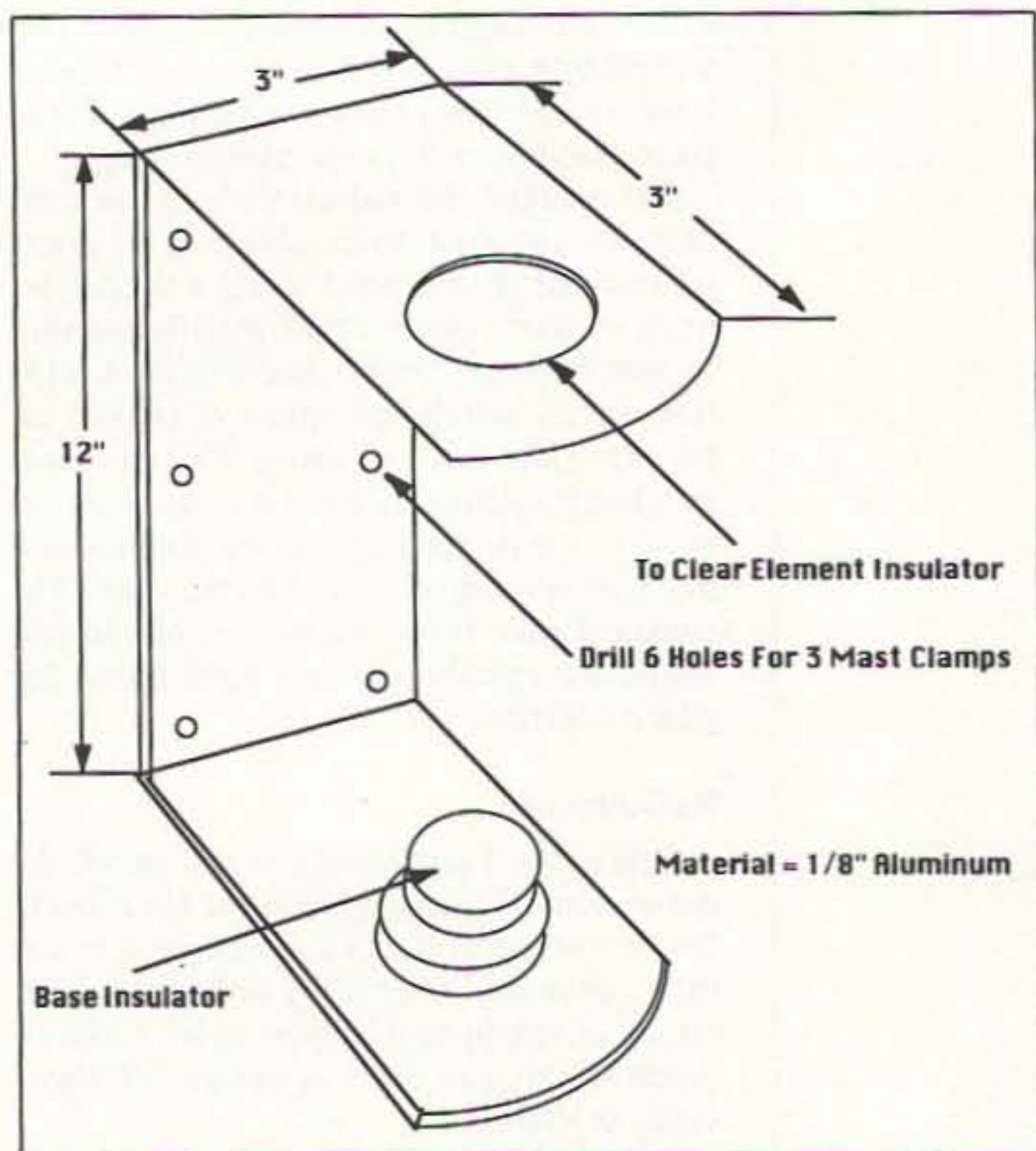


Figure 6. Base mounting bracket.

Mechanicals

The major consideration was now mechanical: How do you build a sufficiently strong, free-standing, 24-foot-tall vertical antenna? My first design was fine in calm weather, but it was too flexible and winds

whipped it around greatly. The tip of the antenna was pulled over to almost 90 degrees by very strong winds, but it didn't break!

Even small amounts of antenna bending produced a lot of QSB on signals. This was because the main lobe, now quite narrow in elevation (like a pancake), was being pulled above and below the horizon as the antenna was bending.

The final sizing of aluminum tubing (mostly type 6061-T6) which cured the bending problem is shown in Figure 5. The two bottom pieces of tubing with the largest diameters make a double wall in the bottom section for added stiffness. The longer 1-1/8" diameter section of

tubing runs all the way to the bottom of the antenna inside the shorter 1-1/4" section. The individual piece lengths of tubing are not too critical. In my case, they are the result of what was in the junk box. The *total* element lengths need to be correct, however.

Note the piece of white PVC plastic piping (3/4" inside diameter) used as an insulator for the phasing stub. The stub is made from 14-gauge Copperweld (copper-plated, steel core) antenna wire. The stub is then stiff, light, and self-supporting. It is mechanically and electrically attached to the metal tubing sections inside the PVC section, using small aluminum screws and nuts running through a hole the PVC and the tubing inside. Use the cold water type of PVC—it's thicker and stronger.

Connection between tubing sections is made in the following way: The ends of the outer tubes are slit with a hacksaw for about 2", and a stainless-steel worm drive hose clamp is tightened over it. A small aluminum screw and nut may also be run through each connection once the final lengths are set.

I used electricians' "compound for aluminum conduit joints" (for example Noalox) at all tubing connections to reduce corrosion and seizing, and enhance conductivity. The paste was still in place after 10 years of exposure. (I recommend this paste for use with all aluminum antennas.) All joints were weather-sealed with silicone-based bathtub caulk.

Figure 6 shows the insulated base mounting bracket rescued from a 1/2-wavelength 11m antenna. (The Cushcraft R4 vertical HF antenna uses the same kind of base bracket.) The large upper hole of the bracket contains a plastic insulating ring (not shown) in which the antenna is laterally supported but insulated from the bracket. This ring could be made from a short piece of PVC tubing slipped over the bottom end of the element.

The two-step plastic insulating base (which looks like a two-layer cake) shown at the bottom of the bracket supports the lower end of the antenna vertically and laterally. An aluminum bolt and nut is run through the bottom end of the antenna and the upper part of the insulating base. Three muffler or antenna clamps secure the bracket to the mast.

The antenna is strong and light, and has survived for 10 years with no noticeable mechanical or electrical degradation.

On The Air

Results using the final design were gratifying. Ground-wave range increased markedly over the ground-plane antenna, which I kept up for comparison purposes. Signals not copyable on the ground-plane antenna are Q5 on the gain antenna.

On-the-air improvements were considerably greater than would be suggested by gain increase alone. Our antenna "hears" well not only because it has gain but because it ignores sky noise, thus improving the gain-to-noise ratio. The FM threshold effect (the non-linear relationship between the FM signal-to-noise ratio and carrier-to-noise ratio) magnifies the effect of this. [20]

Footnotes:

[1] I have seen this effect on reception of VHF TV signals in remote mountainous regions. A

Current Flow on the Outside of Coaxial Feedline

To see why this happens, let's look at the currents at the bottom end of a vertical antenna, using the matching network described in Figure 1. See Figure 7 for the various current flows.

I_A is the antenna current at the bottom end of the antenna. It flows into the top of the coil. Current I_L flows from the coil tap into the center conductor of the coaxial line. A current of equal strength to I_L but opposite in direction, $-I_L$, flows on the *inside* surface of coaxial shield. Current I_B flows out the bottom end of the coil. I_S flows on the *outside* of the coaxial shield.

Using Kirchoff's current law (the algebraic sum of currents flowing into and out of a junction must equal zero), we get two equations:

$$I_A = I_L + I_B$$

and

$$I_S = I_L + I_B$$

We can solve the first equation for I_B and substitute it into the second.

The result is that I_S is equal to I_A . In other words, the amount of current that flows on the outside of the coaxial shield is the same as the amount of current which flows at the bottom end of the antenna. (This analysis is from Endnote 11.)

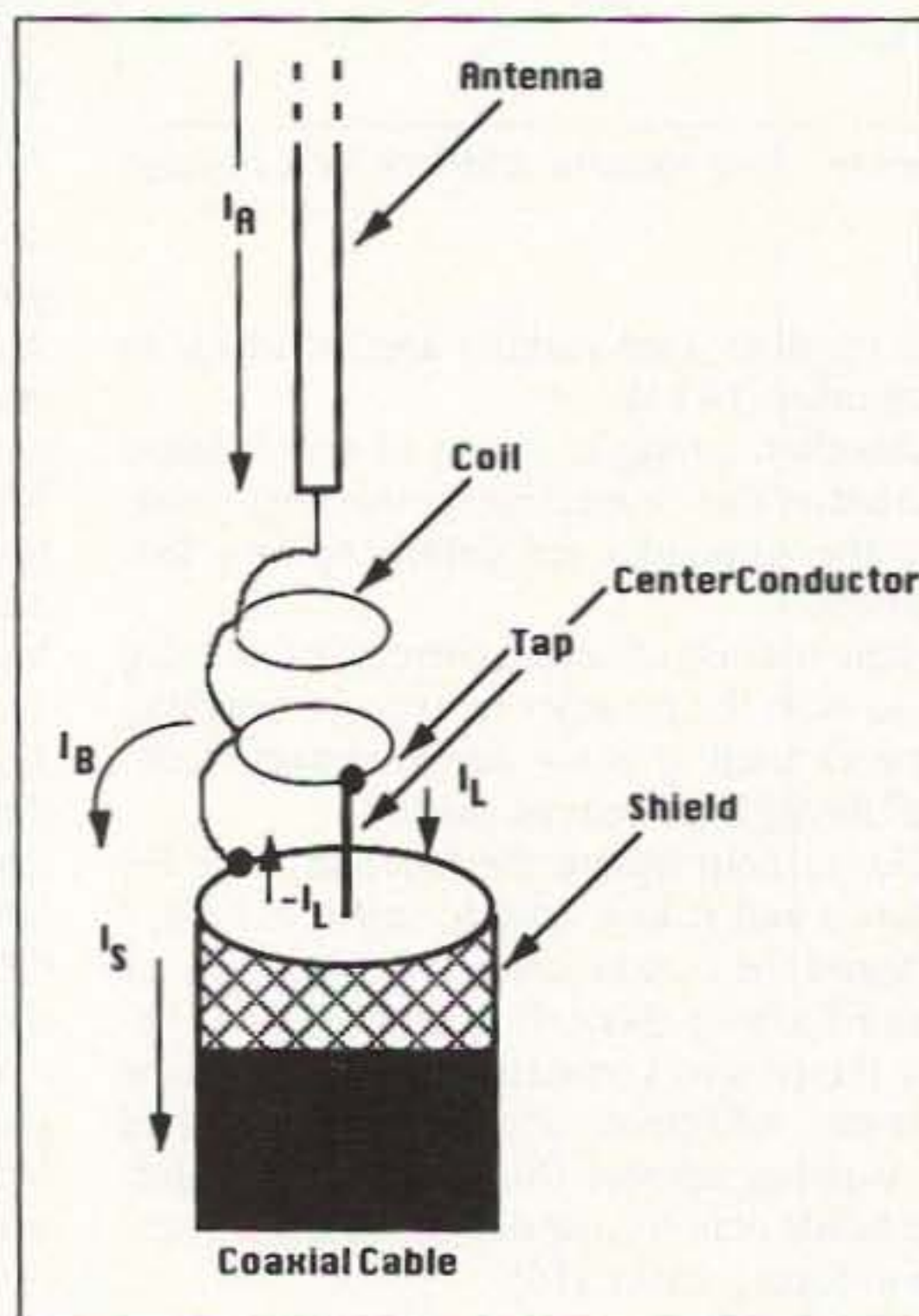


Figure 7. Current flows at the bottom end of a vertical antenna (see text).

highly directional antenna's beamwidth in azimuth appears to become very broad because the diffracted and scattered signal no longer arrives from only one direction.

[2] Orr, W., "Gamma-Loop-Fed Vertical Dipole," *Ham Radio*, May 1972. References 2, 3, and the reference of this footnote contain an inductance nomograph.

The inductance of a single turn coil is approximately:

$$L = 0.016D(2.3\log_{10}(8D/d) - 2)$$

where L is the inductance (μH) of the coil, D is the coil diameter (inches) and d is the wire diameter (inches). (Formula from Terman, *Radio Engineer's Handbook*, 1st Edition, McGraw-Hill, New York, 1943, p. 52).

[3] Orr, W. and S. Cowan, *The Radio Amateur Antenna Handbook*, Radio Publications, Inc., 1978, p. 101.

[4] Manufactured by Cushcraft Corporation, Manchester, NH 03108.

[5] Knaack, R., "Detuning Sleeve for the Ringo Ranger," *QST*, May 1983.

[6] Orr, W., "More About Radials," *Ham Radio*, November 1984. Discusses the use of radials

longer than 1/4 wavelength.

[7] Meyer, P., "The Truth About 5/8-Wavelength Vertical Antennas," *Ham Radio*, May 1974.

[8] Aurik, L., "Equipment Review: The ASEA Isopole 2-Meter Antenna," *QST*, April 1980.

[9] Belrose, J., "Notes on Coaxial Baluns," *QST*, June 1983.

[10] Jasik, H. (Editor), *Antenna Engineering Handbook*, McGraw-Hill, 1961, pp. 22-4 to 22-14.

[11] Reynolds, D.K., *Facts About Proper VHF Vertical Antenna Design*, (pamphlet), Advanced Electronic Applications, Seattle, WA, 1979.

[12] O'Dell, P., "Decouple VHF Verticals," *QST*, April 1982.

[13] A coaxial (unbalanced) feedline connected directly to a center-fed dipole (a point of voltage balance) also suffers from feedline radiation due to outside-of-shield current flow. This may or may not be desirable. Use of a voltage-type balun at the feed point eliminates this cause of it.

[14] *The ARRL Antenna Book*, 13th Edition, ARRL, 1978, Figures 4-7 and 4-8.

[15] Moxon, L.A., *HF Antennas for All Loca-*

tions, Radio Society of Great Britain, 1982, Figure 5.2.

[16] Palmer, B.R., "Ferrite Shield-Current Chokes Cure Stray RF on Vertical-Antenna Transmission Lines," "Hints and Kinks," *QST*, January 1994, p. 78.

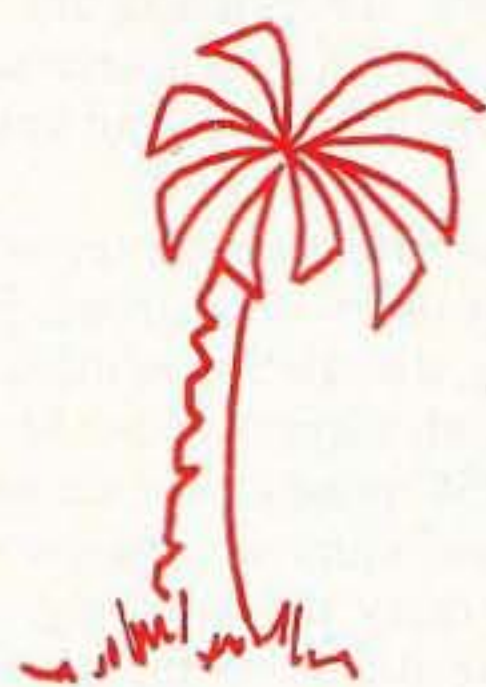
[17] Lewallen, R., "MININEC: The Other Edge of the Sword," *QST*, February 1991.

[18] Fisk, J., "Receiver Sensitivity, Noise Figure and Dynamic Range," *Ham Radio*, October 1975.

[19] *The ARRL Antenna Book*, op. cit., pp. 135, 137.

[20] Decasari, R.J., "The FM Advantage," *Ham Radio*, September 1984. At low signal strengths (low carrier-to-noise ratio), FM's signal-to-noise ratio is markedly inferior (it takes about 9 dB more carrier strength for an equal signal-to-noise ratio) to SSB. At higher signal strengths, its signal-to-noise ratio is superior. The crossover region is called the FM threshold. At low signal strengths, small improvements in carrier-to-noise ratio give big increases in FM signal-to-noise ratio. This can exaggerate antenna gain and/or gain-to-noise ratio improvements.

**Sell your products in 73 Amateur Radio Today.
Call Dan Harper at 1-800-274-7373 for more information.**



35th ANNUAL **TROPICAL HAMBOREE®**

AMATEUR RADIO & COMPUTER FAIR
ARRL HAMFEST OF THE AMERICAS

FEBRUARY 4 - 5, 1995

DADE COUNTY YOUTH FAIR & EXPOSITION CENTER
S.W. 112 AVENUE & CORAL WAY (S.W. 24 ST.)
MIAMI, FLORIDA

• Sponsored by Dade Radio Club of Miami, Inc.



- PROGRAMS & ACTIVITIES FOR EVERYONE • 200 + EXHIBIT BOOTHS • 800 + INDOOR SWAP TABLES
- TWO ON-SITE LICENSE EXAM SESSIONS • FIELD CHECKING FOR DXCC AND CQ AWARDS
- INTRODUCTION TO AMATEUR RADIO DISPLAY • INTERNATIONAL AMATEUR RADIO PRESENTATION
- FORUMS ON FCC, AMSAT, ARRL, QCWA, DXPEDITIONS, ANTENNAS, PACKET, TRAFFIC, ARES
- ALTERNATE INTEREST PROGRAMS ON CRAFTS, PERSONAL APPEARANCE, HEALTH & NUTRITION

ON-SITE CAMPING FOR 300 RVs • FREE PARKING FOR 15,000 VEHICLES

Registration: \$5.00 Advance (deadline Jan. 31st) — \$7.00 Door
Campsites: 3 days (Fri., Sat., Sun.) \$45.00, 4 days (Thur., Fri., Sat., Sun.) \$60.00
Swap Tables: \$25.00 each* plus reg. ticket • Power: \$10.00 per user.
*CALL OR FAX FOR SWAP SPACE AVAILABILITY BEFORE SENDING IN TABLE RESERVATION.
(Prices quoted for tickets, tables & camping include Fla. & Dade Co. tax)

Headquarters Hotel: Miami Airport Marriott - \$70.00 Single, Double + Tax. Tel. (305) 649-5000 - Speak Only to Reservation Department and MUST mention "Tropical Hamboree" to get special rate. Deadline Jan. 20, 1995.

Alternate Hotel: Holiday Inn LeJeune Center - \$70.00 Single, Double + Tax
(Complimentary Drink Coupon upon check-in) — TOLL FREE TEL: 1-800-428-9582.
Speak to Reservation Dept. and mention "Tropical Hamboree." Deadline Jan. 20th

TICKET, CAMP, TABLE PAYMENTS **PAYABLE TO: DADE RADIO CLUB OF MIAMI, INC.**
Mail to: Evelyn Gauzens, W4WYR, 2780 N.W. 3 St., Miami, FL 33125-5059
BOOTH & TABLE INQUIRIES: Call 305-642-4139 or Fax: 305-642-1648

CIRCLE 50 ON READER SERVICE CARD

The CW Operator's Friend

Simply push a button and send those frequently-repeated CQs, IDs and QTHs.

by Herbert M. Rosenthal WV5Q

I read "The Morse Messenger" by Scott Edwards KF7VS (73 *Amateur Radio Today*, June 1994, page 46) with keen interest. His device uses a PIC chip in a CW message generator for foxhunts, repeaters, etc. I thought I could use the chip in an add-on to my squeeze key and MFJ keyer. The idea was to place several "buttons" in close proximity to the paddles, and to put the electronics inside the keyer. Then, with just an inch or so movement from the paddles to the buttons, I could summon up a CQ or "OP HR IS HERB HERB" sequence with the touch of a button. This adjunct would certainly eliminate manual sending of many repeat messages.

Well, I put it all together, and it works just great! I'd like to share this with all the CW ops. Refer to the original article as you read this. Here goes:

It's Simple!

I ordered a chip from Scott, programmed with my call and sequences for DE, CQ, CQ DX, QTH, and OP, following his instructions to count spaces and to limit the total count to 92 for all six messages. Figure 1 shows my messages; the combination of highs/lows necessary on the M0, M1, and M2 memory select lines remains the same for any message. An array of 1N914 diodes and pull-up resistors is used to make each of the six buttons select the proper message; this takes 17 diodes and three resistors. They are mounted

on the same perfboard that holds the message buttons. This board fits mostly under the key, and the buttons stick out in front, very close to the paddles, three on each side of the paddles. Mount the board to the key as you wish; I used duct tape. The speaker (audio) output and tone-select functions are not used.

The rest of the electronics is mounted on a small piece of perfboard, with a socket for the PIC chip. Then the assembly is direct-wired to the keyer, wrapped with a turn or two of paper to prevent shorts, and stuffed inside the keyer cabinet. A thin, six-conductor shielded cable connects to the perfboard under the keyer, and you're up and running. Use tiny switches that take just the barest touch to operate—Digi-Key has such switches; Radio Shack 275-016 switches will work, but they are not really small. Look for small, sensitive switches. Defunct computer mice are a good source for switches and cable.

A diode connected to each switch grounds a common R-C-R circuit to give a negative-going pulse for the trigger line. Thus, any key depressed selects its message and also triggers the start of the message.

The XMTR LED is mounted on the keyer panel as a "RUN" indicator, and serves to advise you when a message sequence is complete.


Modification

There is a 0.5-second delay programmed in the software that is *undesirable* for this ap-

plication; it takes too long at moderate CW speed for the message to begin. I reduced this wait time by speeding up the operating frequency of the chip, replacing the original RC components with a 10 pF capacitor and a 1,500 ohm fixed resistor in series with a 10k ohm pot. Of course, this throws the original speeds way off, but with the new pot set at zero ohms, and the three speed lines pulled to zero, the original 7 wpm is now about 18 wpm, and the start delay is about 0.1 second—acceptable. To QRS, increase the setting of the pot; this *does* increase the start delay, but it's manageable.

They KEY output drives an inverting NPN transistor to give a low-going CW sequence. I wired this to the manual key input of the MFJ keyer (pin 20 on the Curtis 8044ABM chip). Others may use this transistor to operate a reed relay as shown; the contacts are then "clean" and may be used for positive or negative keying, or connected across your keyer's output.

That's it. The temptation to do a repeat circuit for the CQ messages was strong, but I decided against this; a single 3x2 suffices.

I have written Scott, suggesting that he consider re-doing the PIC program for the button function. This would eliminate the memory diodes, the turn-on delay, the start trigger, the tone and speaker leads, providing a simple one-chip, six-button keyer. Until such a chip is available, you can do it "my way." 

See Figure 1 on page 38

hambrew

FOR AMATEUR RADIO DESIGNERS
AND BUILDERS Quarterly
\$20/yr.



- HF • QRP • UHF
- VHF • Rcvrs • Xmtrs
- QRO • Ants. • Projects

BUILD IT-THEN OPERATE IT!

- HAMBREW Fall Festival Contest
- From Kits To RF Design • New Products
- Free Classified Ads To Subscribers
- Design Awards For Amateur Builders

\$25/yr. (Canada, Mexico) • \$35/yr. (Intl.)
PO Box 260083 • Lakewood, CO 80226
VISA • MC only: 1-800-5-HAM RIG

CIRCLE 286 ON READER SERVICE CARD



Now for Windows!

LOGic 4

HAM RADIO SOFTWARE

The ultimate in ham radio software! Complete logging, online awards tracking, QSL management facility, radio interfacing, antenna rotor control, data terminal for all digital modes, unequalled packet spotting, contesting, CW keyer, sound card support, full mouse support, customizable screens and reports, superb documentation and tech support, grayline propagation chart, interface to callbook databases, and much more. Specs: IBM 386SX, 4mb RAM, hard drive. LOGic 4 DOS \$79, Windows \$99. LOGic Jr DOS \$39, Windows \$49. Foreign shipping extra. visa/mc. **Free 30-day!** Also available: PDA QSL Route List. Radio interface hardware. Keyer interface hardware.

Personal Database Applications, Dept 7, 2616 Meadow Ridge Dr., Duluth, GA 30136. Ph. 404-242-0887. Fax 404-449-6687 Tech supp. 404-417-1899. 8-6 M-Th, 8-noon Fri.

Windows
or
DOS!

BUSINESS FOR SALE

OWNER RETIRING

This small manufacturing business established in 1956 has shown a profit every year. Can be operated with just 2 employees or partners. Sales in 1993 \$159,000. Can easily be doubled.

Complete manufacturing facilities from design to finished product. Adapts quickly to any new product. Replacement cost of equipment over \$250,000. Sale price of business \$150,000 includes everything except 2 story frame building which is available separately for only \$140,000.

OPPORTUNITY OF A LIFETIME. DON'T MISS OUT.

Business continues to operate. Strong growing market for product line. Call or FAX the owner any Tuesday, Wednesday or Thursday at: 718-468-2720.

MFJ Super CW Keyboard with Perpetual Memory™

... two line LCD display ... includes RFI suppressed keyboard ... eight 250 character nonvolatile message memories ... 150 character type-ahead buffer ... iambic keyer ... powerful Morse Code Trainer ...

MFJ-452
\$129⁹⁵

Includes Keyboard!

Send effortless CW as soon as you turn on this MFJ Super CW Keyboard -- there's no computer to boot up, no program to load -- just start typing.

You get a standalone MFJ CW Keyboard that includes an RFI suppressed keyboard, a two line 16 character LCD display, eight 250 character nonvolatile message memories, a 150 character type-ahead buffer, iambic keyer, plus a powerful Morse Code Trainer and much more for an incredibly low \$129.95!

Big 150 Character type-ahead Buffer

Even "hunt and peck" typists can send perfect sounding CW because a large 150 character type-ahead buffer smoothes out your typing and gives you time to compose.

MFJ Perpetual Memory™

Eight 250 character message memories let you store often used messages.

MFJ's unique nonvolatile Perpetual Memory™ saves your messages and settings up to 20 years without power or batteries.

Unlike short term memory, you won't lose your messages and settings every time you turn power off.

LCD Display

Only MFJ gives you an easy-to-read LCD display that simultaneously shows what you're typing in on one line and what you're sending out on another line.

You can review stored messages, keyboard settings and spot typing errors that you can quickly correct by backspacing.

LCD display is mounted on a sloped front panel and has a contrast control.

MFJ AutoCommand™

MFJ AutoCommand™ lets you execute

The world's most powerful CW Keyboard

Want the world's most powerful CW keyboard with all the features of the MFJ-452 Super CW Keyboard, 32K of lithium battery backed up message memory, plus much, much more?

Choose the MFJ-498 and you'll also get . . . an FCC Exam Simulator™ that sends random QSOs exactly like FCC exams -- when you can copy these random QSOs, you're ready to pass your exam and upgrade . . . MFJ's QSO Simulator™ simulates on-the-air contacts -- answer a CQ, call a station, enjoy a QSO and get operating experience while boosting your code speed . . . MFJ's new WordRecognition™ mode gives you hundreds of commonly used words -- learn to copy entire words in your head without writing it down, just like the pros. 6 1/2 x 2 1/2 x 6 3/4.

MFJ's exclusive AnalogSet™ speed control lets you customize your speed range.

MFJ-498X, \$159.95, same as MFJ-498 without keyboard.



commands stored within a message.

For example, you can insert pauses and incrementing serial numbers, play messages continuously or call other messages.

Includes RFI Suppressed Keyboard

Keyboard included -- you won't have to supply your own keyboard.

It has excellent RFI suppression -- it won't lockup or send characters you don't want because of RF and you won't hear digital hash in your receiver.

SingleTouch™ Function Keys

No complex keystrokes! MFJ's SingleTouch™ function keys make it simple to store and recall messages, set speed, weight and tone, setup serial numbering, turn on/off transmitter tune, keying and handkey mode.

Prosigns

Commonly used prosigns are assigned keys for easy use. You can also create any prosign by pressing Alt and any characters.

Full Featured Iambic Keyer

For fast break-in, plug in an iambic paddle and use it as a full featured keyer.

You can pause your playing buffer or message, insert your comments with your paddle and then resume playing.

Powerful Morse Code Trainer

You can practice or teach Morse code in Farnsworth or normal mode.

Select letters, numbers, punctuations or prosigns or any combination for practice. Use standard 5, random 1 to 8 character

groups or select specific six character sets.

Plus much more

Has speaker, sidetone, volume control and jack for external speaker or earphones.

You can vary speed from 5 to 100 WPM, weight from 5 to 95%, sidetone from 300 to 3300 Hz and serial number from 0 to 9999.

Has buffer and memory full audible indicators, Keys solid state and tube rigs.

AT101 compatible keyboard plugs into compact 3 1/2 x 2 1/2 x 3 1/2 inch interface. Use 12 VDC or 110 VAC with MFJ-1312B, \$12.95.

MFJ-452X, \$99.95, same as MFJ-452 without keyboard.

Free Instruction Manual

Want a closer look? Write or call toll-free 800-647-1800 for a free manual.

MFJ CW Keyboard



MFJ-451 **Don't need an LCD display or \$99⁹⁵** Morse Code Trainer but want all the features of the MFJ-452 **Includes Keyboard!** Super CW Keyboard? Choose the MFJ-451. It has two 100 character message memories instead of eight 250 character message memories. **MFJ-451X, \$79.95, same as MFJ-451 without keyboard.** 3 1/2 x 1 1/4 x 3 1/2.

MFJ Iambic Keyer Paddle

MFJ Deluxe Iambic Paddle feature a full range of adjustments in tension and contact spacing, self-adjusting nylon and steel needle bearings, contact points that almost never need cleaning, precision machined frame and non-skid feet on heavy chrome base. For all electronic CW keyers.

MFJ-564
\$49⁹⁵



Free MFJ Catalog

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

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH (8324)
• 1 year unconditional guarantee • 30 day money back guarantee (less s/h) on orders from MFJ • Free catalog

MFJ MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon-Fri
FAX: (601) 323-6551; Add s/h

MFJ . . . making quality affordable

Prices and specifications subject to change © 1994 MFJ Enterprises, Inc.

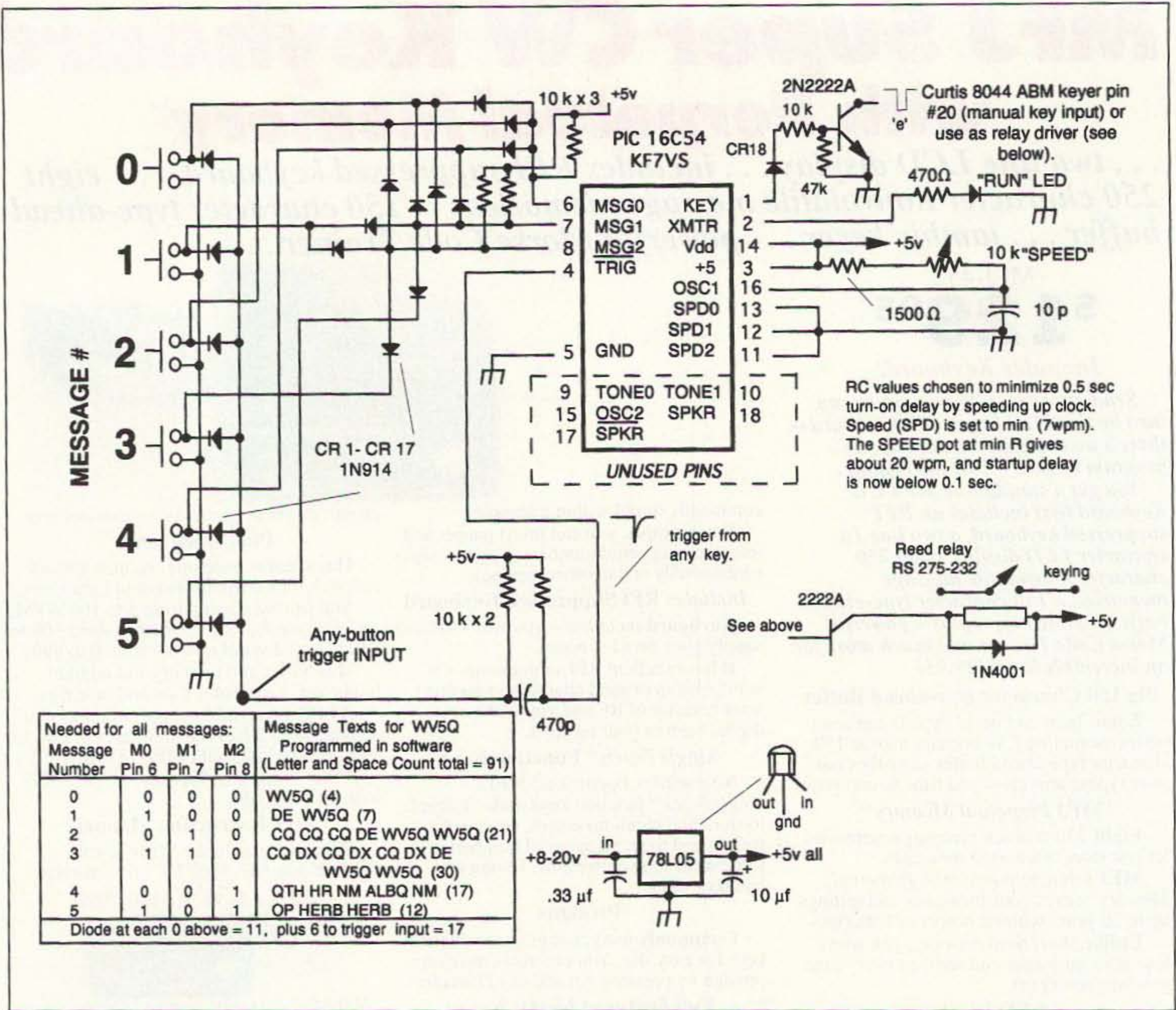
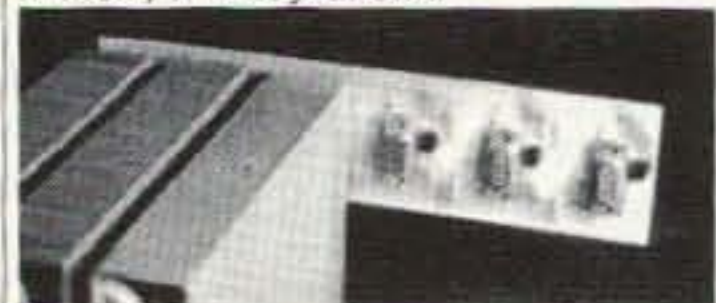


Figure 1. KF7VS Morse Messenger as PIC Button Keyer, Adapted by Herbert M. Rosenthal WV5Q, 1994.

ARE YOU BUILDING A Packet Network?

ANS has the hard-to-find parts that make building a Packet Network easy! Using ordinary Packet TNCs with network software installed, you too can expand the existing network, or start your own!



The NETRIX Diode Matrix Board connects up to six TNCs together to form a network switching node. It uses DE-9F connectors, needs no expensive, unsightly cables, and works with either TheNET or ROSE networking software. Complete kit \$24.95, \$39.95 assembled. Adapters for DRS1 or MFI, \$2.49 each - specify.

Other useful products for network builders include:
Power Supply for the TEKK T-Net Data Radios, with TNC cable (\$18.99 kit, \$34.95 assembled); **WireModem Adapter**, connects TNCs together over wire via the Modem Disconnect header (Set of 6, \$12.95 kit); **TNC to Radio Cables** (Starting at \$1.99 kit, \$7.99 assembled); **RS-232 Timeout Timer** prevents computer-based applications from locking up a TheNET Matrix (\$14.95 bare board, \$29.95 kit, \$44.95 assembled, Optional case \$12.95); **Power Distribution Board**, easy, neat & convenient 12 volt power distribution (\$15.95 kit, \$24.95 assembled); **Networking Software, Documentation and EPROMs**, too!

PLEASE WRITE FOR OUR FREE CATALOG

To order, send check or MO (US Funds) add \$3 S/H, NJ address add 6% tax. All US orders shipped 2-Day airt!
Your Satisfaction is Fully Guaranteed.

Amateur Networking Supply

Post Office Box 219, Montvale New Jersey 07645-0219

CIRCLE 76 ON READER SERVICE CARD

SAM Amateur Radio Callsign Database

Find Hams quickly and easily by Callsign or by Name. Search for a specified City, State, or Zip Code. Print with standard or customized output. Ideal for mailing lists, QSL's etc. **NEW FOR '94**, search filters that allow you to specify **FIRST NAME, LICENSE CLASS, AGE, ADDRESS, or CALL SUFFIX, AREA, OR PREFIX.**

SAM Option files include County Cross Reference, License Expiration Date, Full Date of Birth, Previous Calls and Date First Licensed.

Requires IBM Compatible PC, 17.5 MB of hard drive space, and high-density floppy drive.

NOW AVAILABLE ON CD-ROM

Disk Version \$39.95 CD-ROM \$39.95

SAM OPTIONS \$7.50 each
 Shipping and Handling \$5.00

RT SYSTEMS, INC

8207 STEPHANIE DRIVE, HUNTSVILLE, AL 35802
 1-800-723-6922 or 1-205-882-9292
 Visa, MasterCard or Discover

Direct Digital Synthesizer Kits

DDS-3: \$149 kit, \$209 assembled.
 • 2 Hz to 12 MHz, 2 Hz steps. Sine and TTL.
 • Dip switch or parallel bus controlled.
 • 3"x4" PWB. Requires +/-5 VDC.
 • 5ppm internal crystal oscillator.

DDS3 PC: \$249 kit, \$399 assembled.
 • 8 bit PC bus version of DDS-3.
 • Sine output to +20dBm into 50 Ω.
 • 0-70 dB step attenuator added.
 • Provision for external clock added.
 • V-Basic and C software w/sources.

DDS-1C: \$89 kit only
 • 1 Hz to 524 kHz, in 1 Hz steps, sine only.
 • 4"x5" PWB. Requires +/-5 VDC.
 • Dip switch control of discrete DDS.

Call, Write, FAX or e-mail for catalog

Novatech Instruments, Inc.
 1530 Eastlake Avenue East, Suite 303
 Seattle, WA. 98102
 206 328-6902 FAX 206 328-6904
 e-mail novatech@eskimo.com

CIRCLE 25 ON READER SERVICE CARD



Over 9,000 Ham Operator Items - and Ross has them all at his fingertips

For over 40 years Ross has provided the lowest prices on all the current models of Ham equipment plus keeping track of some of the classics and hard to find equipment.

This huge inventory combined with Ross' experience and knowledge of electronics makes buying from Ross Distributing an interesting, educational and profitable experience.

Call Ross today and see what's new, his low, low prices and quick delivery. If you are looking for one of the "hard to find" items give us a call today. Stocks are really, really limited.

We are good and you'll appreciate it.

All Orders Promptly Shipped
FOB Preston, Idaho



YAESU

FT-416

2-M HAND HELD PAGING TRANSCEIVER

- Compact FM
- Dual-microprocessor
- Sculptured gray-colored case
- Side-mounted PTT
- Tapered top panel control knobs
- Non-slip operation



Only **\$255**

SUPER BUYS ON SUPER GIFTS

RYAFT11R	\$290	RYAFT53025B	\$488
RYAFT2200H	\$360	RYAFT703RTT	\$259
RYAFT2500M	\$345	RYAFT73622	\$296
RYAFT2625	\$247	RYAFT736R	\$1,769
RYAFT26X27	\$264	RYAFT73RTT	\$240
RYAFT33R	\$290	RYAFT770RH	\$350
RYAFT311RM	\$369	RYAFT780R	\$600
RYAFT411E17	\$300	RYAFT811	\$300
RYAFT41525	\$324	RYAFT890AT	\$1,295
RYAFT41625B	\$255	RYAFT900AT	\$1,332
RYAFT416G25B	\$320	RYAFT990	\$2,040
RYAFT470	\$370	RYAFTC1045D	\$350
RYAFT5100B8	\$630		

NOTE: THESE PRICES ARE SUBJECT TO CHANGE AT ANY TIME

**You Want It
 We've
 Got
 It
 and at
 Lower
 Prices**



Gae



Kathy

Watch For Our Monthly Goodie From The Candy Store



Ross Distributing Company

P.O. Box 234, 78 South State Street, Preston, Idaho 83263

Telephone (208) 852-0830.

Hours: Tuesday-Friday 9:00-6:00,
 9:00-2:00 Mondays

Polarity Protection Plus

Don't take a chance of smoking your next project!

by Frank Kamp K5DKZ

Any project that is designed to run off batteries or an external supply needs reverse polarity protection. For applications requiring current levels under one amp, a simple silicon diode in series with the positive power supply lead prevents damage should the supply leads be reversed. At higher current levels, a diode across the supply terminals can cause an in-line fuse to open under reverse polarity conditions. Both methods protect the load from damage but do little to prevent frustration for the careless user.

In the case of the series-connected diode, reversing the power leads will prevent the circuit from drawing current. The resulting operational failure can be easily corrected by reversing the power supply leads. Unfortunately, there are a multitude of other factors that can lead to operational failure. Most probably, the user did not reverse-connect the power leads intentionally. That lack of intent could have a person needlessly searching for other causes of failure before discovering the reverse connection. Intentionally reverse-connecting the power

input to non-functioning electronics devices is not a well-accepted troubleshooting procedure. What we really need here is a polarity correction circuit. By adding three additional diodes we can provide a polarity correction feature that has inherent polarity protection and does not result in undue frustration.

Four diodes connected in a simple single-phase bridge circuit will steer the supply current to the correct polarity regardless of the input polarity to the bridge. The positive output of the bridge is connected to the



\$40 Special To Charge You Up...

Periphex Power Packs for Longer QSO Time

replacements for	regular price
BP-85S ICOM 12v 800ma	\$76.00
FNB-27 YAESU 12v 600ma	\$60.00
EBP-22S ALINCO 12v 800ma	\$65.00
PB-14S KENWOOD 12v 400ma	\$60.00

Now Only \$40 Each

- One Year Warranty
- Matched cell construction
- Case re-build service
- Long life, extended operating time

Add \$4.00 Shipping & Handling for first battery.
\$1.00 for each add'l battery - U.S. only
MA residents add 5% tax.

Available from your dealer...



the only thing low about our charge is the cost...
1-800-634-8132

Periphex, Inc. • 300 Centre Street • Holbrook, MA 02343 • (617) 767-5516 • (617) 767-4599

Isn't Your Radio Worth The Investment?
Protect It With



THE PACK-IT
FROM TRANSEL TECHNOLOGIES



Protect your HT's, Cellular Phones, Pagers, and any other devices you carry that may be subject to damage.

The PACK-IT is made of 1/4" neoprene material which is safety belt sewn to the nylon protective backing. The PACK-IT doesn't fray like many other materials and is safe to wash whenever needed.

The strap and 2" beltloop is made from commercial grade webbing and is secured in the front with a Velcro hook and loop assembly.

The PACK-IT doesn't wear the radio like leather and protects the radio from the small falls which occurs in everyday usage. The neoprene material is a cushion material which not only covers the radio but also protects it. Various sizes available so call for the size to fit your need.

Made In The USA!

\$15.95 + \$3.00 S&H

1 (800) 829-8321

Dealers Welcome

positive input of the circuit. The negative output of the bridge is connected to the negative input of the circuit. Now, power of either polarity can be applied to the AC terminals of the bridge and the load will still receive properly polarized supply current.

This trick is not without some minor drawbacks. The most significant drawback is the additional voltage drop across the extra diodes. In the case of silicon diodes, you will experience a 1.4 volt drop between the input and output of the bridge. A power dissipation concern becomes a problem when load currents in excess of a few amps are required. A 2 amp load will dissipate almost 3 watts in the diodes.

The usefulness of this method far outweighs its drawbacks when we apply it to low-current devices that have their own voltage regulation. If we add a large-value filter capacitor across the output of the bridge, we end up with a device that can have a large range of power sources. Either AC or DC wall bug-style supplies could be employed and we would no longer have to worry about the polarity of the DC supplies. We can now use any source of AC or DC for input to the bridge, assuming its supply voltage is

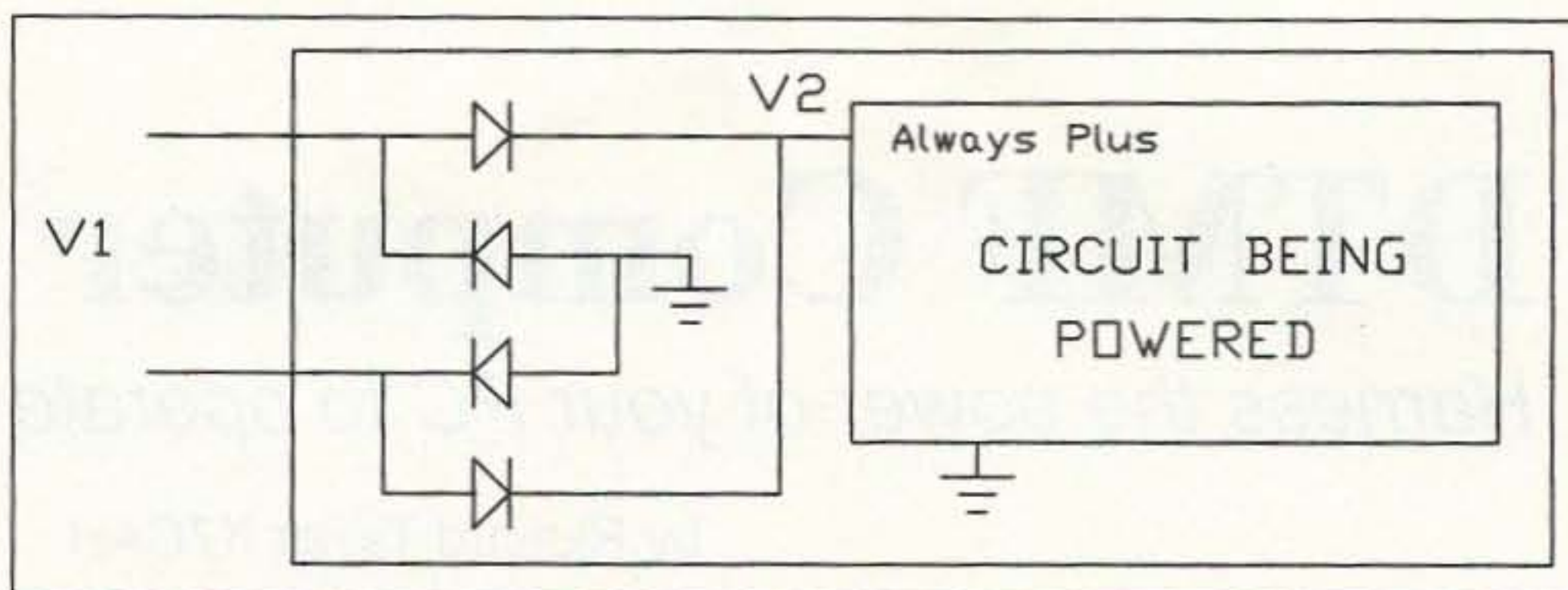


Figure 1. V1: Any polarity DC voltage 1 or 2 volts greater than that required at V2. The current rating must be sufficient for the circuit being powered.

large enough to overcome the 1.4-volt drop through the bridge and the possible 3-volt drop through any regulators in the load. This generally means that a wall bug-style

circuit uses devices that operate over a large voltage range, like CMOS devices, regulation might not be required at all. In such an application, power sources with voltages

ranging from 5 to 16 volts AC or DC could be employed.

So now we have polarity protection, polarity correction, and the versatility of using a large range of assorted AC or DC power

supplies. I figure that is a lot of performance for the cost of three additional diodes.

“The usefulness of this method far outweighs its drawbacks when we apply it to low-current devices that have their own voltage regulation.”

supply with a minimum of 9 volts will be required for a 5-volt circuit. A 12-volt circuit will need a 16-volt supply. If the cir-

Antennas West TigerTail?

For dB's per dollar, it beats an amplifier, and works on receive also. What more could you ask?

Lou Ann Keough, KB6HP

When Antennas West sent in a tiny (1/3 oz.) object that made claim to improving signals on 2 meter handhelds, I took it home to try it.

Gayle Shurum, KD6CJ, lives about seven miles away and, using her Yaesu FT 480R and roof mounted vertical, kept record of her receiver's meter readings. Marking my desk so the handheld would be in exactly the same location, we did the standard ham radio "Here's antenna one, here's antenna two" routine.

Since the TigerTail is in effect a counterpoise (or the missing half of the dipole), I expected some improvement in signal strength, but the results were far better than I anticipated.

Without TigerTail when I transmitted on low power (1W), Gayle recorded an S-3 signal with 15 percent white noise. With TigerTail, the reading was S-7, and full

quieting.

On high power (2.5W) the meter displayed an S-5 with a small percentage of noise. On high power with the TigerTail, the reading jumped to S-9.

With TigerTail I did better on low power than on high power without it. That saves my battery pack. Besides, the improvement in receiving Gayle's signal was excellent. So there you have it. A completely subjective, non-scientific report.

If you backpack, are involved in search and rescue or help out on public service events, this little device could prove invaluable.

The TigerTail is small, neat, tidy, relatively inexpensive (\$7.95), and does nothing but sit there and work. For dB's per dollar, it beats an amplifier, and works on receive also.

What more could you ask?

-condensed from WorldRadio



Yes, I want to increase range and save my batteries.

Send my TigerTail. (1 for \$7.95, 2 for \$15, 3 for \$21)

Send my Pico-J. (2m=\$19.95, Dualband 2m/70cm=\$26)

Send a combo. (PJ 2 + TTail=\$26, PJ Dual + TTail=\$32)

Name _____

Call _____ Phone _____

Street _____ Apt _____

City _____ State _____ Zip _____

Antennas West InfoPak Order Hotline
 Box 50062A Provo UT 84605 \$1 800 926 7373

CIRCLE 57 ON READER SERVICE CARD

DTMF Computer Interface

Harness the power of your PC to operate DTMF tone controls.

by Richard Taylor K7CAH

The Capitol Peak Repeater Group operates five repeaters on Capitol Peak, near Olympia, Washington. Three of the repeaters are linking repeaters for the Evergreen Intertie system. One repeater is on 145.47 and one is a redundant repeater that can be switched in or out of the system. The entire configuration is controlled by two microprocessor-based controllers with programmable speech, voltage and temperature sensors, an autopatch, and weather receivers.

There are over 600 user and control codes involved in the setup and operation

of the two controllers. This does not include the speech or macro programming. A hard reset of the system involves the long and tedious job of reprogramming. Also, changing system configurations requires inputting several long strings of digits, one at a time. A faster means of programming the repeaters was clearly needed.

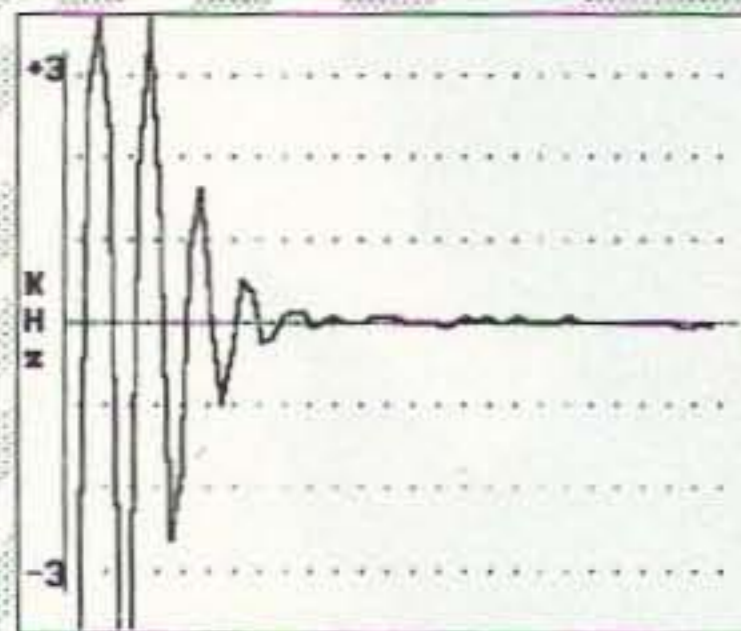
The following computer interface evolved out of this need. It is a small, easily-built unit that interfaces an IBM-compatible computer with the mike input of the transceiver. It generates all 16 DTMF tones that are inputted from the computer key-

board. With a little modification it can also be used through telephone lines.

The interface was designed around the SK22859 tone-generator chip. This chip is used primarily as a replacement for the tone generators in telephone Touch-Tone pads and is readily available. It is also capable of generating all 16 DTMF tones and uses an easily-available 3.58 MHz TV type crystal in its oscillator circuit. The chip is a low-voltage (3 volts) low-current device, which makes it ideal to use with a laptop computer both in the field and at home. The interface connects to the computer via

MoTron Electronics

310 Garfield St. Suite 4 PO Box 2748 Eugene, Oregon 97402



This is an actual FingerPrint captured by the TxID-1

TxID-1

Transmitter
FingerPrinting
System

Now Shipping!

FM/AM radio transmitters have a unique frequency versus time start-up characteristic—even radios of the same make and model. This "FingerPrint" can be captured, stored and analyzed. Our exclusive TxID Software and the patented technology of the TxID-1 IBM/Compatible circuit board can help you identify the abusers on your repeater! Or help you keep track of the number of radios per account on commercial repeaters. CTCSS and DTMF decoding, as well as Spectrum Occupancy and Deviation measurement features further enhance the system.

Call or write for a brochure with full details, additional examples, and technical specifications.

TxID-1 with Software \$699.00

Shipping/Handling UPS Ground USA: \$8.00

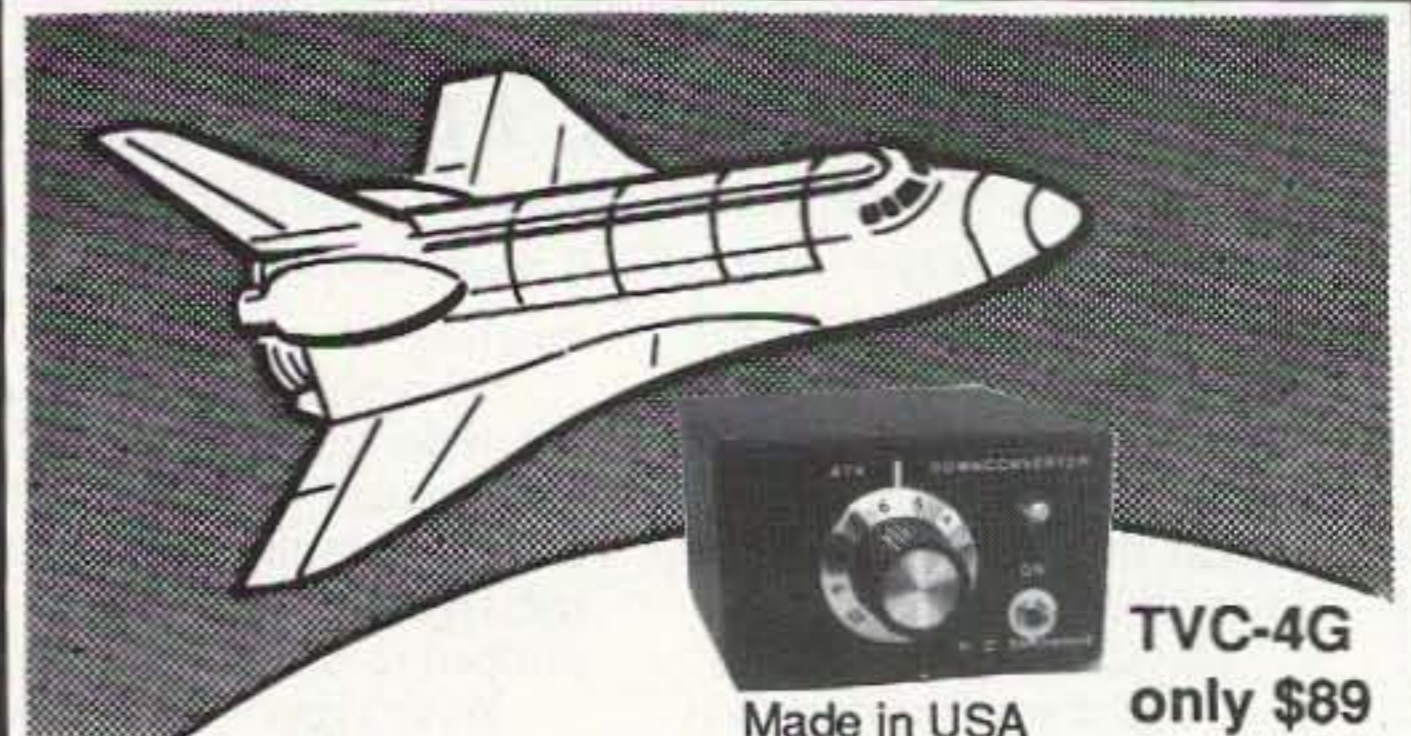
Visa/MC and AMEX accepted. COD on cash or Money Order basis only.

Government Purchase Orders accepted.

Orders: (800) 338-9058

Info: (503) 687-2118 Fax: (503) 687-2492

AMATEUR TELEVISION



SEE THE SPACE SHUTTLE VIDEO

Many ATV repeaters and individuals are retransmitting Space Shuttle Video & Audio from their TVRO's tuned to Spacenet 2 transponder 9 or weather radar during significant storms, as well as home camcorder video. If it's being done in your area on 420 - check page 501 in the 94-95 ARRL Repeater Directory or call us, ATV repeaters are springing up all over - all you need is one of the TVC-4G ATV 420-450 MHz downconverters, add any TV set to ch 2, 3 or 4 and a 70 CM antenna (you can use your 435 Oscar antenna). We also have ATV downconverters, antennas, transmitters and amplifiers for the 400, 900 and 1200 MHz bands. In fact we are your one stop for all your ATV needs and info. We ship most items within 24 hours after you call. Hams, call for our complete 10 page ATV catalogue.

(818) 447-4565 m-f 8am-5:30pm pst.

Visa, MC, COD

P.C. ELECTRONICS

2522 Paxson Ln Arcadia CA 91007

Tom (W6ORG)

Maryann (WB6YSS)

CIRCLE 248 ON READER SERVICE CARD

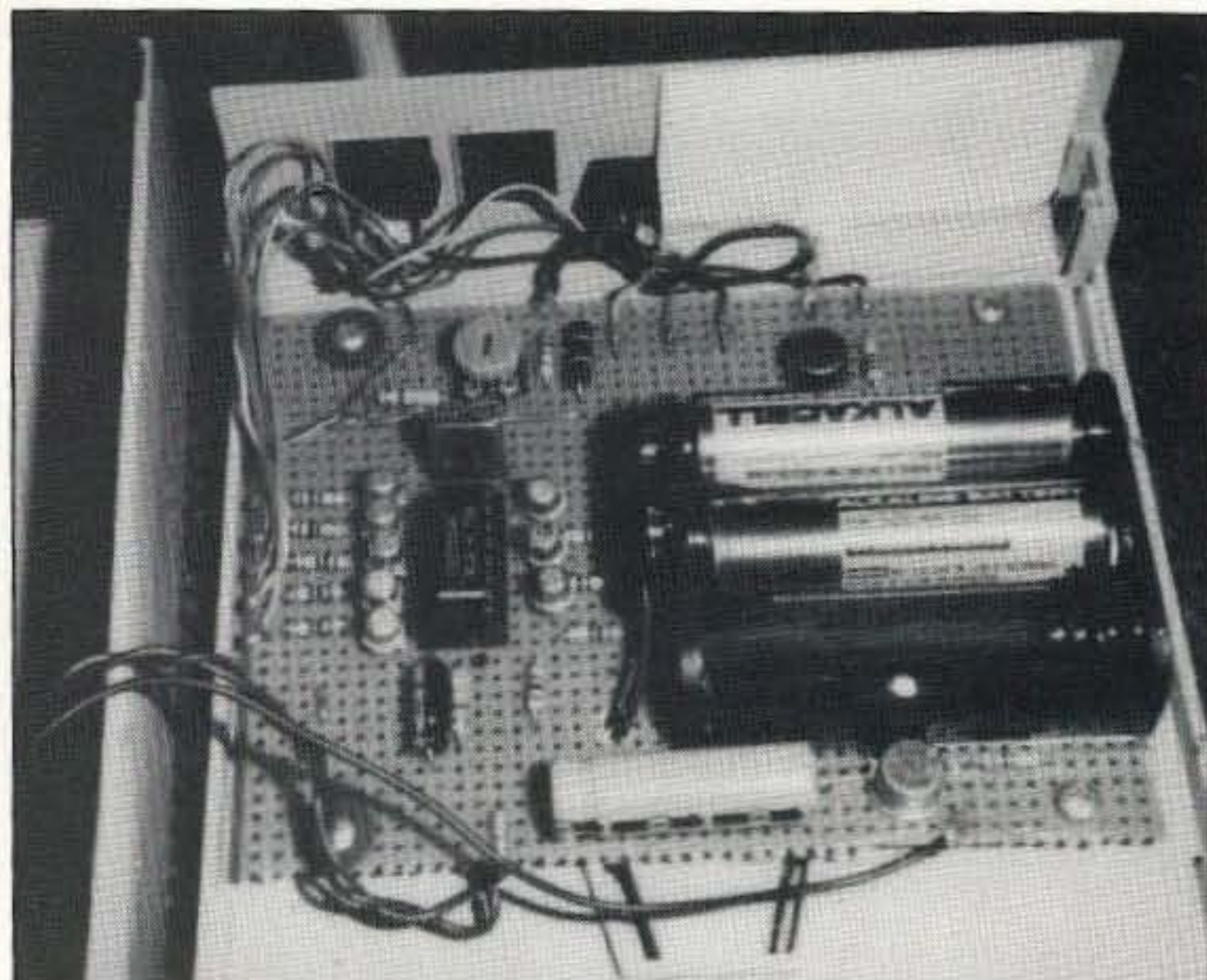


Photo A. An early prototype of the DTMF Computer Interface built on perfboard.

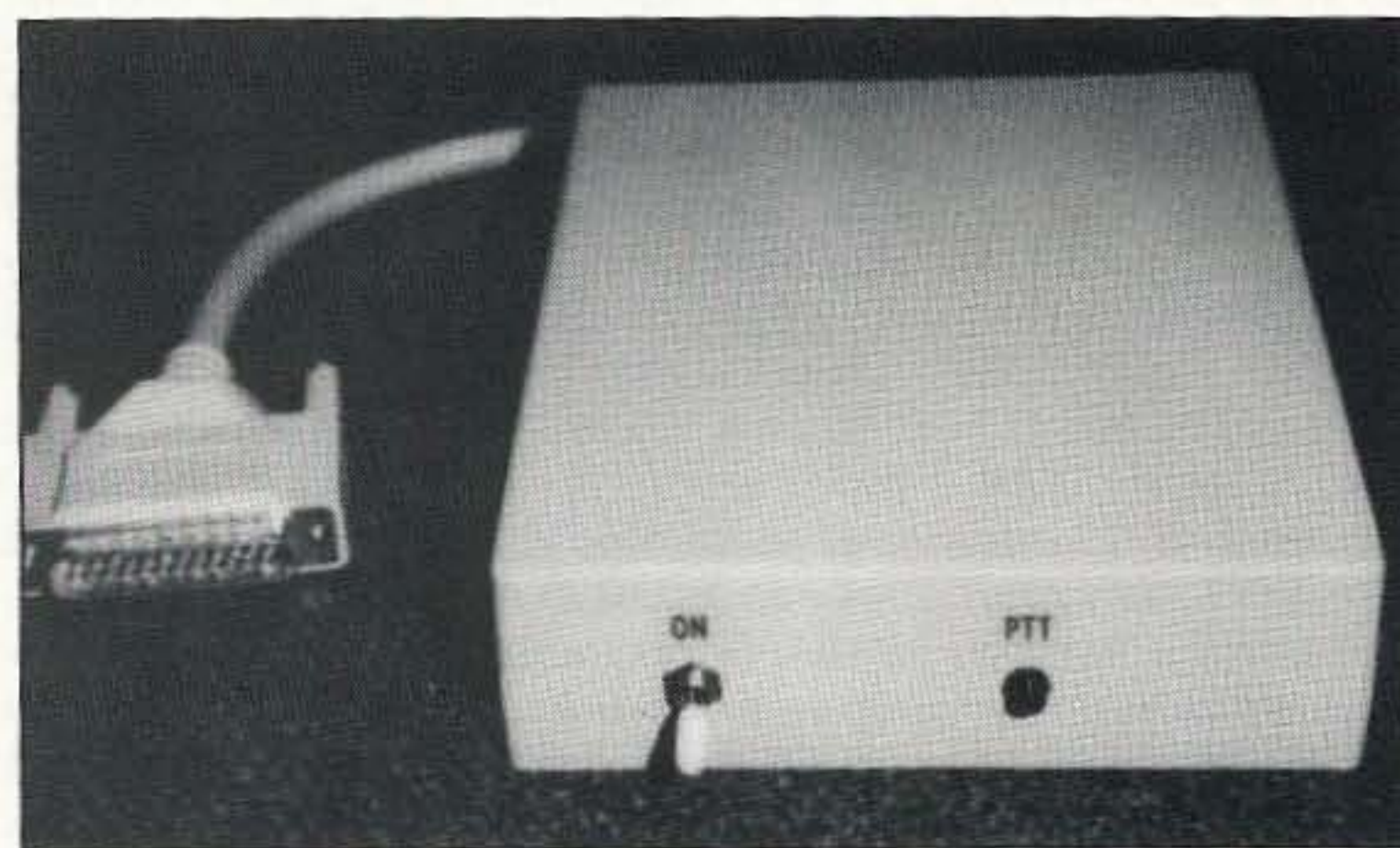


Photo B. The DTMF Computer Interface looks inconspicuous in its own little box.

the parallel printer port. This port can be programmed for both input or output, and is probably one of the easiest ports to use to connect outside devices to the computer.

Operation

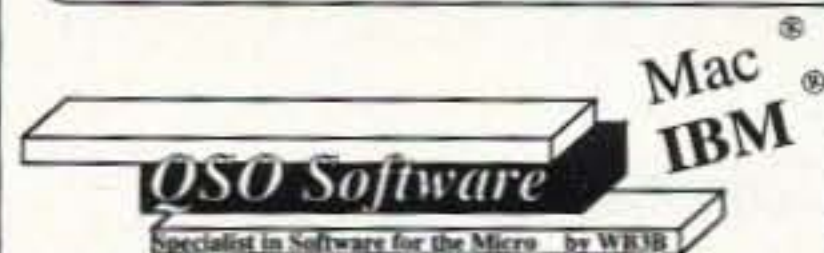
The standard DTMF (Dual-Tone Multiple-Frequency) keypad is arranged in rows and columns (see Figure 1). Each row and each column has a single frequency tone associated with it. By connecting a row and a column together, two tones are generated and combined to produce a standard dual tone associated with a particular digit or letter (A, B, C, D). To produce the dual tone for the digit 3, row 1 is connected to column 3. This produces and combines the tones of 697 Hz and 1477 Hz, representing the digit 3. Tone generating and combining is done within the SK22859 IC. By grounding both a row and a column on the IC, the proper tone is produced. Output is audio, sufficient to drive a small speaker.

Instead of the DTMF keypad, the

computer printer port is used. This port is easily programmable in BASIC and is readily accessible without any modification to the computer. The portion of this port that we are mainly interested in is the eight "Data" lines and the "Strobe" line. The Strobe line is used to key the mike PTT. Each of the

QSO Tutor[®]

Study Aid for the Amateur Radio Exams



Compare the features - No other theory tutor contains the entire question pool, explanations, graphics, progress analysis and automatic concentrated study where you need it.

"Great Programs - I passed the advanced and extra licenses both in one morning! After 12 years as a general. The sample test portion really got me going! See you in the pileups!"
WBSYJF

"As far as I am concerned, there is nothing like the QSO Tutor program. I have tried another and believe me, there is no comparison."
KASZBE

"The most advanced program I've tried... Graphics are extraordinary... This program should be your first consideration."
Gordon West - Worldradio

"Do I recommend the QSO Tutor? Heartily, yes! It really motivated me and it's a great way to test my progress. The learning is a natural by-product of the fun I am having."
Jim Bail - 73 Magazine Review

- Runs on IBM compatibles or Macintoshes
- Programs are available for Novice, Technician, No-Code Technician, General, Advanced and Extra Amateur class exams as well as Commercial Radiotelephone and Commercial Radar Endorsement. Each program sold separately.
- Work with the entire question pool, or study questions automatically selected by the program from your weakest areas.
- Current Question Pools
- Includes full screen graphics, explanations on appropriate questions and, on the IBM version, a pop-up calculator.
- Logs multiple study sessions and allows resuming at a later time. Returns to review missed questions if desired.
- Creates randomly generated sample tests on-line or printed with graphics on Epson/IBM or Macintosh printers.
- Public Domain Morse code tutor is included on request at no extra charge.

Also Available:

QSO Controller[®]

- The ultimate companion for controlling late model Kenwood rigs.
- Full mouse driven graphical user interface.
 - Controls all functions of TS-950, 940, 850, 811, 711, 450, 440 and 140.
 - Includes integrated logging, custom scanning, extended memories with annotation, real time S & multi-meters on screen, GMT, in/out-of band conditions by license class, and much more.
 - Available for Macintoshes and IBM compatible (EGA or VGA only)
 - Call or write for details

\$29.95 per class for Novice thru Extra and Comm. Radar
PA residents add 6%. Price includes shipping.

\$39.95 per class for No-Code Tech (Novice and Tech programs) and Commercial Radiotelephone



QSO Software
208 Partridge Way
Kennett Square, PA 19348
215-347-2109 (Voice or FAX)

1 800 483-3973
(1 800 GUD DX 73)
Ordering info only please!

CIRCLE 145 ON READER SERVICE CARD

Sell your products in 73 Amateur Radio Today.
Call Dan Harper at 800-274-7373.

POWER POCKET

POCKET provides hours of extended talk time, up to 6 times longer than standard battery packs!

- Emergencies - Special Events - Search & Rescue - Hiking - Cycling - Hamfests - Field Day - Etc.

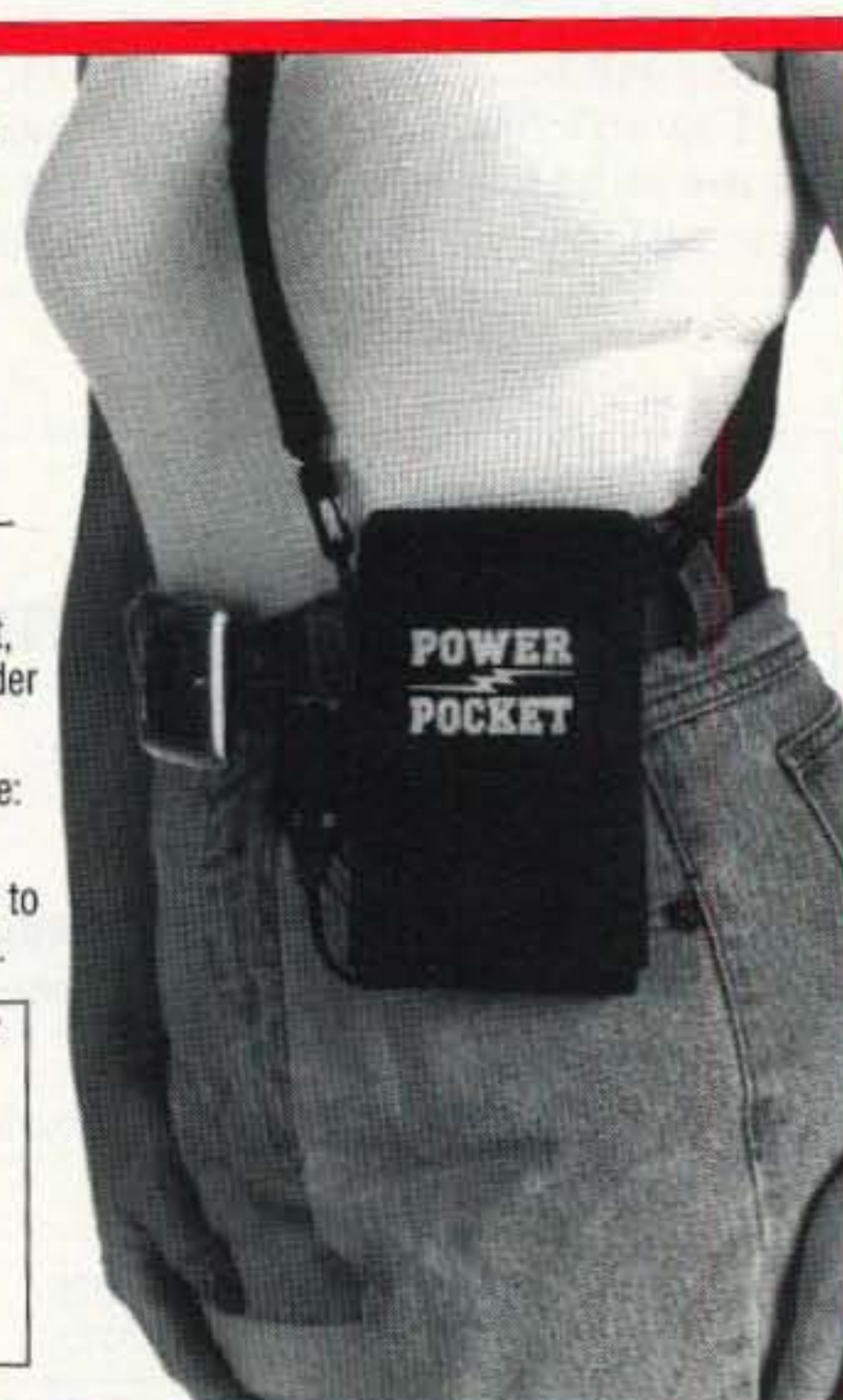
Without power, your HT is useless! Don't be caught without a POWER POCKET when you need it most.

- Compact slim design that is light weight, only 30 ozs., with a belt loop and shoulder strap included.
- 110V Wall Charger included. Charge rate: 6-8 hours from complete discharge.
- Sealed lead acid case, can be recharged to 100% without memory effect of NiCads.

The POWER POCKET is available from most major Amateur Radio Dealers, or contact:



NCG COMPANY
1275 N. Grove Street
Anaheim, CA 92805
(800) 962-2611
(714) 630-4541
Fax (714) 630-7024



CIRCLE 54 ON READER SERVICE CARD

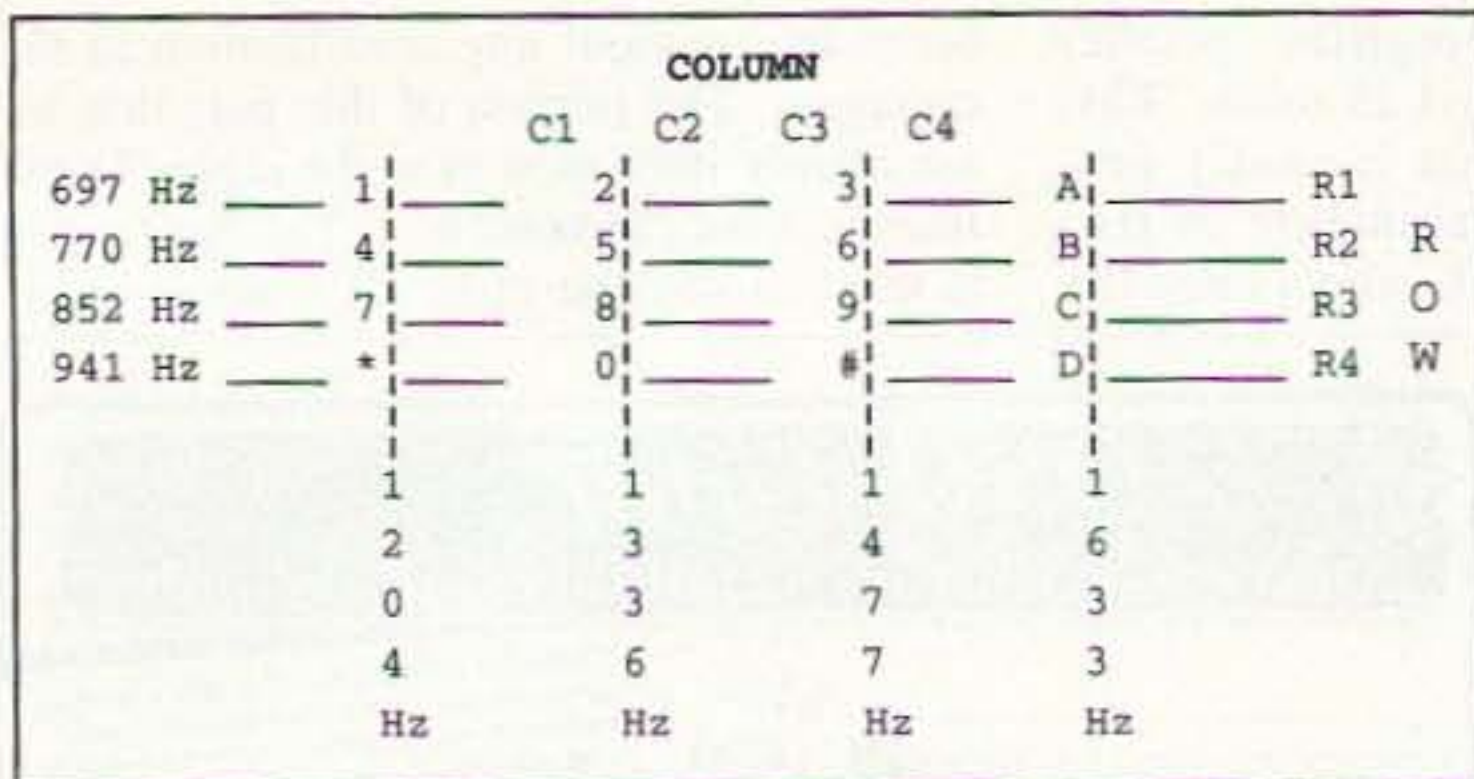


Figure 1. DTMF keypad.

data lines is either on or off (+5 volts or 0), depending on the binary number associated with all eight data lines (see Figure 2). Possible combinations of 255 numbers are available; however, only 16 numbers are used for our interface. The combination of four rows and four columns on a DTMF pad and eight data lines works out well. All we need to do is assign each data line to act like a row or column on a DTMF keypad. We then program the computer to output the correct binary number to the printer data lines that represent the decimal digit entered at the keyboard. The binary output from the printer port (+5 volts or 0) is sent to the IC keying transistors. The keying transistors ground either a row or column line on the IC. At the same time, the Strobe line is keyed on. This in turn keys (grounds) the transceiver PTT line and sends the appropriate tone out over the air.

As is usually the case, there is always something that makes a simple project just a little more difficult. However, in this case it is just a minor irritation. Not all computers use the same port assignment to access the printer port. LPT1 and LPT2 are used to designate the printer ports. LPT1 should have an address assignment of decimal 956 or 888 and LPT2 of 632. The strobe line address will be either 890, 958, or 634. So far, I haven't found any computers that do not use at least one of the above port address assignments. However, if you have

trouble running the program, consult your computer manual and make sure at least one of the printer port assignments matches one of the above. In the program listing, the printer port used is LPT1, with a port assignment of 888 and strobe assignment of 890 (C=888:W=890). If the program will not operate, change C and W.

Construction

Parts placement is not critical. I used Radio Shack perfboard for component mounting on the prototype shown in Photo A. You can also use a drilled and etched PC board, like the one pictured in Figure 5. All the switching transistors are 2N2222, although any general-purpose NPN transistor should work. Parts values also are not too critical. However, the 680 ohm load resistor (R5) on pin 16 of the IC should be as close as possible. The SK22859 IC is static sensitive, so it is best to use an IC socket and install the IC after all the wiring has been completed.

I cut a six-foot DB25 double-male computer cable in half to obtain the plug and cable to plug into the printer port. Use an ohmmeter to trace out the pins and wire colors for the data and strobe lines. A much neater installation would be to use a

Row/Column	R4	R3	R2	R1	C4	C3	C2	C1	Decimal value for BASIC "OUT" command
Data line #	8	7	6	5	4	3	2	1	
Decimal	128	64	32	16	8	4	2	1	
1	0	0	0	1	0	0	0	1	17
2	0	0	0	1	0	0	1	0	18
3	0	0	0	1	0	1	0	0	20
4	0	0	1	0	0	0	0	1	33
5	0	0	1	0	0	0	1	0	34
D 6	0	0	1	0	0	1	0	0	36
T 7	0	1	0	0	0	0	0	1	65
M 8	0	1	0	0	0	0	1	0	66
F 9	0	1	0	0	0	1	0	0	68
*	1	0	0	0	0	0	0	1	129
0	1	0	0	0	0	0	1	0	130
#	1	0	0	0	0	1	0	0	132
A	0	0	0	1	1	0	0	0	24
B	0	0	1	0	1	0	0	0	40
C	0	1	0	0	1	0	0	0	72

Figure 2. Printer port data output lines.

DB25 jack mounted to the project box, and use a separate cable to connect it to the computer.

Most transceivers today use a 600 ohm microphone impedance. The interface audio can be wired into the microphone input along with the station mike without causing any loading. If you have a high impedance mike input on your radio, you may have to disconnect the station mike while using the interface.

I used a 3 volt wall-type transformer power supply to power the unit. This is the type used to power small battery-operated cassette recorders and is available at Radio Shack. For portable operation, two AA batteries in series work just fine. However, do not put more than 5 volts across the IC. S1 is a double-pole single-throw switch. S1A applies power to the circuit, while S1B connects the strobe line. The interface should be turned off when not in use to prevent inadvertent transmitter key-up when the computer is used for other programs.

Operation

The program listed was written in GW-

SERIES MODE

Powerline surge protection

- ◆ **EFFECTIVE**-- required protection for interconnected or networked equipment
- ◆ **RELIABLE**-- non-sacrificial design
- ◆ **SAFE**-- Uses no MOVs

Award winning Series Mode technology eliminates the destructive energy of surge voltage and surge current!

Call or write for full details today. Ask about your ham operator/ club discount.

ZeroSurge Inc.

944 State Rt 12 Frenchtown NJ 08825
800-996-6696 FAX (908) 996-7773

CIRCLE 268 ON READER SERVICE CARD

Rack Boxes New Sizes

FREE 1995 CONSTRUCTOR'S CATALOG



PANELS ARE .063" ALUMINUM

MODEL	W x D x H (IN.)	\$	MODEL	W x D x H (IN.)	\$
1RU5	19 x 5 x 1.75	34.00	2RU12	19 x 12 x 3.5	45.25
1RU7	19 x 7 x 1.75	36.50	2RU15	19 x 15 x 3.5	48.25
1RU10	19 x 10 x 1.75	38.75	2RU17	19 x 17 x 3.5	51.25
1RU12	19 x 12 x 1.75	42.75	3RU5	19 x 5 x 5.25	46.00
1RU15	19 x 15 x 1.75	45.75	3RU7	19 x 7 x 5.25	48.50
1RU17	19 x 17 x 1.75	48.75	3RU10	19 x 10 x 5.25	51.00
2RU5	19 x 5 x 3.5	36.50	3RU12	19 x 12 x 5.25	54.00
2RU7	19 x 7 x 3.5	38.75	3RU15	19 x 15 x 5.25	57.00
2RU10	19 x 10 x 3.5	41.25	3RU17	19 x 17 x 5.25	60.00

PREPAID ORDERS SHIP GROUND FREE (48 STATES, CANADA & MEXICO)

SESCOM, INC.

2100 WARD DR., HENDERSON, NV 89015 USA
USA/CANADA (800) 634-3457 FAX (800) 551-2749
(702) 565-3400 FAX (702) 565-4828
TECH LINE (702) 565-3993 M-Th 8 am to 4 pm (PST)



CIRCLE 167 ON READER SERVICE CARD

SPY ON THE EARTH



See live on your PC what satellites in orbit see

Capture live breathtaking images of the Earth for fun or profit. Zoom in up to 20X. Send \$39 check or M.O. (\$45 air, \$50 overseas) for our fantastic 12 diskette set of professional quality copyrighted programs (IBM type) that does satellite tracking, image acquisition, image processing, 3-D projections and more. Direct reception from the satellites guaranteed worldwide without a satellite dish. Schematics included for interface. For FREE information log-on to our bulletin board anytime at: (718) 740-3911.

VANGUARD Electronic Labs
Dept. RF, 196-23 Jamaica Ave.
Hollis, NY 11423 Tel. 718-468-2720

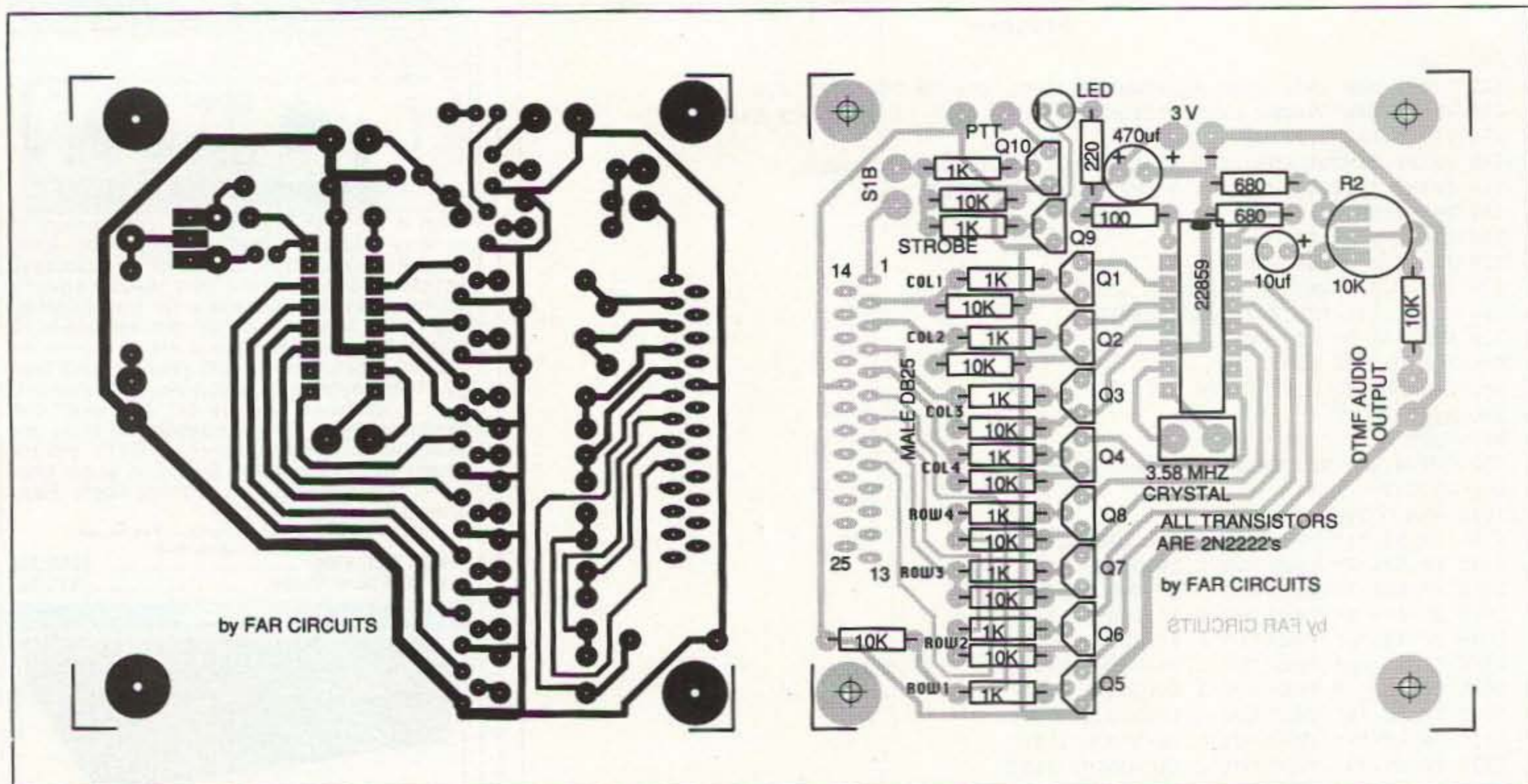


Figure 5. Drilled and etched PC boards are available for \$4.50 plus \$1.50 S & H per order from FAR Circuits, 18N640 Field Ct., Dundee, IL 60118.

BASIC and should run on any computer using DOS 2.0 or greater. Bring up BASIC on your computer, then type in and save the program. Connect the interface to your computer printer port and the radio to the interface. Run the program and input several numbers. When the ENTER key is pressed on the computer, the radio PTT should light and DTMF tones should be sent out over the air. If the PTT light does not light, change W in line 120 of the program. If no tones are outputted, change C in line 110. Once the program and interface are up and running, adjust R2 to obtain 3 to 3.5 kHz deviation. This will be the point

just above the threshold where the tones will access your repeater. Too much audio will cause distortion in your radio and will not be decoded at the repeater.

Connecting two rows to ground produces a single frequency tone. The BASIC command "Out C,48" (see text for the value of C) connects Row 1 and Row 2 to ground, producing a single tone. This can be useful for producing a test tone or, with a little programming, to send your call in CW.

A complete program with data storage and documentation is available on 5-1/4 disk for \$15 U.S. from the author. Write to me at 613 N. 5th, Tumwater, WA 98512.

Parts List

- 1 Tone generator, RCA SK22859 or CD22859E
- 10 2N2222 transistors or equivalent
- 1 10k ohm variable resistor
- 1 100 ohm resistor
- 1 680 ohm resistor
- 10 1k ohm resistor
- 9 10k ohm resistor
- 1 470 μ F capacitor
- 1 10 μ F capacitor
- 1 3.5795 MHz TV color burst crystal, ECG 358 or equivalent
- 1 16-pin IC socket
- 1 Red LED
- 1 DB25 male computer cable

SELL YOUR PRODUCT IN 73 MAGAZINE CALL DAN HARPER 800-274-7373

We have what you're looking for BRIGHT NEON QSLs \$26.95

Bright Neon QSLs that jump off the wall. Black ink on 65# Postcard Stock with six Neon colors to choose from: Neon Blue, Neon Purple, Neon Lemon, Neon Orange, Neon Red, and Neon Pink. Printed in format shown, state outline & logo included at no extra charge. (Please indicate if you want ARRL logo when ordering).

250 QSLs \$ 26.95
500 QSLs \$ 30.95 1000 QSLs \$ 36.95
plus \$3.95 shipping U.S.

Ham it up with all six Neon colors, order the **Rainbow Box** for only \$4.00 more. You'll be hard pressed to beat the price while creating such **STAND OUT** quality.



Send your check or money order along with (Printed or Typed) Name, Address, (including County), Call Letters and Color of Stock

TO: **BB&W Printing**
803 N. Front Street
McHenry, IL 60050

Custom job or Different Stock, No Problem,
Call: (815) 385-6005

BackPack Solar?

10 watt DesertStorm panel is size of open 73 magazine, weighs 1lb, and delivers 600mA for 12v charging or direct operation. Tough, Solid, with no glass to break. So rugged Uncle Sam used this for spotter communications and portable repeaters in Desert Storm. Ready to use. \$169. Add \$5 S&H. Info \$1.



AntennasWest
Box 50062 Provo UT 84605

Order HotLine
801 373 8425

CIRCLE 340 ON READER SERVICE CARD

C.W. WOLFE COMMUNICATIONS, INC.

*** HELP US OUT SALE ***

We're overstocked which means BIG savings on all our overstocked inventory — radios, reeds, elements, base cards.

WE BUY, SELL & TRADE ALL BRANDS OF
2-WAY RADIOS & ACCESSORIES

Call or write for our current flyer

406-252-9220 Fax 406-252-9617
1113 Central, Billings, MT 59102

CIRCLE 20 ON READER SERVICE CARD

HAM HELP

Number 13 on your Feedback card

We are happy to provide Ham Help listings free on a space available basis. To make our job easier and to ensure that your listing is correct, please type or print your request clearly, double spaced, on a full (8 1/2" x 11") sheet of paper. Please indicate if it is for publication. Use upper- and lower-case letters where appropriate. Also, print numbers carefully—a 1, for example, can be misread as the letters l or i, or even the number 7. Specifically mention that your message is for the Ham Help Column. Please remember to acknowledge responses to your requests. Thank you for your cooperation.

I need the manuals for: (A) JOHNSON VIKING Ranger Type #249-161 SN #62917; (B) EICO RC Bridge Model 950B SN #71492; (C) Minneapolis Honeywell Reg. Co., Rubicon Instruments WHEATSON Bridge Model #1071. I will pay for originals or copies. Zachary Stakis, c/o Aeromotive Eng. Inc., 58 Seabring St., Brooklyn NY 11231.

WANTED: A copy of the Manual for PRIDE 100A Amateur Radio Bi Linear, 80-10 mtr. Model MB0100-02. I will pay expenses! I also need a copy of the Manual for SIGMA AF-250L AM/FM Analyzer. Kenny Hudson K5QLP, 1021 8th St., Bay City TX 77414.

WANTED: Manual/schematic for B1 Linear Amplifier Model 150 made by PALOMAR INSTRUMENTS, not Palomar Engineers Inc. Thomas Wright N4GPV, 3758 Matheson Ave., Miami FL 33133.

Does anyone have the schematic for a Heath DX-100? If so, please contact Lowell Blevins, 4509 Westchase Circle, Grapevine TX 76051.

NEEDED: Schematic or 10 meter conversion info for J.C. PENNY 40 channel SSB CB (Cat. #9818360). Also, I need the schematic for UNIDEN Bear Cat 100 Pocket Scanner. I will pay copy costs. Dave Kovatch, 7346 Brushcreek Rd., Fairview TN 37062. Tel. (615) 799-8147.

I need a copy of the Service Manual for a MARANTZ Ampli/Tuner, Model SC1000, so that I can make repairs. Also, I need the Owner's Manual. Thank you. Xavier Duclos VE2XTT, 7194 Casgrain, Montreal Quebec, Canada H2R 1Y1.

WANTED: A copy of the Manual for HEATHKIT Frequency Counter Model IB-101. Write to Robert Schlegel N7BH, 2302 286 St. East, Roy WA 98580.

DEALER DIRECTORY

Number 14 on your Feedback card

DELAWARE New Castle

Factory authorized dealer! Yaesu, ICOM, Kenwood, ARRL Publications Callbook, ARE Hamlink, AEA, Kantronics, Ameritron, Cushcraft, HyGain, Heil Sound, Standard Amateur Radio, MFJ, Hustler, Diamond, Butternut, Astron, Larsen, and much more. **DELAWARE AMATEUR SUPPLY, 71 Meadow Road, New Castle DE 19720. (302) 328-7728.**

NEW JERSEY Lodi

North Jersey's newest Two Way Radio and Electronics Dealer is now open. Sales of Ham, Business, Marine and C.B. two way equipment as well as Scanners, Shortwave, Electronic Kits, Antennas, Books, Cable Boxes and more. Friendly service and low prices. **Advanced Specialties, 114 Essex Street, Lodi NJ 07644. (201) VHF-2067.**

NEW JERSEY Park Ridge

North Jersey's oldest and finest Shortwave and Ham Radio Dealer. Three minutes from Garden State Pkwy and NY Thruway. Authorized Dealers for AEA, Alpha Delta, Diamond, ICOM, Japan Radio Company, Kenwood, Vectronics, Yaesu, Ham Sales, Lee WK2T. **GILFER SHORTWAVE, 52 Park Ave., Park Ridge NJ 07656. (201) 391-7887.**

NEW YORK Manhattan

Manhattan's largest and only ham Radio Store, also full line of Business, Marine, Aviation, Shortwave Radios and Scanners, and Cellular Phones and Beepers. Large selection of Books,

Antennas, Test Equipment, coaxial cable and parts. Full Service Repair Lab on premises. Our 44th Year...We carry all major lines: MOTOROLA, ICOM, KENWOOD, YAESU, BENDIX KING, ASTRON, AEA, SONY, PANASONIC, MFJ, CCTV CAMERAS AND MONITORS, BIRD WATTMETERS, FREQUENCY COUNTERS, SCANNERS, HYGAIN, VIBROPLEX, HEIL, CALLBOOK, ARRL OTHER PUBLICATIONS. Open 7 days M-F, 9-6 p.m.; Sat., 10-5 p.m., Sun. 11-4 p.m. We ship Worldwide. Call, Fax, or write for information and prices. Your one Source for HAM and Business Radios... **BARRY ELECTRONICS, 512 Broadway, New York NY 10012. (212) 925-7000. FAX (212) 925-7001.**

OHIO Columbus

Central Ohio's full-line authorized dealer for Kenwood, ICOM, Yaesu, Alinco, Japan Radio, Standard, AEA, Cushcraft, Hustler, Diamond and MFJ. New and used equipment on display and operational in our new 10,000 sq. ft. facility. Large SWL Department too. **UNIVERSAL RADIO, 6830 Americana Pkwy., Reynoldsburg (Columbus) OH 43068. (614) 866-4267.**

PENNSYLVANIA Trevose

Authorized factory sales and service. KENWOOD, ICOM, YAESU, featuring AMERITRON, B&W, MFJ, HYGAIN, KLM, CUSHCRAFT, HUSTLER, KANTRONICS, AEA, VIBROPLEX, HEIL, CALLBOOK, ARRL Publications, and much more. **HAMTRONICS, INC., 4033 Brownsville Road, Trevose PA 19047. (215) 357-1400. FAX (215) 355-8958. Sales Order 1-800-426-2820. Circle Reader Service 298 for more information.**

Dealers: Your company name and message can contain up to 50 words for as little as \$420 yearly (prepaid), or \$210 for six months (prepaid). No mention of mail-order business please. Directory text and payment must reach us 60 days in advance of publication. For example, advertising for the April '92 issue must be in our hands by February 1st. Mail to 73 Amateur Radio Today, 70 Rte. 202 N, Peterborough, NH 03458

A NEW DIMENSION HAS OPENED...



Satellite Times

With your CURRENT equipment, YOU can begin listening to signals from orbiting satellites! You don't need a satellite dish to hear satellite signals! The signals are there, you just need to learn HOW to hear them. Satellite Times will be there for you all year long to lead you into this ever-growing and FASCINATING realm of monitoring. Don't miss another signal; CALL TODAY!

Each issue dedicated to:

- Worldwide TVRO
- NASA and Weather
- GPS and Satellite
- Radio Astronomy
- Amateur
- Business
- Computers and Satellites
- Military and Government
- How-To's and MUCH MORE!

ORDER NOW!

Charter Subscription Rates:

- 1 year US: \$16.95 (6 issues)
- 1 year foreign: \$23.95 (US funds) (6 issues)

Subscription after 12/31/94:

- 1 year US: \$19.95 (6 issues)
- 1 year foreign: \$26.00 (US funds) (6 issues)

Satellite Times

(800) 433-8155
PO Box 98
Brasstown, NC 28902
Toll free: (704) 837-8200
Fax line: (704) 837-2216

CIRCLES 280 ON READER SERVICE CARD

The Bencher Chrome Straight Key

Experience the feel of a well-built code key.

Remember the days of the J-38 key and its unique feel? If you enjoy the touch and mechanics of a straight key, plus the familiar click-action of sending without paddles, you will enjoy using the new Bencher RJ-1 that will bring back some wonderful straight key memories.

"Give me a good straight key, and I'll have a race with you on any electronic keyer," quipped the late Jim Rafferty N6RJ. The "RJ" designation on the Bencher straight key is a memorial to one of the finest CW operators in the country. "The action of a good straight key has got to be felt to be appreciated," said Rafferty.

The Bencher straight key was developed in response to requests from a number of customers and dealers wanting something new from CW key guru Bob Locher W9KNI. You can tune in Bob most evenings at the very bottom of the 20 meter band. Need I say more? I have witnessed him drinking a cup of coffee, munching a sandwich, and carrying on a conversation, all the time sending CW to a rare DX station somewhere else in the world!

"Although there are conventional straight key designs that we studied, no effort was made to copy them," comments Locher. "We wanted our engineering team to create a

product that would utilize modern materials and manufacturing techniques to meet the traditional straight key requirements," adds Locher. The RJ-1 chrome-plated key on a black-painted steel base uses oil-impregnated sintered bearings at all pivot points, and stainless steel adjustment screws. Of course, a complete range of locking adjustments of all movement and tensioning is provided along with an Allen wrench for the adjustment that feels right to you.

"We assemble everything at the same place where we turn out our popular Bencher paddles," adds Locher. "And we are talking about assembly personnel at our facilities who have the skills of a Swiss watchmaker—white gloves and the works," smiles Locher.

The Expert Users Approve!

We ran our tests on the Model RJ-2. And, while you might not think that there is any good way to test a straight key, we found the best way was to invite accomplished CW enthusiasts to come over and rate its feel. "I'm going to retire my J-38," comments Bob Gregg AB6CH. "I liked the oversized black plastic knob with a second plastic ring to rest my fingers on," comments Roy Stephens AC6CQ. "The soldered tabs on the bottom also make for a quick hook-up," adds

Stephens. On the bottom of the key there is also a holder for the Allen wrench adjustment tool, plus a plastic strain relief to keep your two-conductor keyline from tugging at the soldered connections.

The base of the key is common with one side of the key line solder lug. The other side is insulated off of the base, and connects to the gold-plated contacts that gave us a crisp open-and-close connection. Locher indicates that these are the same contact points that are found in all of his proven Bencher paddles.

For adjustments, you've got them! We found that you could adjust the knob height, adjust the contact spacing, and adjust the spring tension all with knurled knobs. The Allen wrench is there only if you need to completely strip down the key for an annual cleaning.

A set of instructions cautions never to spray any contact cleaner into the ball bearings. It also cautions against using steel wool or abrasive cleaners on any Bencher key or paddle. The bearings are Oilite, and no lubrication should ever be needed.

Best of all, the key is massively heavy, so it won't be hopping around your operating desk as you are pounding out those dits and dahs. And, just like all Bencher paddles, the key should last for a lifetime of amateur radio operation.

Departing from its traditional practice of using the prefixes of rare countries as the product identifier in the paddles, the "RJ" designation is to honor the memory of Jim Rafferty N6RJ, who was a close friend and once fellow co-worker of Bencher Management.

The keys are available in two versions—RJ-1 for \$69.95 with chrome-plated parts on a black-painted steel base, and RJ-2 for about \$79.95 with chrome-plated parts on a chrome-plated base.

For more information on the complete line of Bencher paddles, keys, baluns, and filters, write Bencher, Inc., 831 N. Central Avenue, Wood Dale, Illinois 60191; (708) 238-1183. 73



MFJ Keyers

More hams use MFJ keyers than all others in the world! Choose the one that's right for you. Write or call toll-free 800-647-1800 for more info.

MFJ-422B
\$134⁹⁵



MFJ Keyer/Bencher Paddle Combo is the world's most popular keyer because it's the best of all CW worlds -- a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle! Iambic keying, speed, weight, tone, volume controls. Automatic or semi-automatic bug modes. RF proof. MFJ-422BX, \$79.95, keyer only.

Deluxe Keyer, MFJ-407C, \$69.95, gives you easy access front panel speed, weight, volume, tone controls, all keyer modes, dot-dash memories, jam-proof spacing, sidetone, speaker.

Econo Keyer, MFJ-401B, \$49.95, for dual iambic or single lever paddles. Sidetone, speaker, volume, speed, internal weight and tone controls.

Memory Keyers

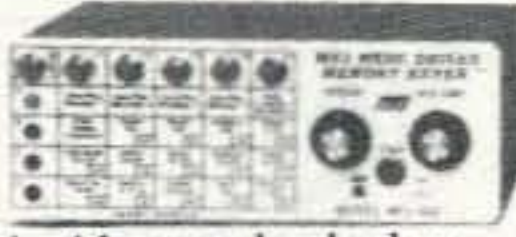
Menu Driven -- so easy-to-use you don't need an instruction manual!

MFJ-490
\$164⁹⁵



MenuDriven Memory Keyer™ in a compact package mounted on a Bencher iambic paddle. Store 192 characters in 4 message memories. Morse trainer, sidetone, automatic serial numbering plus all the features of MFJ-492 except remote control jack and extra memory. MFJ-490X, \$109.95, keyer only, no paddle.

MFJ-492
\$99⁹⁵



MenuDriven Memory Keyer™ stores 192 characters in 4 battery backed-up message memories. Expands to 8000 characters, 8 memories with MFJ-80, \$14.95. Automatic, semi-automatic bug or handkey modes, reverse dot/dash paddles, select iambic A or B or non-iambic modes. Morse trainer, automatic serial numbering, sidetone, volume and speed panel controls, remote control jack, plus more.

Super MenuDriven Memory Keyer™ MFJ-493, \$139.95, is the world's most sophisticated memory keyer. Stores 32,000 characters! Plug in AT keyboard and it turns into full featured CW keyboard. Serial port lets your computer control your keyer, compose, edit, display, save messages and record your transmissions. FCC Exam Simulator, QSO Simulator, Word Recognition Trainer, remote control jack, plus all the features of MFJ-492. MFJ-492/493 Remote Control, MFJ-78, \$19.95.

CW Keyboard

MFJ-451
\$99⁹⁵



Stand alone CW Keyboard includes AT type keyboard, 200 character type-ahead buffer, two 100 character nonvolatile message memories, more. MFJ-451X, \$79.95, keyboard interface only.

MFJ Iambic Paddles

MFJ-564
\$49⁹⁵



MFJ Deluxe Iambic Paddle features full range of adjustments in tension and contact spacing, self-adjusting nylon and steel needle bearings, contact points that almost never need cleaning, precision machined frame and non-skid feet on heavy chrome base. For all keyers.

MFJ SSB Transceiver

MFJ-9420
\$219⁹⁵



Take this tiny MFJ 20 Meter SSB Travel Radio™ with you and enjoy DXing and ragchewing wherever you go.

It's the smallest rig of its kind! A complete station -- MFJ-9420, microphone, power supply and antenna -- fits easily in your brief-case!

12 powerful watts give you enough power to work the world -- even with a makeshift antenna -- but needs only a lightweight power supply.

Potent RF speech processing focus all your power into a clear highly-intelligible signal that even DX will notice.

You get high performance superhet receiver, razor sharp crystal filter, sensitivity down to noise, smooth vernier drive VFO, one watt of audio, speaker, real S-Meter, rugged transmitter, 14.150-14.350 MHz coverage and low current drain. Tiny 2 1/2 x 6 1/2 x 6 inches.

Plug-in this MFJ-415 module, \$39.95, and operate CW. 14.000-14.100 MHz. Has semi break-in, sidetone, key jack, CW/SSB switch.

Special offer: matching microphone and MFJ-9420 SSB Travel Radio™, MFJ-9420X, \$229.95. Microphone only: MFJ-290, \$29.95.

MFJ CW Transceivers

MFJ-9020
(20 Meters)
\$179⁹⁵



Put some fun back into ham radio and work QRP-DXCC with 5 watts!

You'll be amazed at how easy it is to work the world. Countries you've worked in the past become fair game once again.

These MFJ CW rigs are real radios with all the high-performance features you expect from expensive multi-band transceivers. You get a hot superhet receiver, sharp CW crystal filter, smooth VFO, RIT, AGC, built-in speaker, sidetone, adjustable full/semi QSK.

Models for 40, 30, 20, 17 and 15 Meters CW band, \$179.95 each. Please specify band.

Plug-in options: MFJ-412, \$39.95, Curtis keyer; MFJ-726, \$29.95, narrow audio filter.

Portable Accessories

MFJ-971
\$89⁹⁵



Antenna Tuner, MFJ-971, \$89.95. Tunes coax, balanced lines, random wire, 1.8-30 MHz, Cross-Needle SWR/Wattmeter with two ranges.

Battery/AC Power Pack, MFJ-4114, \$69.95. Uses Ni-cad, regular or alkaline D cells or 110 VAC. Charges Ni-cads. No batteries.

AC Power Supply, MFJ-4110, \$39.95. Travel light and leave the heavy hardware at home. 110 VAC power supply delivers 13.8 VDC, 2 amps from rugged wall adapter and regulator module.

Antenna, \$34.95. Lightweight easy-to-carry single band folded dipoles for MFJ rigs and others. Specify 40, 30, 20, 17, 15 Meters.

Free MFJ Catalog

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

Code Practice Oscillator

Deluxe MFJ Code Practice Oscillator has adjustable Morse key and oscillator-speaker unit mounted on a heavy steel base so it stays put. Tone, volume controls. Earphone jack. MFJ-557 \$24⁹⁵



For 110 VAC Keyer operation use MFJ-1305 for MFJ-422B/401B/557; MFJ-1312B for MFJ-407C/490/492; \$12.95; MFJ-1315 for MFJ-493, \$14.95.

Mobile Handbook

A super hands-on book with hundreds of useful ideas to make mobiling great!



MFJ-33 See how easy it is to have a ham shack in your car with this idea filled Mobile Handbook!

For the beginning mobiler, Dave Ingram K4TWJ shows you how to set up a super mobile installation!

For the experienced, K4TWJ includes hundreds of useful ideas for mobiling on HF, VHF, 10 meters and FM, QRP and legal limit mobiling, mobile antennas and mobile CW.

K4TWJ shows you how to DX on the road, make antennas, reduce ignition noise and RFI.

More ham radio books

The Packet Radio Operators Handbook by Buck Rogers K4ABT. How to build and use packet stations, Nodes, Rose switches, 9600 baud stations, trunks, backbones, networks, BBSs, interfaces. MFJ-3036, \$12.95.

Packet Radio is Made Easy by Buck Rogers K4ABT. Makes packet easy! How to set up, digipeating, mailbox, more. MFJ-32, \$9.95.

Easy-Up Antennas by W3FQJ. Gives you inexpensive, easy to build antennas for virtually every SWL or ham need. MFJ-38, \$16.95.

Troubleshooting Antennas and Feedlines by W1TF. How to troubleshoot and get your antenna system performing. MFJ-3301, \$12.95.

73 Dipole and Long-Wire Antennas* 8 chapters, 7 appendices. MFJ-3302, \$12.95.

73 Vertical, Beams and Triangle Antennas* All built and tested by W3FQJ. MFJ-3303, \$12.95.

Technician Antenna Handbook by Larry Luchi, W7KZE. Build proven Tech/Novice antennas using common materials. MFJ-3304, \$12.95

Oscar Satellite Revue by K4TWJ. How to set up a satellite station. Quick Start guide, tracking data and equipment review included. MFJ-31, \$7.95.

The Shortwave Listener's Guide for Apartment/Condo Dwellers by W3FQJ. Key to indoor SWLing and DXing. MFJ-36, \$9.95.

QuickStudy™ License Guides. When you take written exam, correct answers jump out at you using MFJ's new QuickStudy™ concept. Each license class, \$7.95 each. No Code Tech, \$14.95.

Golden Classics of Yesteryear by K4TWJ. Remember your first rig with this fun filled golden age book. MFJ-30, \$9.95.

The Fox Hunt Adventure by Dave Casler KE0OG. Enjoy mystery and adventure as you follow a young group using ham radio to crack open a ring of drug dealers. MFJ-3101, \$7.95.

The Wonderful World of Ham Radio: An Introduction for Young People by Richard Skolnik KB4LCS. MFJ-35, \$7.95

Ham Radio Communications Circuit Files by W3FQJ. 61 bipolar transistor, FET and linear integrated circuits. MFJ-37, \$9.95.

Solid State QRP Projects* 52 QRP projects in 8 chapters. MFJ-3502, \$12.95.

FET Principles, Experiments and Projects* Practical FET circuit design. MFJ-3504, \$16.95.

* Reprints of older classics by Ed Noll, W3FQJ
Authors: Let us see your manuscripts
Nearest Dealer/Order/Catalog: 800-647-1800
Technical Help: 800-647-TECH (8324)

• 1 year unconditional guarantee • 30 day money back guarantee (less s/h) on orders from MFJ • Free catalog

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon-Fri
FAX: (601) 323-6551; add s/h

MFJ . . . making quality affordable
Prices and specifications subject to change © 1994 MFJ Enterprises, Inc.

RTTY LOOP

Number 16 on your Feedback card

Amateur Radio Teletype

Marc I. Leavey, M.D. WA3AJR
6 Jenny Lane
Baltimore MD 21208

Over the past 18 years, the December "RTTY Loop" has often served as a Guide to the Perplexed, answering that eternal question, "What gift to get for your favorite ham radio operator?" With Channukah coming relatively early this year, beginning during Thanksgiving weekend, followed by Christmas and Kwanza at the traditional late December times, I thought it might be nice to return to those thrilling column ideas of yesteryear. So, with a hearty Hi Ho Silver, here we go!

As always, we will first take a look around 73rd Street (you're holding the directory in your hand). How about a good book? The National Amateur Radio Association offers a copy of Dave Ingram's *How To Get Started In Packet Radio*, reviewed in this column many months ago, for \$9.95 plus shipping. Call them at (206) 869-8052 for more information.

Chuck Harrington Software offers

PacketPet for Windows, an excellent packet terminal program described here a few months back. For \$49.95 plus shipping, this is a nice package. Call them at (407) 679-9017 for information, or take advantage of the shareware version, recently updated, on Disk #5 of the "RTTY Loop" disk collection.

"Thank goodness for packet radio! If you are running Windows, OS/2, DESQview, etc., you will find paKet runs quite happily in the background as a simple DOS task."

Packet Power is a new periodical which looks interesting. I have not seen an issue, but their ad in 73 gives an address of Box 189, Burleson TX 76097. Might be worth a peek.

A little packet modem in a connector, suitable for use with the BayCom program on Disk #2 of the "RTTY Loop" disk collection, is available from Tigertronics for \$49.95 plus shipping. Call (800) 8BAYPAC for information.

Now, if all of these are just too rich for your blood, I have one more item up my sleeve that has just got to be affordable: Disk #7 of the "RTTY Loop" disk collection! This new disk comes complete with the following programs:

paKet version 6 PAKET6.ZIP

Tony Lonsdale VK2DHU, the author of paKet, describes it as a communications program developed especially for use with packet radio, although it can be used for other modes with the appropriate equipment. It is designed to run on any IBM-compatible comput-

er system and to communicate through a standard TAPR-compatible Terminal Node Controller (TNC).

The program is very easy to use, even for newcomers to this field. As you gain experience with the system, you can explore some of the more sophisticated features which are provided to meet the needs of even the most demanding packet operators. It is simple if that is what you want; and it is

sophisticated if that is what you want.

The modern trend is towards Graphical Environments with the likes of Windows, or OS/2. paKet is written to run as a plain DOS program, so if you have an old XT with a CGA or even a Mono display system gathering dust in the corner, paKet will run on that just fine. Packet radio is an excellent application for the older systems that are not much use for anything else nowadays, so it is quite feasible to dedicate an older system to running paKet 24 hours per day. What else do we do with those older systems now? We used to give them to the wife or children to use as a word processor, play games, etc., but many modern word processors need at least 4MB RAM, 10 to 20 MB of disk, 80386, etc. . . . the good games are not much better. Thank goodness for packet radio! If you are running Windows, OS/2, DESQview, etc., you will find paKet runs quite happily in the background as a simple DOS task. In addition to providing the usual Terminal Mode where you can send and receive data via the TNC, the program provides many features and facilities to enhance the operation of your packet radio system. Such features include:

- Full Personal Message System with automatic Mail Forwarding to the BBS

A NO-RADIAL VERTICAL THAT COVERS 80 OR 75 METERS?

THERE'S ONE NOW!

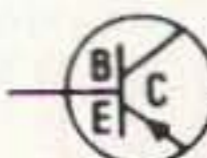
No, we won't insult your intelligence by telling you that it's a "halfwave" or that ANY vertical will operate more efficiently without a good radial system than with one; it certainly won't! If you want expensive fairy tales talk to our competitors! If, however, you've no room for even the smallest radial system just install the most efficient multiband vertical in the business, the HF9V-X, over our counterpoise kit. You'll not only save a tidy sum but you'll work DX that the shorter and more lossy no-radial "halfwaves" can't touch because both the HF6V-X and HF9V-X use longer active element lengths for higher radiation resistance and greater efficiency on more bands than any of the so-called halfwaves. Ask for our free brochure for complete specs on all Butternut models and receive technical note DLS-1 "Dirty Little Secrets from the Antenna Designer's Notebook" that shows you how to calculate the probable efficiency of any vertical antenna using the manufacturer's own specs so you won't have to learn the truth the hard way!



Model HF9V-X (shown to the left) for 80/75, 40, 30, 20, 17, 15, 12, 10 and 6 meters.



Model CPX counterpoise kit for Butternut models HF9V-X, HF6V, and HF6V-X; substitutes for ground or elevated radials. Self-supporting tubing bolts onto base of antenna. Mast not provided.



BUTTERNUT ELECTRONICS CO.

P.O. Box 1234, Olmito, TX 78575 (210) 350-5711

1691 MHz Weather Satellite System

1691 MHz Hemt Pre-amp. model TS-1691-P. Amp	\$250
1691 MHz Receiver model TS-1691-Recvr	\$450
Decoder Board & Software model TS-VGA-SAT4	\$349
Low Loss Coaxial Cable (65ft) with connectors. other lengths available	\$65
Track II Satellite Orbital Program. Tracks ALL satellites, world map, print out	\$99
1691 MHz Loop Yagi Antenna model 1691-LY(N)	\$99

Demonstration Disc (IBM-PC VGA compatible)
of signals recorded from WX-SAT system. \$3

Shipping: FOB Concord, Mass.

Prices subject to change without notice.



SPECTRUM INTERNATIONAL, INC.
Post Office Box 1084, Dept. S
Concord, Mass. 01742, U.S.A.
Phone: (508) 263-2145
Fax: (508) 263-7008

CIRCLE 183 ON READER SERVICE CARD

• Flashback feature to review earlier communications

• Disk and/or printer logging

• ASCII text file transfers

• Exchange computer programs and other disk files with: paKet-Protocol, an advanced Binary File Transfer protocol YAPP Binary File transfer protocol BayCom Binary File transfers (Digicom supported too)

• Full online TNC help for your TNC commands

• Online Manual—this entire Manual is available in a pop-up window

• Interrupt driven communications, so you don't lose anything even when paKet is running in a multi tasking environment.

• Runs on COM1, COM2, COM3 or COM4

• Both Hardware and Software Handshaking supported

• Multiple windows for up to 10 simultaneous connections

• REMOTE Mode—(unattended access)

• Access to DOS, your favorite editor, and file LISTER from within paKet

• Automatic Script processing . . . etc., etc., etc.

PaKet is fully configurable so you can customize a system especially to suit yourself. Setting up your system is but a matter of a few keystrokes. It will run with any TAPR-compatible TNC, and that includes just about all

TNCs on the market today.

Super Morse version 4.15 SM415.EXE

This is the latest version around of the premier Morse trainer program. The author, M. Lee Murrah, has created a program that teaches Morse as a

"So there you have it. A variety of gifts, ranging from two bucks up, with something in there sure to satisfy the pickiest among us."

foreign language, not just as disconnected sounds or letters. Supporting SoundBlaster compatible audio cards, capable of running under Windows, this is one very nice way to learn Morse.

EzPacket version 17a EZPKT17A.ZIP

Frank Domina N9MXI used the code written by Andrew C. Payne for the Poor Man's Packet (PMP) modem as a model for this program. With more than 95% of EzPacket being written from scratch, he hopes to replace the few bits left for low-level bit I/O in the next version.

The author feels this program is friendlier than the original PMP software, while offering more features. I

leave it to you all to decide.

Frequently Asked Questions FAQ-PAK.TXT

Picked up on the Internet, this is a text file which answers just about every question I've ever been asked about packet, including a few that I


have asked myself. For many of you, this might even beat \$10 bucks for a book!

A2Fterm version 3.01 A2FTERM.BXY

With some anticipation, I am including this program, A2Fterm, an Apple IIE, //e, IIC terminal software for packet radio, PacTOR, AmTOR, etc. Featuring multiple screens using HOST mode with Kantronics TNC's. Contest features. Macros. File transmit/receive. Relay received data on one stream to another. "Brag." Operate PacTOR/other HF modes while operating VHF packet at same time with KAM. Usable with all TNCs. Does NOT operate on Apple II, II+ or IIGS nor on Apple clones. ShrinkIt (3.4)

archive. Please note that this is an APPLE program on an IBM PC disk! If you want this program on your Apple, you will need a friend with a PC to transfer it to you.

So there you have it. A variety of gifts, ranging from two bucks up, with something in there sure to satisfy the pickiest among us. Now, all you have to do is leave this issue of 73 lying open on the kitchen table, with a strategically placed circle or sticky note, and let the family take it from there! To receive any or all of the now seven disks in the "RTTY Loop" disk collection, send a self-addressed stamped envelope or E-mail message to me for the list of programs on each disk. Each disk collection is over 1.2 Mb of material, and will fit comfortably on a 1.4 Mb 3.5" PC compatible disk. Just send sufficient disks for the collections you want, \$2 in US funds for each disk to be filled, and a self-addressed, stamped disk mailer to return the disks to you, to the address at the top of the column.

As I look for your comments and questions, to the above SnailMail address, or via CompuServe 75036,2501; Delphi MarcWA3AJR; America Online MarcWA3AJR; or Internet MarcWA3AJR@aol.com—my family and I extend to your and yours the best for this holiday season, with health and happiness for all. See ya next year! 

Ever wish
you had a radar gun
in your car?



The ZAPPER is an awesome Answer!

This magic-like little box activates any radar detector within 3/4 of a mile. Watch the brake lights come on the speeding sports car that just flew by. Keep those speeding big trucks from eating your bumper. The ZAPPER is a 10GHz amateur transmitter the size of a cigarette pack, operates on a 9v battery. Complete with road game "Trolling for Tailights".

Built & tuned only **\$49⁹⁵** Plus \$5.00 S&H

TRANSEL
TECHNOLOGIES
MADE IN USA

123 East South Street
Harveysburg, Oh 45032
1-800-829-8321

CIRCLE 11 ON READER SERVICE CARD

SEEK YOU

A new CD of country songs about
HAM RADIO, recorded in Nashville

Written, sung and played by G3WZZ, Andrew, His XYL, Lissa and 15 world famous Nashville musicians - THE HAM BAND!

Every HAM (and his XYL) and every SWL will love these GREAT songs.

Just look at the titles:

- Always on the Air
- I'm not Climbing up the Tower any more
- It's Great to QSO in Morse again
- The Trip to Dayton
- and 8 other songs

This unique CD costs only \$15
Cassette tape version only \$10
Shipping and handling \$2.50

To order just call 1-800-721-4077 toll free
BONNEVILLE MUSIC, P.O. BOX 8521, MOSCOW, ID 83843

For further information call 208-882-6526 (In Europe + 45 86 130632, fax + 45 86 191980).



CIRCLE 45 ON READER SERVICE CARD

PACKET & COMPUTERS

Number 17 on your Feedback card

Jeffrey Sloman N1EWO
c/o 73 Magazine
70 Route 202 North
Peterborough NH 03458

Potluck

September was an incredibly busy month here. That's why you didn't see anything from me last month. (There is a two-month lag between writing and publishing.) I am barely recovered from the frenzy, so this month I am going to cover a variety of smaller items that get overlooked.

Contacting Me

I apologize at the outset to my regular readers who have seen some of this information before. On the other hand, don't skip this section because you'll find a new E-mail address in here. There are three ways to reach me (and I am always glad to hear from you!):

Electronic Mail

This is the best way to get in touch with me. The address is:

n1ewo@iquest.net

and it can be used for any sort of communication. Comments and questions concerning the column, greetings, etc., are all OK here. Though you may find me listed on other services (CompuServe, AOL, BIX, MCI, etc.), I will NOT answer mail to those addresses. The IQuest address is reachable from anywhere on the Internet, and from any of the other services on which you will find me as a user. So, if you want an answer, use n1ewo@iquest.net.

Paper Mail

For those of you without E-mail access (you have got to change that!), paper mail care of the magazine (address at the top of this column) will do. Once again, any sort of question or comment is fine by this route. I answer paper mail as I have the time. I try to answer it all, but you guys like to write and sometimes I cannot handle the volume.

Packet Mail

I am very pleased to be the first packet mail contact for many of my readers. Messages saying hello are always welcome, and I enjoy responding to let you know that I got your traffic. However, I simply cannot respond to packet mail that asks questions about the magazine or column—I cannot do business over ham radio. Please do not send me such mail—it is very frus-

trating; I cannot answer it. If you'd like to send a greeting, though, use: N1EWO@NØARY.#NOCAL.CA.USA. NOAM

(Note: I am NOT in California; the NØARY gateway forwards mail from the AX.25 network to and from the Internet. If you are interested in this service, send mail to BBS@ARASMITH.COM with any contact and you'll receive instructions.)

NA vs. NOAM

I got quite a response to my suggestion that you avoid the .NA ending to hierarchical addresses. To refresh your memory, I pointed out that .NA is the Internet specification for Namibia! The people in Namibia are not too pleased to handle traffic mistakenly routed there. The correct ending for North America is .NOAM, but it seems that many sysops do not have their BBSs configured to handle .NOAM. The result is that if you (correctly) address your North American-bound mail with .NOAM, it will sit on the BBS until the sysop changes it to .NA. The best strategy is probably just to leave that part of the address off completely, and let the sysop deal with it—the mail will probably make it.

The Internet

It is about time that each of you finds a way to access the Internet. I am not just talking about E-mail, I am talking about a full-fledged SLIP (Serial Line Internet Protocol) connection that puts your machine on the Net. Here's how it works: With a SLIP connection you use special software to

any host out there is. So what can you do? Anything that can be done on the Net. This includes the obvious, like E-mail, and many utilities that we have discussed here in the coverage of JNOS, like finger, ftp, etc. It also includes exciting things like WWW (World Wide Web). WWW is a graphical, hypertext-based way to find and use information out on the Net. The most popular implementations run under Windows, and you can spend hours looking around with a WWW client.

How do you get connected? That depends upon where you are. There are many Internet Providers across the country, some local, some regional, some national. A local or regional provider has the potential to be a better deal, and you'll probably find people you know using the service. A couple of examples of outstanding providers: If you are in Indiana, a company called IQuest Internet offers very low cost (about \$15/120 hours/month) SLIP. I am currently using IQuest for my own Internet connectivity and am quite pleased. In Massachusetts there is a company called Software Tool & Die. These folks have been around for quite a while and recently upgraded their host. I know quite a few satisfied users of STD's "World" host and their fees are reasonable. In New York, check out Panix, which is similar to these other two. There are many Internet providers out there; you'll need to talk to users about the service they have received to determine if the provider you are interested in is a good deal. If you are currently using a local/regional provider that you like, drop me a line to n1ewo@iquest.net and let me know—I'll mention it here.

That's it for this month—next month I'll be ramped back up into a full-length column. Until then, I look forward to hearing from you. 73 de N1EWO.

"A local or regional provider has the potential to be a better deal, and you'll probably find people you know using the service."

treat your modem as if it were a NIC (Network Interface Card). With this software in place, you call up a router—this could be a dedicated box which does nothing else or a port on a host that also supports logins—this depends on your Internet provider's configuration.

Once this connection is made, your machine—the PC on your desk—is actually on the Internet, the same way

SMART BATTERY CONTROLLERS
FOR LEAD-ACID/GEL-CELLS
BASIC KIT 6 - 20 V.: - \$34.95; WITH XFMR.. \$ 44.95
WITH ENCLOSURE AND METER- \$ 84.95
SOLAR CONTROLLER: 6 - 20 V. \$ 44.95

CURTIS KEYSER KIT
KR01. INCLUDES AUDIO AMPLIFIER, IAMBIC KEYING, ADJUSTABLE SPEED CONTROL .. \$ 39.95
KR02. SPEED METER OPTION \$ 10.00

ANTENNAS: TWIN-LEAD LADDER-LINE
MARCONI: 80 M - \$37.95; 160 M - \$ 44.95
J-POLES: PORTABLE OR FIXED STATION (2M, 6M, 220 MHZ) \$ 8.95 TO \$ 37.95
MULTIBAND "WINDOM" WITH 1:4 BALUN & 50' FEED LINE- \$ 89.95
G5RV MULTIBAND ANTENNA (60 THRU 10M). \$ 44.95

COMPONENTS
UC3906 BATTERY CHARGER CHIP; 8044ABM CURTIS KEYSER CHIP; LM338K; LM350K; NE602AN; MC3423P1; NE604AN; AND MORE
FOR ORDERS CALL 1-800-JADE PRO (523-3776)

JADE PRODUCTS, INC.
P.O. Box 368
E. HAMPSTEAD, NH 03828
PHONE: 603-329-8995
FAX: 603-329-4499
\$5.00 USA SHIPPING CHARGE

PUTTING THE AMATEUR BACK IN RADIO

CIRCLE 228 ON READER SERVICE CARD

X-BAND TRANSMITTER
Miniature (2¼ x 3¾ x 1") GaAs microstrip transmitter provides 10 dBm centered at 10.525 GHz. Integrated microstrip patch antenna eliminates the need for an external antenna. Advanced matching techniques secured good temperature stability with low frequency pulling. Great for long-range testing of radar detectors, calibration of radar receiving equipment, and point-to-point communication links.

Complete Assembled System \$39.00
Parts & Instruction Kit \$29.00
Plus \$2.00 Shipping and Handling

INNOTEK Inc.
P.O. Box 80096, Fort Wayne, IN 46898
(219) 489-1711

Visa • MasterCard • Check • Money Order • COD
Money-Back Guarantee

CIRCLE 283 ON READER SERVICE CARD

COLOR SLOW SCAN TV
for the
SOUND BLASTER

VISA **Master Card**

COLOR **SSTV**

Now send and receive Slow Scan TV with your Sound Blaster compatible sound card in FULL COLOR!!! Easy and fun to use! Send your own pictures and Receive in Robot 8,12,24,36 B&W, Robot 36 & 72 COLOR and Scotty 1 & 2 in COLOR.

Requires PC, VGA 640 x 480 - 256 colors, and Sound Blaster compatible sound card.

ONLY \$99.95

Shipping \$5 - Overseas \$10
Illinois residents add 6.25% tax

SLOW SCAN II \$40.00
AUDIO ANALYZER \$39.95

Voice 815-398-2683
Fax 815-398-2688

Harlan Technologies
5931 Alma Dr. - Rockford, Illinois 61108

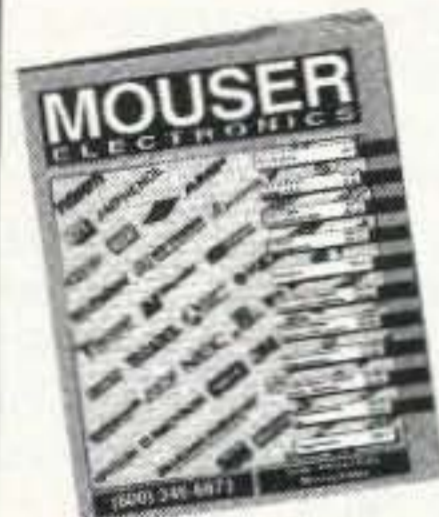
CIRCLE 187 ON READER SERVICE CARD

47,114

ELECTRONIC COMPONENTS

Whether you order 1 part or all 47,114...MOUSER stocks and...ships same day!!

CALL...(800) 992-9943



for your
**FREE
CATALOG**

2401 Hwy 287 N.
Mansfield, TX 76063

MOUSER[®] ELECTRONICS

Sales & Stocking Locations Nationwide

CIRCLE 64 ON READER SERVICE CARD



AMSAT[®]

The Radio Amateur Satellite Corp.

SOFTWARE

If you want to use, or just listen to, the various Amateur and weather satellites - AMSAT offers a variety of inexpensive satellite software for IBM[®] compatibles, including both DOS[®] and Windows[®], plus a tracking program for the Mac[®].

Here are just a few:

WISP - A brand new Windows based program by ZL2TPO provides all the facilities needed to operate the digital Amateur satellites.

WINSAT - A new Windows based satellite tracking program by KA7LDN.

QUIKTRAK - N4HY's full featured DOS based program. (For CGA/EGA/VGA systems)

INSTANTTRACK - AMSAT's most popular tracking software by N6NKF. (For DOS systems with EGA/VGA/SVGA)

SATELLITE PRO - A tracking program for the Macintosh by W7HR.

And many more!

For further information or to order, contact:

AMSAT PO Box 27 Washington, DC 20044 Phone: 301-589-6062

IBM is a registered trademark of International Business Machine Co.
DOS & Windows are registered trademarks of Microsoft Inc.
Mac. is a contraction of Macintosh, a registered trademark of Apple Computer Co.

CIRCLE 110 ON READER SERVICE CARD

here is the next generation Repeater

MARK 4CR

No other repeaters or controllers match Mark 4 in capability and features. That's why Mark 4 is the performance leader at amateur and commercial repeater sites around the world. Only Mark 4 gives you Message Master™ real speech • voice readout of received signal strength, deviation, and frequency error • 4-channel receiver voting • clock time announcements and function control • 7-helical filter receiver • extensive phone patch functions. Unlike others, Mark 4 even includes power supply and a handsome cabinet.

Call or write for specifications on the repeater, controller, and receiver winners.

Phone: #(508) 372-3442
FAX: #(508) 373-7304

MICRO CONTROL SPECIALTIES

Division of Kendecom Inc.
23 Elm Park, Groveland, MA 01834



The **only** repeaters and controllers with REAL SPEECH!

Create messages just by talking. Speak any phrases or words in any languages or dialect and *your own voice* is stored instantly in solid-state memory. Perfect for emergency warnings, club news bulletins, and DX alerts. Create unique ID and tail messages, and the ultimate in a real speech user mailbox — only with a Mark 4.



2 meters 220 440

CIRCLE 144 ON READER SERVICE CARD

CARR'S CORNER

Number 18 on your Feedback card

Joseph J. Carr K4IPV
P.O. Box 1099
Falls Church VA 22041

Single-Band Wideband Receiver Preamplifiers

If your HF receiver is a bit marginal on one or more bands, or if you build home-brew "minimalist" receivers (such as direct conversion receivers), then it is possible that the sensitivity is not up to snuff. The sensitivity problem for manufactured receivers is usually seen on older, low-cost models. Direct conversion receivers (DCR) sometimes suffer from sensitivity problems, especially those models that have considerable mixer loss (not usually a problem on NE-602 designs used by many hams, but often a problem with diode double-balanced mixers).

One possible solution to these problems is the use of a wideband preamplifier. However, if the "wide" part of wideband is too great, then it is possible that you will create as many problems as you solve. The wideband

preamplifiers will see all signals within its passband, and this may affect dynamic range or otherwise overload the front end of the receiver. This can especially be a problem with diode mixer DCRs, even those that use a single LC resonant circuit between the an-

"The wideband preamplifiers will see all signals within its passband, and this may affect dynamic range or otherwise overload the front end of the receiver."

tenna and the mixer input. If the problem is only on a single band, then it's possible to overcome the induced overload problem by limiting the bandwidth of the preamplifier.

This month we'll take a look at a single-band wideband amplifier based on the MAR-x series of RF integrated circuits. I first used this project in an article in a magazine dedicated to

scanner/SWLs for antennas for Jupiter reception. That application requires an 18-to-24 MHz bandwidth. One reader wrote to me and told me of using the preamplifier for his home-brew 15 meter ham band receiver used in "mountain topping" and other QRP applications. That idea struck a resonant chord!

Figure 1 shows the circuit for the single-band preamplifier. It consists of a wideband MAR-x amplifier IC preceded by a high-pass filter and a low-pass filter in series. The MAR-x de-

around 5 dB. The MAR-6 is a low-noise variant that operates to 2,000 MHz with gains to 20 dB in the lower frequencies with a noise figure of 2.8 dB. Both devices use the pinouts shown in Figure 1.

On all of the MAR-x devices the input is pin no. 1, and is identified by a color dot (brown on MAR-1 and white on MAR-6) and a bevel on the lead itself. The output is pin no. 3, while both pins 2 and 4 are grounds.

The DC power supply is connected to the output pin through a resistor and an optional RF choke (RFC1). The MAR-1 wants to see +5 VDC @ 17 mA and the MAR-6 wants to see +3.5 VDC @ 16 mA. The DC voltage regulator in Fig. 1 (i.e. U2) should be a 78L06 for MAR-1 circuits, and 78L05 for MAR-6 circuits. Both of these are available either under the part numbers (78L05 and 78L06), or as replacement part numbers from service replacement lines such as NTE and ECG. Ocean State Electronics carries the NTE Semiconductors replacement line [Note: 78L05 = NTE-977 and 78L06 = NTE-988].

The value of resistor R1 depends on the regulator and MAR-x device used. For either case:

$$R1 \text{ (ohms)} = V_o - V / I_{mA} \times 1,000$$

Where:

R1 is the value of resistor R1 in ohms;

V_o is the output voltage of U2

V is the preferred terminal voltage of U1.

Equation [1] evaluates to 58 ohms for the MAR-1 conditions (use 56 ohms), and 88 ohms for MAR-6 conditions (use 91 ohms).

A printed circuit pattern for the circuit of Figure 1 is shown in Figure 2. If you don't want to bother making your own board, then you may order one from FAR Circuits (18N640 Field Court, Dundee IL 60118) for \$4.75 plus \$1.50 S & H per order.

The input circuit for the MAR-x device is a low-pass filter in series with a high-pass filter. The values for the inductors and capacitors are found from tables in *The ARRL Handbook for Radio Amateurs*. A limited set of these values (for 1 dB ripple factor) is:

L1 = K1/F _{MHz}	=	17/F _{MHz} μH
L2 = K2/F _{MHz}	=	24/F _{MHz} μH
L3 = K1/F _{MHz}	=	17/F _{MHz} μH
L4 = K3/F _{MHz}	=	7.3/F _{MHz} μH
C1 = K4/F _{MHz}	=	3473/F _{MHz} pF
C2 = K4/F _{MHz}	=	3473/F _{MHz} pF
C3 = K5/F _{MHz}	=	2776/F _{MHz} pF
C4 = K6/F _{MHz}	=	1662/F _{MHz} pF
C5 = K5/F _{MHz}	=	2776/F _{MHz} pF

If you want to build for 0.1 dB or 0.01 dB ripple, then see the *ARRL Handbook* for the K values. The inductors are made on toroid cores. Use either the T-50-2 or T-50-6, and wind the cores with enameled wire. The number of turns is found from:

$$N = 100 \sqrt{L_{\mu H} / A_l}$$

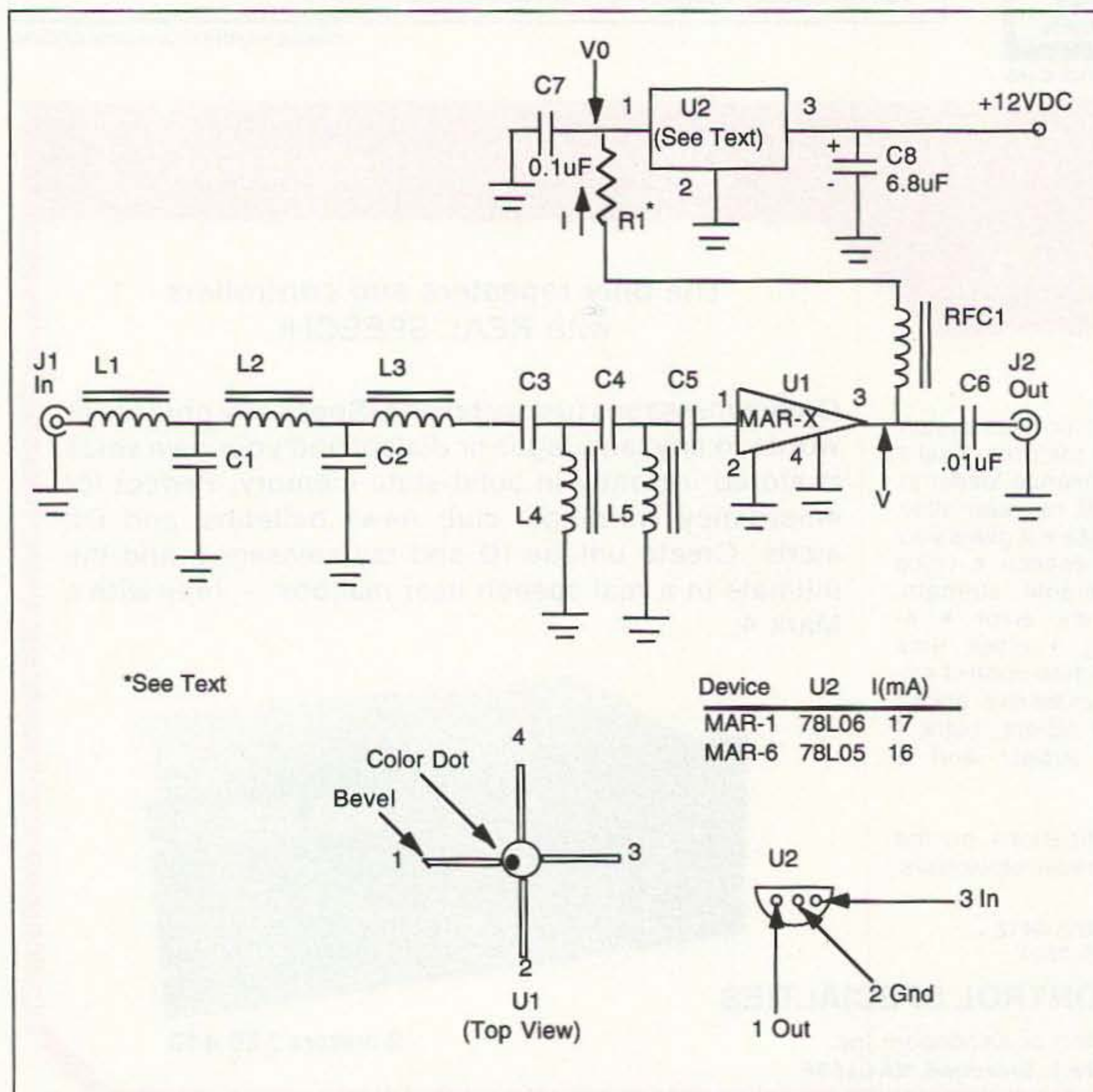


Figure 1. Circuit for single-band preamplifiers.

Where:

N is the number of turns;

$L_{\mu H}$ is the required inductance in microhenrys;

A_L is a property of the toroidal core (49 for T-50-2 and 40 for T-50-6).

The last coil in the circuit (RFC1) is actually used as a peaking coil to improve the bandwidth. This coil should have an inductive reactance about four times the output impedance at the lowest frequency of operation. Because both input and output impedances on the MAR-x devices is 50 ohms, the inductive reactance of RFC1 should be on the order of 200 ohms (but the precise value is not terribly critical). Find the inductance from:

$$L_{\mu H} = 200 \text{ ohms} / 2\pi F_{\text{MHz}}$$

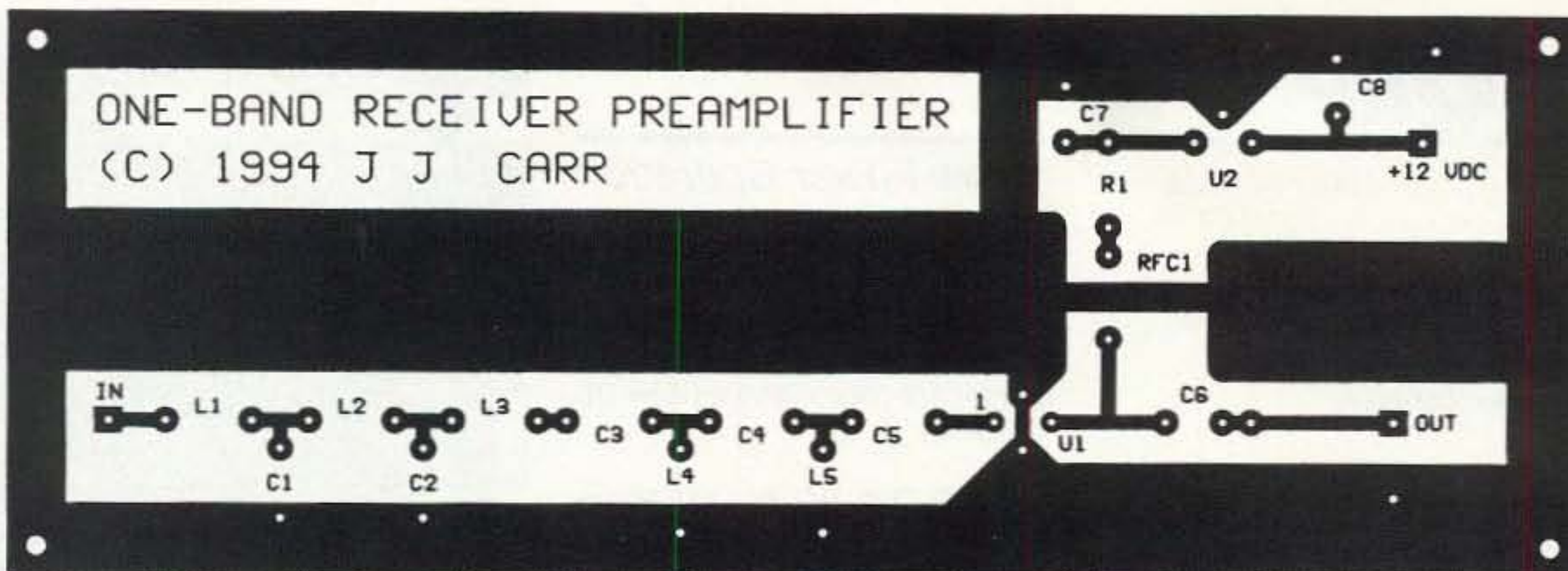


Figure 2. Printed circuit pattern for the circuit shown in Figure 1.

For example, for a 14 MHz receiver this equation evaluates to 2.3 μH . If a T-50-2 toroid core is used to make this coil, then 22 turns of wire are

required.

Conclusion

The single-band receiver preampli-

fier will go a long way towards boosting the poor performance of marginal receivers. It is easy to build, and behaves quite nicely.

CornerBeam?

SWR < 1.2:1 across the band
Gain of a 15 ft Yagi
No dimension over 7 ft
40 dB Front-to Back Ratio
60° Half-power Beamwidth
Mounts directly to mast
Vertical or Horizontal Polarization
2meters \$145, 220 MHz \$145, 70 cm \$115, Dual 146/440 \$165
Weighs only 10 lbs. Add \$11 Shipping & Handling. Info \$1.



AntennasWest
Box 50062 Provo UT 84605

Order HotLine
801 373 8425

CIRCLE 380 ON READER SERVICE CARD

2 Meter Portable

Arrow (shaft) Antenna

This is the one you have heard about. Changes from a walking stick to a 4 element beam in less than 2 minutes. Strong & Light Weight

Simply the Best

\$73.00

Includes Shipping

Arrow Antenna

1461 Peacock Pl.

Loveland, CO 80537

(303) 663-5485

Fax (303) 663-5065

CIRCLE 80 ON READER SERVICE CARD

CABLE T.V. CONVERTERS

Jerrold™, Oak, Scientific Atlantic, Zenith, & many others. "New" MTS stereo add-on: mute & volume. Ideal for 400 & 450 owners.

1-800-826-7623

B & B INC.

3584 Kennebec, Eagan MN 55122

CIRCLE 21 ON READER SERVICE CARD

A KEYNOTE SPEAKER from Grove!

NEW!



The Grove engineering team has created the most revolutionary audio accessory on the communication market: the SP200 Sound Enhancer.

Housed in a stylish, solid oak cabinet hand crafted in the mountains of North Carolina, the SP200 is sure to enhance any radio room. The control panel, constructed of sturdy, black aluminum, has been designed for optimum ease and convenience when tuning and refining signals.

The SP200 combines a powerful audio amplifier, top-of-the-line speaker, and an adjustable filter system to create the most versatile listening environment ever available to radio enthusiasts. The keen peak/notch filter system and advanced noise limiter allow the listener to pull clear and distinct signals out of the haze of interference and background noise, while the adjustable bass and treble controls provide the flexibility to create just the sound you want. FSK, RTTY, packet, FAX, CW and all other data systems are enhanced while interference and electrical noise are reduced or even eliminated by the analog audio processor.

The SP200 also comes equipped with a stereo/mono headphone jack for private listening, and an automatic tape activator so that you never have to miss anything.

Try the new Grove SP200 Sound Enhancer with your receiver, scanner, or transceiver and enjoy the latest in speaker sophistication; you'll agree this is truly a keynote speaker!

Why pay over \$400 for these separate accessories:

- Speaker
- Adjustable Filter
- Recorder Activator
- Audio Amplifier
- Audio Activated Squelch
- Noise Limiter

When you can have it all in the new Grove

SP-200 SOUND ENHANCER

CALL NOW!

(800) 438-8155
(704) 837-9200

Order SPK13

\$249⁹⁵*

* Plus \$7.50 UPS Ground Shipping

SPECIFICATIONS:

- Power Required: 12 to 14 VDC @500 mA; 120 VAC adaptor Incl.
- Audio Power Output: 2 W @ 10% THD (8 ohms)
- Audio Selectivity: Peak/notch 30 dB or greater, 0.3-6 kHz
- Squelch Hold: 0-10 seconds
- Noise Limiter: Adjustable-threshold pulse noise clamp
- Tape Activator: Audio activated (VOX), 3 second hold
- Tape Output: 500 mV P-P @ 600 ohms (nom.)
- Headphone Jack: Universal mono-wired stereo jack
- Dimensions: 10-7/8"W x 6-7/8"H x 7-1/4"D



GROVE ENTERPRISES

Changing the way you hear the world

CIRCLE 348 ON READER SERVICE CARD

Low Power Operation

Michael Bryce WB8VGE
2225 Mayflower NW
Massillon OH 44646

With the coming of winter, the days are shorter and the nights are longer, just perfect for some late-night QRP-ing. But, sometimes you're just not in the mood. Well, instead of talking your wife into letting you go to the next hamfest, how about firing up the word processor for some letter writing? I've compiled a list of current QRP clubs. This is the most complete list I've been able to compile.

QRP ARCI, c/o Mike Bryce WB8VGE, 2225 Mayflower NW, Massillon OH 44647. \$12 for new membership, \$10 for renewal, \$2 for info package.

CW Operators QRP Club, c/o Kevin Zietz VK5AKZ, 41 Tobruke Ave, St. Marys SA 5042 Australia. \$14 for US membership.

G-QRP Club, c/o Mike Kilgore KG5F, 2046 Ash Hill Road, Carrollton TX 75007. \$12 for US membership.

Michigan QRP Club, 654 Georgia, Marysville MI 48040. \$7 for new US membership.

The Northwest QRP Club, Bill Todd N7MFB, 2418 55th Ave S.W., Seattle WA 98116. \$10 for new members.

The QRP Club of New England, Jack Frake NG1G, P.O. Box 1153, Barnard VT 05031. \$10 for new US members.

U-QRP Club, P.O. Box 100, Saransk-31 Russia 430031. Unknown membership; newsletter is in Russian.

NorCal QRP Club, Jim Gates WA6GER, 3241 Eastwood Road, Sacramento CA 95821. \$5 for US membership.

K5FO QRP Newsletter, Chuck Adams, Twilight Publishing Co., 1301 Highway 407, Suite #353, Lewisville TX 75067. \$10 for 12 issues.

St. Louis QRP Club, Keith Arns KC0PP, 2832 PenBrooke Lane, St. Charles, MO 63301. Dues are unknown at this time.

Oklahoma QRP Club, OK QRP Group, Don Kelly, Editor, 703 West 8th Street Edmond OK 73003. No dues, but \$10 donation helps the club out.

EA QRP CLUB, c/o Sr. Miguel Molina, Avenia Rio De Janeiro 123 2-1 08016 Barcelona, Spain. No kidding, the newsletter is in Spanish.

OK QRP CLUB, c/o OK1CZ, Petr Doudera, U 1.Baterie 1, 16200 Praha 6, Czech Republic. 15 IRCs or \$10 dues. The newsletter has English translations for the most of the text.



Photo A. The NorCal Sierra multiband transceiver.

WI QRP Club, P.O. Box 111, Brandon WI 53919-0111. Dues suggested: \$5-\$10.

Central Pennsylvania QRP Society, Cameron Bailey KT3A, P. O. Box 173, Mount Wolfe PA 17347.

Colorado QRP Club, Rich High W0HEP, 14261 East 4th Avenue #161, Aurora CO 80011-8711.

There, that should keep you busy!

Home-Brew

If you've been thinking of a late-winter project, I've got two you may be interested in. Both are transceivers you can build for either 30 or 40 meters. The first one is the 40-40 rig made possible by the New England QRP Club. Late word has it the 40-40 is also available on 80 meters, and a 160 meter version is on the drawing board. The rig is on a single-sided PC board. This one board contains both the superhet receiver with a crystal filter and the 2 watt transmitter. Full electronic QSK is used for T/R control. The entire rig can be put inside your shirt pocket. The 40-40 was designed by Dave Benson NN1G. Kits are available from Dave for \$43, at 80 East Robbins Ave., Newington CT 06111.

What's unusual about this rig is the lack of an IF amplifier. From the mixer, the signal is routed through the crystal filter, and then directly to the BFO. There's plenty of gain in the chain for weak signal work, and without the hassle of tuning the IF for the correct peak. Only two crystals are used in the IF filter, but they are plenty narrow for CW work. Adding an extra crystal in such a simple rig does not increase the selectivity of the rig so much that most of us can hear.

Another important feature of the 40-40 is the way the tuning is accomplished. Instead of the usual variable capacitor, a varactor is used. A stable reference voltage is applied to the varactor via the front-mounted 100k tuning pot. This scheme works quite well. My first attempt, however, did not fly—out of the junk box came a 100k pot all right, but it had an audio taper instead of the required log taper. With this pot, the rig proved almost unusable. Use the proper taper on the tuning pot.

The 40-40 lacks two other fea-

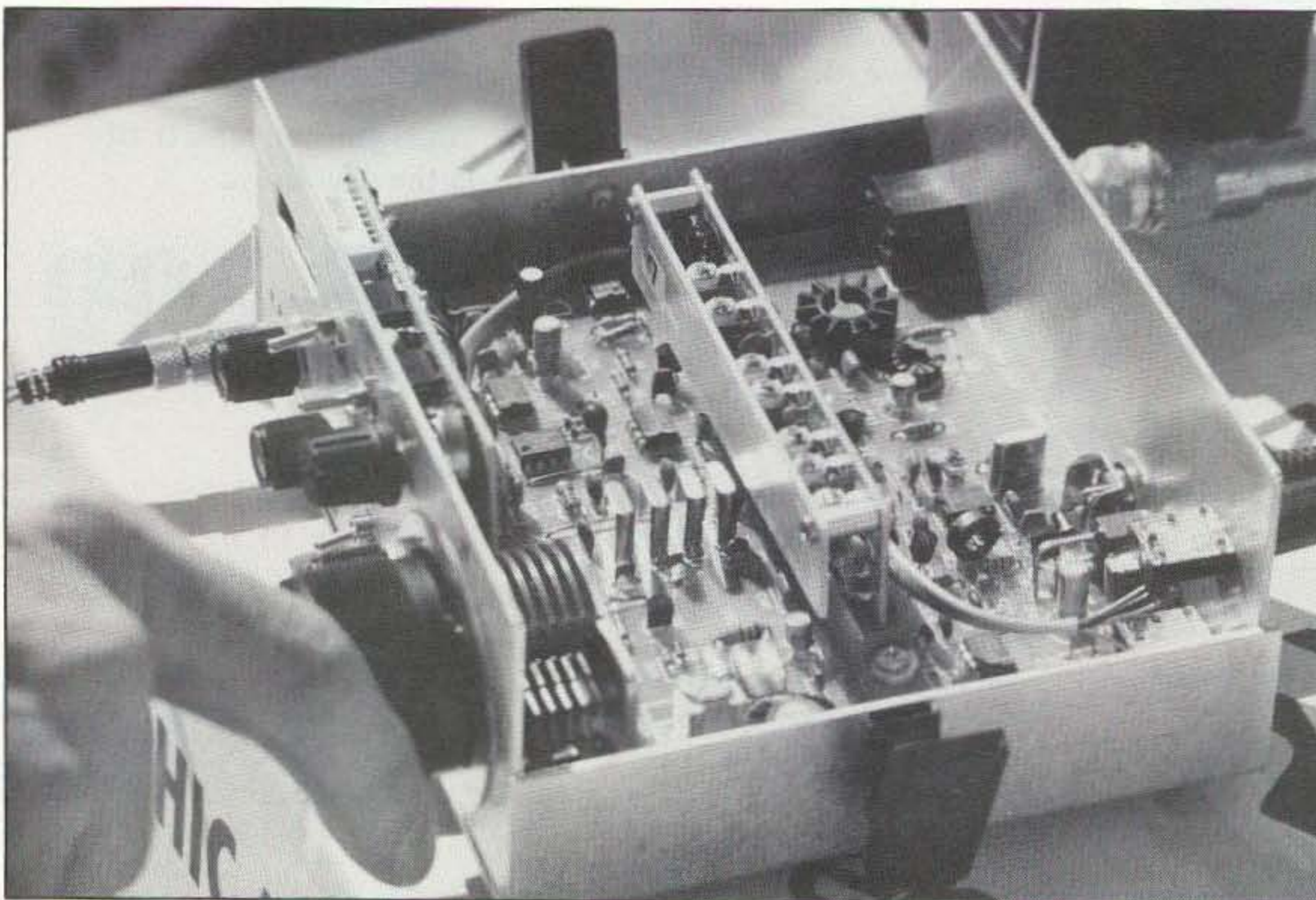


Photo B. Inside the NorCal Sierra. The plug-in band module is in the center.



"FIBERWHIPS"

GO
MONO
H.F. 1/2 WAVE
DIPOLE
Horizontal or Vertical
MODEL DI-2B

For apartments, attics,
boats, RV's and campsites.
Antennas restricted areas,
etc.

Available in 6, 10, 12, 15,
17, 20, 30, 40, 75 meter.

Double U-Bolt L Bracket fits
up to 1 1/2" mast. SO-239
connector w/any two same
meter "Fiberwhips". Total
installed length 16 ft. 250
Watts.



\$45.00

+ \$6.00 S & H
5% Sales Tax S.C.



A.S.A.

P.O. Box 3461

Myrtle Beach, S.C. 29578

1-800-722-2681

Prices Inside Continental U.S.A. only.

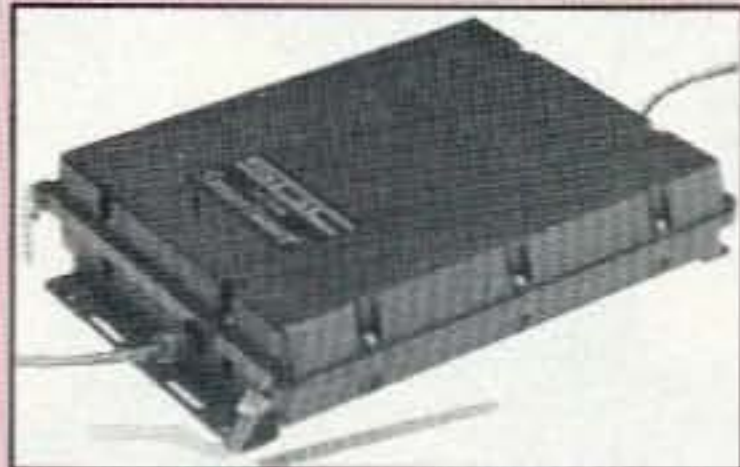
CIRCLE 18 ON READER SERVICE CARD



BUY AMERICAN, BETTER PRICE AND QUALITY

The SG2000 HF transceiver is type accepted for commercial and marine service made with traditional U.S. commercial radio quality (and of course it can be used on the ham bands also). While the Japanese radios have 2 final transistors that strain to put out 100 watts on the low bands and only 75-85 watts on ten meters, the SG2000 has 4 large transistors that loaf along at 150 watts on ALL THE BANDS INCLUDING 10 METERS! Some of the SG2000 features are: 1) A control head removable (no special kit necessary) up to 150' away from the rig, perfect for automobiles and boats. Up to 8 heads can be utilized and used as intercoms also. 2) The largest display of any HF transceiver. 3) 644 pre-programmed memories and 100 user programmable memories. 4) operable from -50F (-45C) to 185F (+85C). You want quality right? Here is what EVERY SG2000 must endure before they're shipped from the factory: 1) They're factory aligned, 2) EVERY SG2000 is keyed down at full power (CW 150 Watts) into an open antenna for about 10 seconds, then connected to a shorted antenna and keyed down for an additional 10 seconds. 3) EVERY SG2000 is put in the "BURN-IN" rack and keyed down for 24 hours non-stop at full power CW. Don't try that with the foreign radios. 4) EVERY SG2000 is then re-checked for alignment and put in the "TORTURE RACK" where they are keyed on and off every 10 seconds for 24 hours. 5) The SG2000 is then re-evaluated and all control functions are verified to ensure that the microprocessor is up to spec. THEN AND ONLY THEN IS THE SG2000 ALLOWED TO LEAVE THE FACTORY.

The bottom line is price, you know how expensive commercial rigs are normally, we are selling the SG2000 BELOW DEALER COST at only \$1,585.00 each!! That's a \$400.00 savings! We guarantee the best price.



The SG230 SMART-TUNER is the best HF autotuner at any price, and to promote a product that is made in the USA, we're offering it at the guaranteed best price of only \$449.00!! WHY THE SG230? BECAUSE: When you tune an antenna at it's base you are resonating the antenna, instead of just matching the coax to the radio as with other tuners such as the AT50, etc. The result YOUR SIGNAL GETS OUT MUCH BETTER. The Kenwood AT50, AT450 and other similar tuners can only match 3:1 mismatches (YES only 3:1) so forget matching anything but a fairly decent antenna. The SG230 can match from 0.5 Ohm to 10 kilohm antennas (up to a 200:1 mismatch), so it can easily match random wires, dipoles, rain-gutters, shopping carts, etc. The result MORE POWER.

To order, send check or money order with \$8.50 for shipping, along with your shipping address (sorry no U.S. Post Office Boxes, UPS will not deliver) and Telephone number to:



Serving The LORD
Since 1987



Joe Brancato
THE HAM CONTACT
PO Box 3624, Dept 73
Long Beach, CA 90803

CA Residents Add 8 1/4% Sales Tax. Alaska, Hawaii, and Canadian Residents please send U.S. Money Order + \$17.10 for shipping.

If you wish more information please send a SASE to the above address. For COD orders, call (310)433-5860, outside of CA **Orders Only** call (800)933-HAM4 and leave a message.

CIRCLE 384 ON READER SERVICE CARD

BATTERIES

BUY DIRECT FROM US, THE MANUFACTURER!

**CLOSEOUT
SPECIAL!!!**

ORIGINAL

YAESU FT-416

Battery FNB25

7.2V @ 600MAH

(Also works with FT-530)

\$25.00

GREY ONLY

Season's Greetings

12% OFF

**ON ALL • REPLACEMENT BATTERY PACKS
MASTERCHARGERS • POWERPAC+**

FOR THE MONTH OF DECEMBER

Monthly Discounts Applicable To End-Users Only

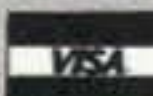
Prices and specifications subject to change without notice.

W & W ASSOCIATES

800 South Broadway, Hicksville, NY 11801

WORLD WIDE DISTRIBUTORSHIPS AVAILABLE. PLEASE INQUIRE

MADE IN
THE U.S.A.
SEND FOR
FREE CATALOG
AND PRICE LIST



NYS residents add 8 1/2%
sales tax. Add \$4.00 for
postage and handling

In U.S.A. and Canada Call Toll Free:(800) 221-0732 • In NY State Call:(516) 942-0011 • Fax:(516) 942-1944

CIRCLE 191 ON READER SERVICE CARD

73 Amateur Radio Today • December, 1994 57

tures—a RIT and an AGC. You ride the volume control to keep strong signals from overloading the receiver. Adding a RIT control is possible, and I'll have some more details soon.

Another rig you'll be hearing a lot about is the Sierra from the NorCal group. The Sierra is the brain work of Wayne Burdick N6KR. This is an all band rig using plug in band modules. Operation from 160 meters through 10 will be possible, with the proper band module. This rig is a bit more complex than what we've seen coming from the NorCal group. It's a double-sided board with plated through holes. I've been told there's even gold plating on the band module fingers. It looks like a first class rig. I've not been able to get my hands on one, as they are still in the *get the bugs out* stage of development. I've included some photos of the rig, inside and out, so you can see what you'll be up against.

Bil Paul KD6JUI took a Sierra out for some bicycle mobile/hiking. Bil writes:

"Ten touring bicyclists, most of whom had never met one another, met at Crescent Lake, Oregon, on August 27 to ride a portion of the Pacific Crest Bicycle Trail for a week. Among them were two women, two Germans and four hams.



Photo C. The Pacific Crest Bike Tour. Clockwise, beginning at upper left: Russell Dwarshuis KB8U, Gottfried Kloyer DLZMFJ/AA1JQ, Cory Mitchum, Liz Burke, Jan Maurer, Rich Lesnik, Tom Hook, Dan Arbogast NØDA, Bil Paul KD6JUI, and Dan Ogilvie.

"The hams, Dan Arbogast NØDA of Corvallis, Oregon; Russell Dwarshuis KB8U of Ann Arbor, Michigan; Gottfried Kloyer DL2JUI of Wessling, Germany; and trip organizer Bil Paul KD6JUI of Dan Mateo, California; operated QRP HF from campgrounds along the way, as well as keeping 2 meter communications between slow and fast groups, and between groups taking slightly different routes.

"Dan Arbogast worked mostly 2 meter packet, while the other hams worked mostly 40 meter CW QRP, with some success: Japan, Alaska, Hawaii, Canada, and all the Pacific Coast states were worked.

"Antennas used were a 40 meter inverted V, a 20 meter end-fed dipole, a 40 meter half-wave vertical and a 40 meter ham stick mounted on a recumbent bicycle. Power in most cases was provided by solar cells. Paul successfully field-tests a prototype Sierra QRP rig being readied for its members by the Northern California QRP Club.

"Combining beautiful scenery with hamming, camping, rigorous bicycling (the cyclists climbed a cumulative 14,000' over a week) was a potent thrill for all radio amateurs involved." 73

2-1000 MHz In One Sweep!

AVCOM's New PSA-65A Portable Spectrum Analyzer

The newest in the line of rugged spectrum analyzers from AVCOM offers amazing performance for only \$2,855.

AVCOM'S new PSA-65A is the first low cost general purpose portable spectrum analyzer that's loaded with features. It's small, accurate, battery operated, has a wide frequency coverage - a must for every technician's bench. Great for field use too.

The PSA-65A covers frequencies thru 1000 MHz in one sweep with a sensitivity greater than -90 dBm at narrow spans. The PSA-65A is ideally suited for 2-way radio, cellular, cable, LAN, surveillance, educational, production and R&D work. Options include frequency extenders to enable the PSA-65A to be used at SATCOM and higher frequencies, audio demod for monitoring, log periodic antennas, carrying case (AVSAC), and more.

For more information, write, FAX or phone.

SWEEP RATE controls the speed of the sweep across the CRT.

VERT is used to position the display on the screen.

SCALE selects an amplitude sensitivity of either 10 dB/DIV or 2 dB/DIV.

CENTER FREQUENCY 4 digit LCD display.

TUNING adjusts the center frequency of the analyzer so that signals of interest appear at the center of the display and their frequency is read out on the LCD.

REFERENCE LEVEL adjusts input attenuator and IF gain. Calibrations in dBm and dBmV are provided.

ZERO SPAN instantly places analyzer in zero span mode and activates audio demodulator for convenient monitoring.

SPAN controls the width of the spectrum being displayed and automatically selects optimum resolution filter.

RF INPUT accepts signals to be observed from less than 2 Mhz to greater than 1000 Mhz.

VAR SPAN reduces the width of the spectrum being displayed for closer signal examination and enhanced amplitude accuracy.

AUXILIARY supports present and future optional accessories for the PSA-65A.

AUDIO DEMOD activates audio demod board and sets audio level.

AUDIO OUT drives low impedance earphone or speaker. Internal speaker provided with optional demod.

BAT CHG switch recharges PSA-65A to 80% capacity in approx. 6 hours.

POWER switch has 3 positions: Battery Operation, Standby and AC Line Operation. Ext. DC Power switch on rear panel for 12 volt operation.

Portable, attractively styled package and ergonometically engineered front panel.

Large bright screen for outdoor and indoor use.

AVCOM BRINGING HIGH TECHNOLOGY DOWN TO EARTH

500 SOUTHLAKE BOULEVARD
RICHMOND, VIRGINIA 23236
804-794-2500 FAX: 804-794-8284

CIRCLE 27 ON READER SERVICE CARD

500KHz to
1.30GHz,
1000 Channels
AM/FM/WFM

Total coverage at a very economical price. VFO, Search lockout and Full function LDC display. Steps down to 5KHz.EEPROM memory. BNC antenna connector. Size: 5 7/8"H x 1 1/2"D x 2"W. Wt: 14oz. Includes AA Batteries. Cell blocked for use in USA. Call or fax Toll free in USA and Canada. 24 hours a day, 7 days a week.



TRIDE-NT
TR1200 Now Only
\$359.00



1 800 445 7717

10707 E. 106th, Fishers, IN 46038
International: 317 842 7115 Fax 317 849 8794

CIRCLE 164 ON READER SERVICE CARD

AZDEN

THE 6 METER FM LEADER

THE MAGIC BAND - SIX METERS. The best of both HF and VHF. Enjoy great DX during band openings and full repeater operation at other times.

BUILT TO MIL-STD-810 2 YEAR WARRANTY

SPECIFICATIONS	PCS-7500H	AZ-61
Frequencies: RX	46-54 MHz	46-54 MHz
TX	50-54 MHz	50-54 MHz
Power:	50/5 Watts	5/0.5 Watts
Sensitivity:	< 0.19 μ V for 12 dB SINAD	< 0.16 μ V for 12 dB SINAD
Memories:	20	40
Tones:	38	38
Keypad:	Backlit DTMF	Prog. and DTMF
DC Power:	+13.8 vDC @ 9 amps (typ)	+12 vDC @ 1.5 amps (typ) operates over +6 to +16 vDC
Size:	2"Hx5.5"Wx7.25"D	6.85"Hx2.6"Wx1.3"D

**TO PLACE ORDERS
CALL 1-800-643-7655**



PCS-7500H MOBILE



AZ-61 HANDHELD



AZDEN
COMMUNICATIONS DIVISION

147 New Hyde Park Rd., Franklin Sq., NY 11010
(516)328-7501 FAX (516) 328-7506

CIRCLE 272 ON READER SERVICE CARD

RUN DON'T WALK

to

The Orlando HamCation

Central Florida Fairgrounds

February 17, 18, 19, 1995

ARRL North Florida Convention



Hurry! Last year was a complete sellout. All exhibit space was taken. The Fairground has enlarged its facilities and we now have more air-conditioned space.

PRIZES

FORUMS

SWAP TABLES

EXAMS

EXHIBITORS

TAILGATE

Name _____	Call _____
Address _____	
City _____	State _____ Zip _____
Tickets-Before Jan 15 () @ \$ 6.00	Tot (.)
Tables () @ \$25.00	Tot (.)
Tailgate () @ \$15.00	Tot (.)
RV Per NITE () @ \$16.00	Tot (.)
Make checks to HamCation & Mail to: HamCation P.O. Box 547811 • Orlando, FL 32854-7811	

CIRCLE 96 ON READER SERVICE CARD

HAMS WITH CLASS

Carole Perry WB2MGP
Media Mentors Inc.
P.O. Box 131646
Staten Island NY 10313-0006

Where in the World are Geography Resources for Teachers?

"Okay, kids, now open up your geography books and let's read about the topography and climate of Ecuador." Students who are lucky enough to be in a classroom with a ham radio will never have to be subjected to this kind of introduction to a geography lesson.

Gone are the days when geography in a classroom referred only to the ability of students to spot places on a globe, or to mentally match cities with countries, or capitals with states. Sadly, many people have the perception that geography is about the location of specific places. As citizens of an "ever-shrinking" world, we can no longer afford to present a one-dimensional view of geography to our children.

Geography should be taught as a way of interpreting the world around us. Geography is an on-going phenomenon involved with history, culture, and a country's contemporary problems. Amateur radio in the classroom allows the teacher to teach geography on a need-to-know basis. My

classroom is set up in a way that allows easy access to wall maps, globes, and atlases. The students are always eager to point to the spot on the map where the voice on the radio is coming from.

There are many resources for the teacher of geography. Be sure to avail yourself of only the most current materials. Geography belongs as an integral part of the amateur radio curriculum for youngsters. An attractive QSL card from some faraway place, or a souvenir or snapshot from another state, can trigger off an entire social studies unit. The teacher who uses the radio must be flexible and ready at all times to respond to the interests and needs of the students.

Very often, I work with the social studies teachers at my school to better coordinate a really stimulating introductory session or to follow up a geography lesson in a meaningful way. The sixth-, seventh- and eighth-grade social studies students look forward to visiting the ham radio room. They know that they may not always make the contact we're looking for, but they also know that we'll probably meet someone new and different and that they will definitely have a fun time.

A group of social studies teachers and I put together this list of geography resources. Be sure to let me



Photo A. Students should enjoy learning about the world around them.

know about successes you've had with the creative use of amateur radio in the teaching of geography skills.

The Geography Education National Implementation Project

The following booklets on *Guidelines for Geographic Education: Elementary and Secondary Schools* are published by the Geography Education National Implementation Project in cooperation with Rand McNally & Co. To order, contact the National Council on Geographic Education, Indiana University of Pennsylvania, Indiana PA 15705, or call (412) 357-6290; *K-6 Geography: Themes, Key Ideas, and Learning Opportunities*, 1987, \$6. This booklet addresses levels of thinking and dimensions of content for elementary students.

7-12 Geography: Themes, Key Ideas, and Learning Opportunities, 1989, \$6. The secondary level volume provides a framework for developing courses of study.

Grades 4-6 students participating in National Geographic Kids Network use computers and telecommunications to learn geography with their peers worldwide. For information, contact the NGS's Educational Services Division, PO Box 98018, Washington, DC 20090 or call 1-800-368-2728.

The *1994 Geography Assessment Framework* (1992), developed to guide the NAEP Geography Assessment in 1994, is an extremely valuable instructional resource for teachers. Strongly influenced by public concern about our nation's geographic ignorance, it is constructed with one guiding question foremost in mind: "What fundamental geographic knowledge, understanding, and appli-

cations should students have mastered in order to be informed and productive 21st century citizens?" It clearly explains the dynamics of geography education and provides sample questions and objectives to illustrate the cumulative nature of geographic learning. Copies are available from the National Assessment Governing Board, 800 N. Capitol St., N.W., 8th floor, Washington DC 20001.

General Reading

Don't Know Much About Geography by Kenneth Davis tells us fascinating facts about the world in an amusing yet extremely informative way. Published by Avon Books, NY; \$11.

The Real World: Understanding the Modern World through the New Geography, 1991; \$35; Houghton Mifflin Co. Students will love the beautiful photos. It addresses basic questions about the physical and social aspects of the contemporary world.

For parents: *Helping Your Child Learn Geography*, 1990, 50 cents. Order from: Consumer Information Center, Dept. 414Y, Pueblo CO 81009. By Carol Sue Fromboluti, this booklet provides games and activities for ages 10 and under.

Resource Places: National Geographic Society, 17th and M Streets, N.W., Washington DC 20036; Association of American Geographers, 1710 16th Street, N.W. Washington DC 20009.

Please be on the lookout for enthusiastic and articulate youngsters who would like to be interviewed for participation in the Dayton '95 Youth Forum. Have them contact me at (718) 983-1416.

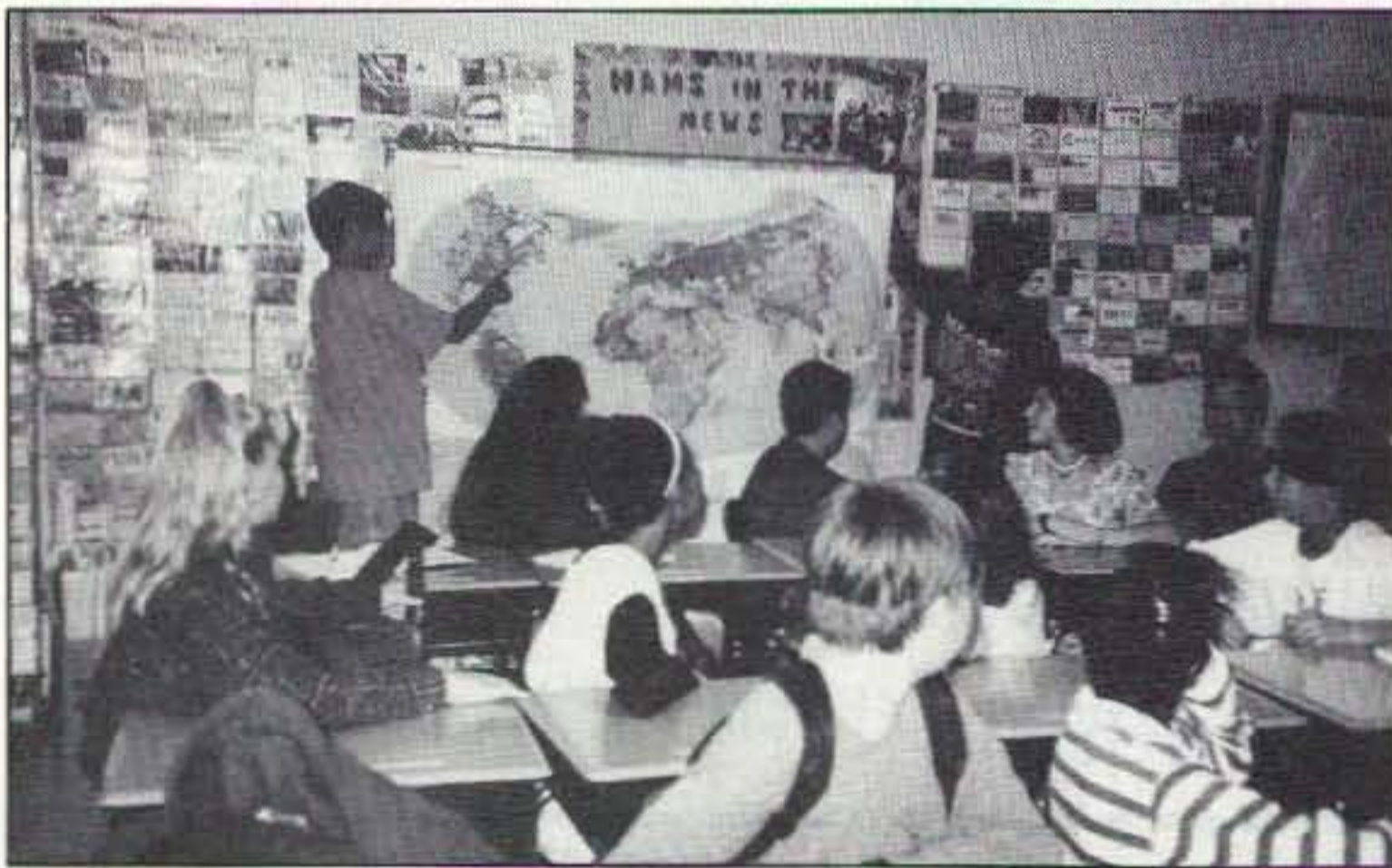


Photo B. Kids like to go to the wall map to pinpoint the location of the voice on the radio.

Terminal Program for KPC-3

User Friendly, Split-Screen, Scroll-Back Buffer
Programable Auto - Connect + Macro Screens
Upload Files from Disk or Editor

KPC-3 Command Control for the most commonly used commands
Help Captions and More
Requires PC with Windows to Operate
Order From
ComTreK, PO Box 4101, Concord, N.H. 03302-4101

\$29.95

includes shipping in US
SASE for Free Details

CIRCLE 274 ON READER SERVICE CARD



Quality Microwave TV Antennas

WIRELESS CABLE - IFTS - MMDS - Amateur TV
Ultra High Gain 50db(+) • Tuneable 1.9 to 2.7 Ghz.
• 55-Channel Dish System \$199.95
• 36-Channel Dish System \$149.95
• 20-Channel Dish System \$124.95
• Optional Commercial Grid Antenna (not shown) Add \$50.00
• Yagi Antennas, Components, Custom Tuning Available
• Call or write (SASE) for "FREE" Catalog

PHILLIPS-TECH ELECTRONICS
P.O. Box 8533 • Scottsdale, AZ 85252
(602) 947-7700 (\$3.00 Credit all phone orders)
MasterCard • Visa • American Express • COD's • Quantity Pricing

Dish System
LIFETIME
WARRANTY

CIRCLE 249 ON READER SERVICE CARD

ULTIMATE MODIFICATION BIBLE VOL. IV NEW AND MORE COMPLETE!!!

OVER 800 MIKE WIRING CODES FOR CB AND HAM RADIOS.
OVER 400 CB POWER/MODULATION BOOST INSTRUCTIONS.
OVER 200 MOD. FOR CB PLL'S.
OVER 175 MOD. FOR HAM RADIOS.
OVER 50 COMPLETE SYNTHESIZED CRYSTAL CHARTS
WITH INSTRUCTIONS.
OVER 25 SCANNER MOD. AND TEN METER RADIO MOD.
OVER 20 PRECALCULATED MOD. CRYSTAL CHARTS.
LINER SCHEMATIC'S AND ANT.COAX db GAIN/LOSS CHARTS.



KDC SOUND
17294 FM 3083
Conroe, TX 77302
Orders Only: 1-800-256-9895
All Other Calls: 409-231-3753
MONEY ORDER, COD
MC/DC/MSA OR CK

\$29.95

CIRCLE 151 ON READER SERVICE CARD

ONV SAFETY BELT CO.

P.O. Box 404 • Ramsey, NJ 07446

800-345-5634

Phone & FAX 201-327-2462

ONV Safety Belt With Seat Harness

\$89.95



OSHA
We Ship
Worldwide
Order Desk Open
7 Days/Week

ONV Tool Pouch \$15.95

Add \$4.00 For Handling VISA M/C CHECK

ONV Belt W/O Seat Harness

\$74.95

CIRCLE 102 ON READER SERVICE CARD

From
Micro
Computer
Concepts

**RC-1000
REPEATER
CONTROLLER**

- Autopatch • Reverse Autopatch
- User Programmable CW ID, Control & User Codes & Timeouts

Manual with schematics • 90-Day Warranty
Wired & Tested w/ manual **\$239.95**

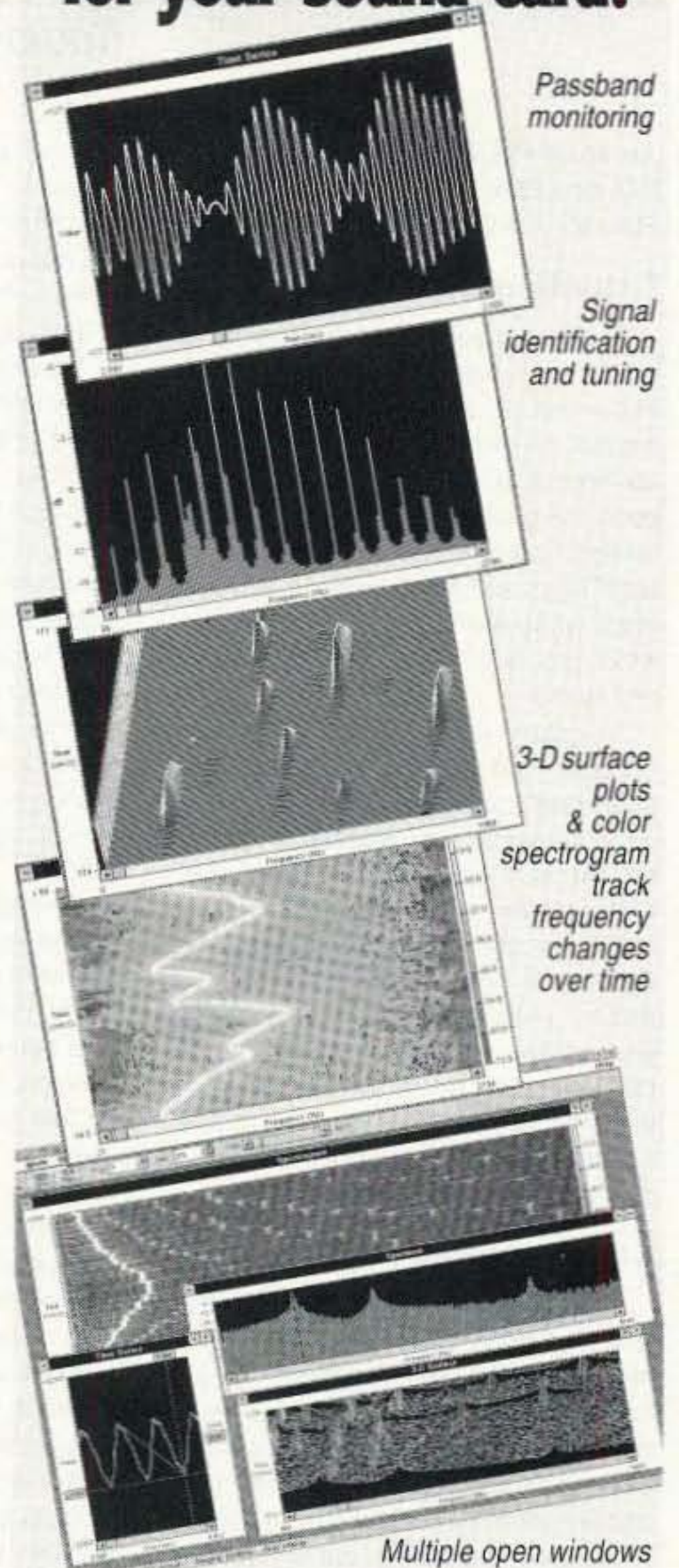


Micro Computer Concepts
8849 Gum Tree Ave.
New Port Richey, FL 34653

813-376-6575

CIRCLE 160 ON READER SERVICE CARD

TIRED OF PLAYING GAMES?
**Finally, a practical use
for your sound card!**



Passband monitoring

Signal identification and tuning

3-D surface plots & color spectrogram track frequency changes over time

Multiple open windows

Sell your product in **73 Amateur Radio Today**

Call Dan Harper today. . . **1-800-274-7373**

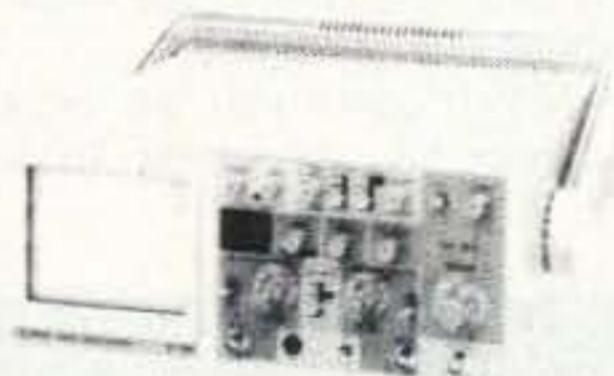
24 HOUR SHIPPING

ELENCO • HITACHI • B&K PRODUCTS
GUARANTEED LOWEST PRICES

TO ORDER
CALL TOLL FREE
1-800-292-7711
1-800-445-3201 (Can.)

AFFORDABLE - HIGH QUALITY
2 YEAR WARRANTY

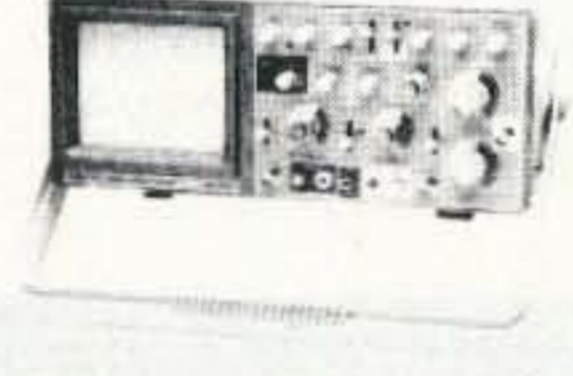
ELENCO OSCILLOSCOPES



STANDARD SERIES

S-1325 25MHz \$349 S-1340 40MHz \$495
S-1365 60MHz \$849

- Features:
- High Luminance 6" CRT
 - 1mV Sensitivity
 - X-Y Operation
 - Voltage, Time, + Frequency differences displayed on CRT thru the use of cursors (S-1365 only)
 - Plus much, much more



DELUX SERIES

S-1330 25MHz \$449 S-1345 40MHz \$575
S-1360 60MHz \$775

- Features:
- Delayed Sweep
 - Automatic Beam Finder
 - Z Axis Modulation
 - Built-in Component Test
 - Plus all the features of the "affordable" series

Hitachi Compact Series Scopes

V-212 - 20MHz Dual Trace	\$425
V-525 - 50MHz, Cursors	\$1,069
V-523 - 50MHz, Delayed Sweep	\$995
V-522 - 50MHz, DC Offset	\$975
V-422 - 40MHz, DC Offset	\$849
V-222 - 20MHz, DC Offset	\$695
V-660 - 60MHz, Dual Trace	\$1,375
V-665A - 60MHz, DT, w/cursor	\$1,449
V-1060 - 100MHz, Dual Trace	\$1,549
V-1065A - 100MHz, DT, w/cursor	\$1,695
V-1085 - 100MHz, QT, w/cursor	\$2,125

B&K OSCILLOSCOPES

2120 - 20MHz Dual Trace	\$389
2125 - 20MHz Delayed Sweep	\$539
1541B - 40MHz Dual Trace	\$749
2160 - 60MHz Dual Trace, Delayed Sweep, Dual Time Base	\$949
2190 - 100MHz Three Trace Dual Time Base, Delayed Sweep	\$1,379
2522A - 20MHz / 20MS/s Storage	\$869

Digital Multimeter EDM-83B
\$175.00
Almost every feature available
Bargain of the decade

Elenco LCR + DMM LCM-1950
\$79
12 Functions
Freq to 4MHz
Inductance
Capacitance

Digital Capacitance Meter CM-1555
\$49.95
• Measures capacitors from .1pf to 20,000µf
• 3-1/2 Digit LCD readout with unit indicator

Digital LCR Meter LCR-680
\$79.95
• 3-1/2 Digit LCD Display
• Inductance 1µH to 200H
• Resistance 1Ω to 20MΩ
• Capacitance 1pf to 200µF

Function Generator GF-8026
\$239
Int/Ext Operation
Sine, Square, Triangle, Pulse Ramp, .2 to 2MHz, Freq Ctr

3-3/4 Digit Multimeter BK-390
\$139.00
• 0.1% DCV acy
• Analog bar graph
• Auto/manual ranging
• 4,000 count LCD display
• Capacitance meas.
• Temperature probe

Digital Multimeter Kit with Training Course By Elenco M-2665K
\$49.95
• Full function 34 Ranges
• Extra large display • Ideal school project
M-2661 (Assembled) \$55.00

Frequency Counter F-1225
\$225.00
• 8 Digit LED display
• Wide measuring range
• High sensitivity
• Data hold function
• Input impedance 1MΩ or 50Ω
• 10:1 Input attenuation function

FLUKE MULTIMETERS (All Models Available Call)

Scopemeters	Model 93 \$1,225.00	70 Series
	Model 95 \$1,549.00	Model 70II \$69.95
	Model 97 \$1,795.00	Model 77II \$149.00
10 Series	Model 10 \$62.95	Model 79II \$175.00
	Model 12 \$84.95	80 Series
		Model 87 \$289.00

FM Receiver Kit & Training Course
\$44.95 AR2N6 kit
Ideal training aid for beginners. Makes it fun and easy to learn about amateur radio.
• Covers both 2 meter (144-148MHz) and 6 meter (50-54MHz) Ft.
• Dual conversion superheterodyne

Butane Soldering Iron
ISOTIP #7980
\$24.95
Two tools in one! Perfect, portable tool for hobbyists and technicians

Combination Emf/Microwave Tester EM 204
\$89.95
Affordable electromagnetic (Emf) and microwave tests made easy!

Telephone Kit PT-223K
\$14.95
Available Assembled PT-223 \$15.95

Function Generator Blox #9600
By Elenco
\$29.95
Kit \$26.95
Sine, Triangle, Square wave

Learn to Build and Program Computers with this Kit
MM-8000
By Elenco
\$129.00
From scratch you build a complete system. Our Micro-Master trainer teaches you to write into RAMs, ROMs and run a 8085 microprocessor, which uses similar machine language as IBM PC.

Electronic Tool Kit TK-1000
\$39.95
A professional organizer tool kit at affordable prices. Includes 25 high quality tools in a high impact carrying case which includes a pocket for meter.

Digital/Analog Trainer
Complete Mini-Lab For Building, Testing, Prototyping Analog and Digital Circuits
XK-525
\$159.95
Kit XK-525K
\$129.95
Elenco's trainer is designed for school projects, with 9 built-in power supplies. Includes a function generator with continuously variable, sine, triangular, square wave forms. All power supplies are regulated and protected against shorts. The case can include a full line of tools and meter of your choice.

Transistor Radio Kits with Training Course
AM/FM Radio Model AM/FM-108 \$29.95
AM Radio Kit Model AM-550 \$19.95

Telephone Line Analyzer
Kit TT-400K \$19.95
Assembled TT-400 \$26.95

WE WILL NOT BE UNDERSOLD
UPS SHIPPING - 48 STATES 5%, OTHERS CALL
IL RES add 7.75% TAX
PROBES INCL ALL SCOPES & METERS

C&S SALES INC.
1245 ROSEWOOD, DEERFIELD, IL 60015
FAX: 708-520-0085 • (708) 541-0710

15 DAY MONEY BACK GUARANTEE
FULL FACTORY WARRANTY
WRITE FOR FREE CATALOG

CIRCLE 184 ON READER SERVICE CARD

Audio Vision & Spectra Plus.

Real-time audio spectrum analyzers. Full control over FFT size, sampling rate, scaling, gain, and averaging. Requires 386 or better, Windows 3.1 and any Windows compatible 8 or 16 bit soundcard.
"A stroke of brilliance...a groundbreaking and valuable program." - Monitoring Times
"Knock-your-socks-off quality!" - Harold Price, QEX Magazine, Dec. '93

	Audio Vision	Spectra Plus
Modes		
Real time	●	●
Recorder	●	●
Post process	●	●
Price	\$89.00	\$179.00

All display formats included with either package.
60 day money-back guarantee.

Also available: 'RF Vision' - RF Spectrum Analyzer

800-401-3472 tax/voice 206-697-3472
Visa, MasterCard, Check or Money Order

Pioneer Hill Software
24460 Mason Rd., Poulsbo, WA 98370
S & H included, foreign delivery add \$10.00
Demo disk available on request.

In Australia: **ME Technologies**
PO Box 50, Dyers Crossing NSW 2429, +61 65-50-2200
In Sweden: **PICS Corporation**
PO Box 113, 577 22 Hultsfred, +46 495-14300

CIRCLE 311 ON READER SERVICE CARD

HOMING IN

Number 21 on your Feedback card

Radio Direction Finding

Joe Moell P.E. K00V
P.O. Box 2508
Fullerton CA 92633

T-Hunting Down Under

December already! Another year is almost over. Are you going to let 1994 end without experiencing at least one hidden transmitter hunt? If my correspondence is any indication, 1994 has been the busiest year yet for radio direction finding (RDF) enthusiasts. In large cities and small towns, hams are discovering the fun of these contests, which are sometimes called foxhunts or T-hunts.

In many parts of the USA and Canada, cold weather has halted foxhunts until spring. In some cities, such as Montreal, snowy weather is no deterrent, and regular hunts continue. With no snow or freezing weather here in the metropolitan parts of Southern California, we hold more than two dozen T-hunts every month of the year. Wintertime can bring heavy rains, but most hunters keep going like the famous battery bunny. All that is needed is a rainproof antenna installation and mud-ready tires.

A Fox on the Barbie?

There is at least one place in the world where a busy warm-weather T-hunting season is just getting started. As I learned in a recent exchange of messages on the Internet, transmitter tracking is becoming more and more popular as a ham activity in Australia. While there are occasional on-foot-only events there, most hunts involve mobiles and pedal-to-the-floor driving.

Bevin Boden VK5TV explained how a typical hunt goes (with my translation in parentheses): "All hounds (hunters) gather at one point and draw starting positions. The fox (hider) departs in his car and is given about 10

minutes start. After that, you are permitted to track and follow the mobile fox. After about another five minutes, the fox goes to ground (stops), sometimes putting the transmitter up a tree, in a bin down a manhole, and so forth.

"After a lot of speeding around with funny-looking aerials, the first hounds arrive. If the fox is in a car parked on the road, it is a quick identification and wait until the next hunt starts. If not, it is out with the sniffer (hand-held RDF) gear and try to find the wretched fox. Sometimes half an hour of people running around like chooks (chickens) with their heads' cut off goes by before the fox is found. The fox has even been one of the hounds in disguise, waving a beam around and supplying strong signals to individual hounds at will."

Sometimes there are several hunts in one evening. It is traditional for the fox team to provide food and drinks for all the hunters after the last round. At this gathering, results are tallied and winners are announced.

The high point of the year for Australian T-hunters is the annual South East Radio Group convention in Mt. Gambier, which includes the annual Australian Foxhunting Championships. "Some hams travel more than 1,500 miles to attend," says VK5TV.

Mark Diggins VK3JMD sent a copy of the itinerary and rules for the 1994 championships. There were 11 separate events over a 26-hour period, including sniffer hunts, mobile outings, and even a special on-foot foxhunt just for kids. Mobile hunters had an opportunity to track beacons on ham bands from 3.5 to 1200 MHz. The winner of every hunt was determined by elapsed time, first finder wins. No hunts were scored by odometer mileage, as is often done stateside.

The biggest challenge of the cham-

pionship weekend was Saturday at 8 p.m., when the marathon four-band night hunt began. Foxes keyed down on 2 meters, 10 meters, 70 centimeters, and 6 meters. Marshals kept close watch to ensure that the rules were obeyed. Special rules were crafted with careful attention to detail. For example, one rule stated, "Should it be necessary to leave the vehicle, only one set of RDF equipment is permitted amongst the group from that vehicle. This includes foil under T-shirts."

Information on the championships was just part of the information package that VK3JMD sent about VK-land T-hunting. It also included photos and videos of Aussie hunters in action. Mark lives in Dingley, which is in Victoria, at the southern tip of eastern Australia. He is close to Melbourne, the apparent capital of T-hunting for the country. His club, the North East Radio Group (NERG) is very active in promoting the sport.

NERG member Andrew McColm VK3KIR produced the video to show non-hunters how it's done there. In it, Geoff Hudson VK3VR tells some of his secrets of success on first-finder-wins hunts. He urges new hunters to start turning their beams and getting bearings as soon as the fox drives away. "If he's been gone 10 minutes and he's as weak as water, the signal will be masked by many reflections

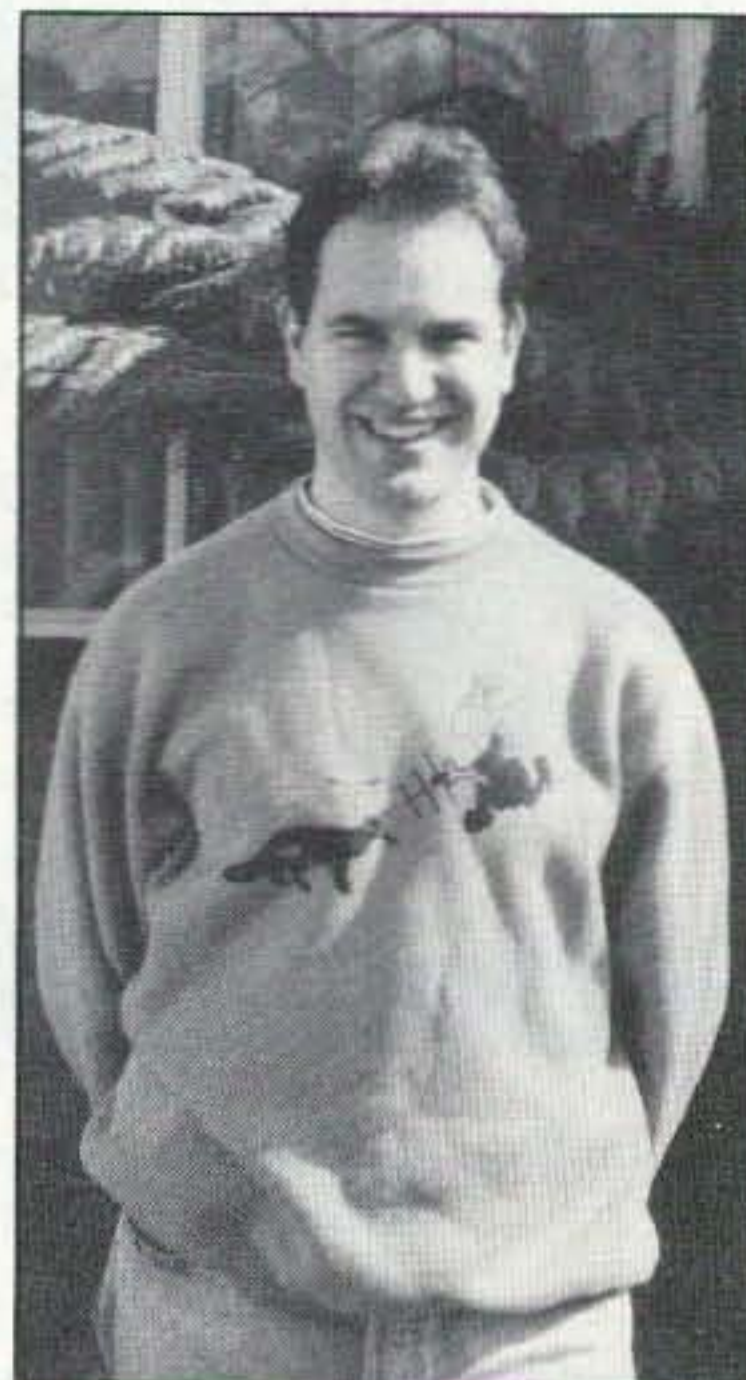


Photo A. Mark Diggins VK3JMD sent these photos of T-hunting in Australia. His sweatshirt (a "wind-cheater," as the Aussies call it) features his original fox-hunting graphics.

and you won't have a clue which way to head."

VK3VR continues, "As you drive out, stick on major roads. For heav-

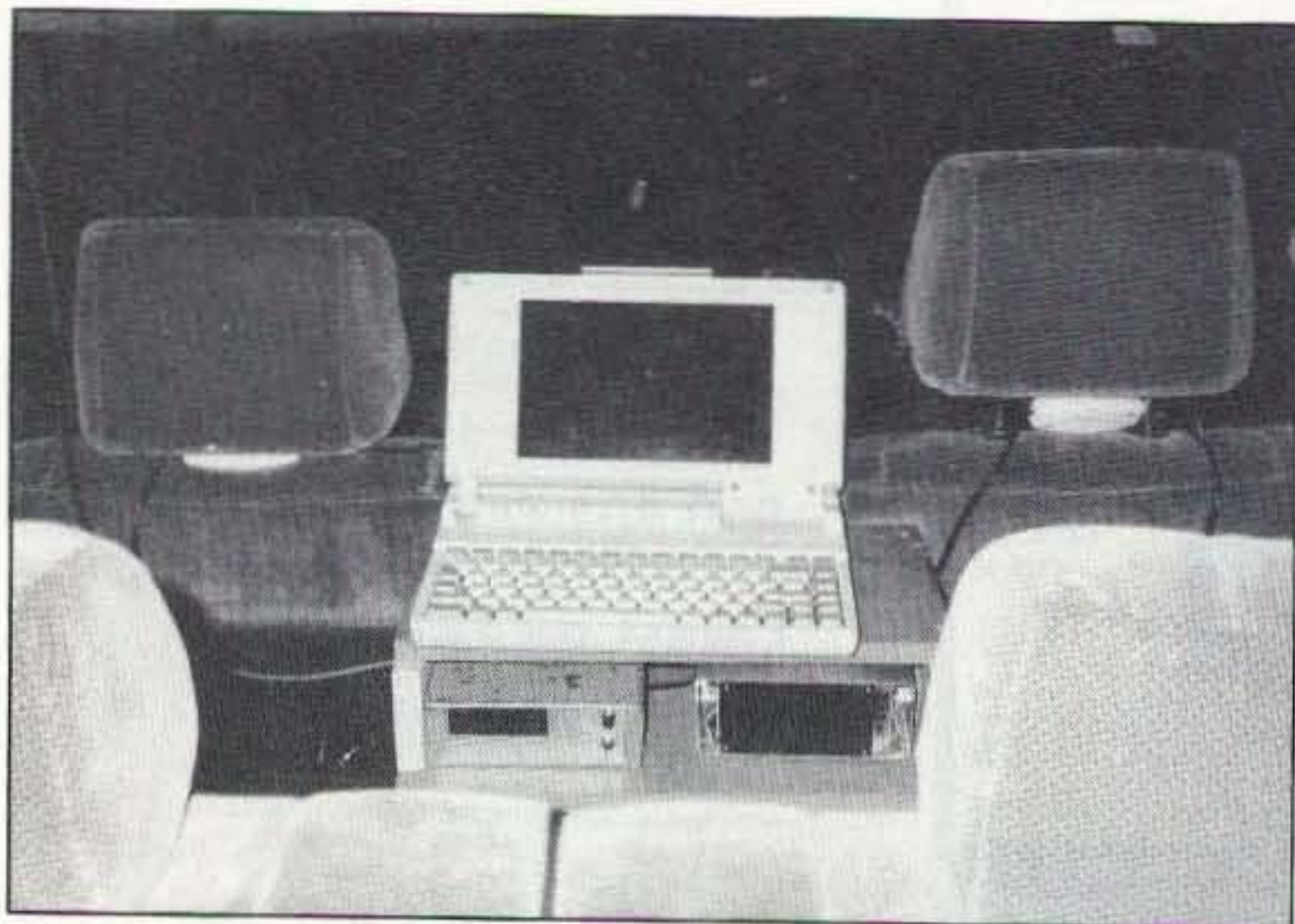


Photo B. The back-seat navigator on Mark's team uses this computer to plot signal strength readings. His Doppler DF display is underneath.



Photo C. The VK3GMZ team hunts on 2 meters with both a horizontally-polarized beam and a modified marine Doppler array.

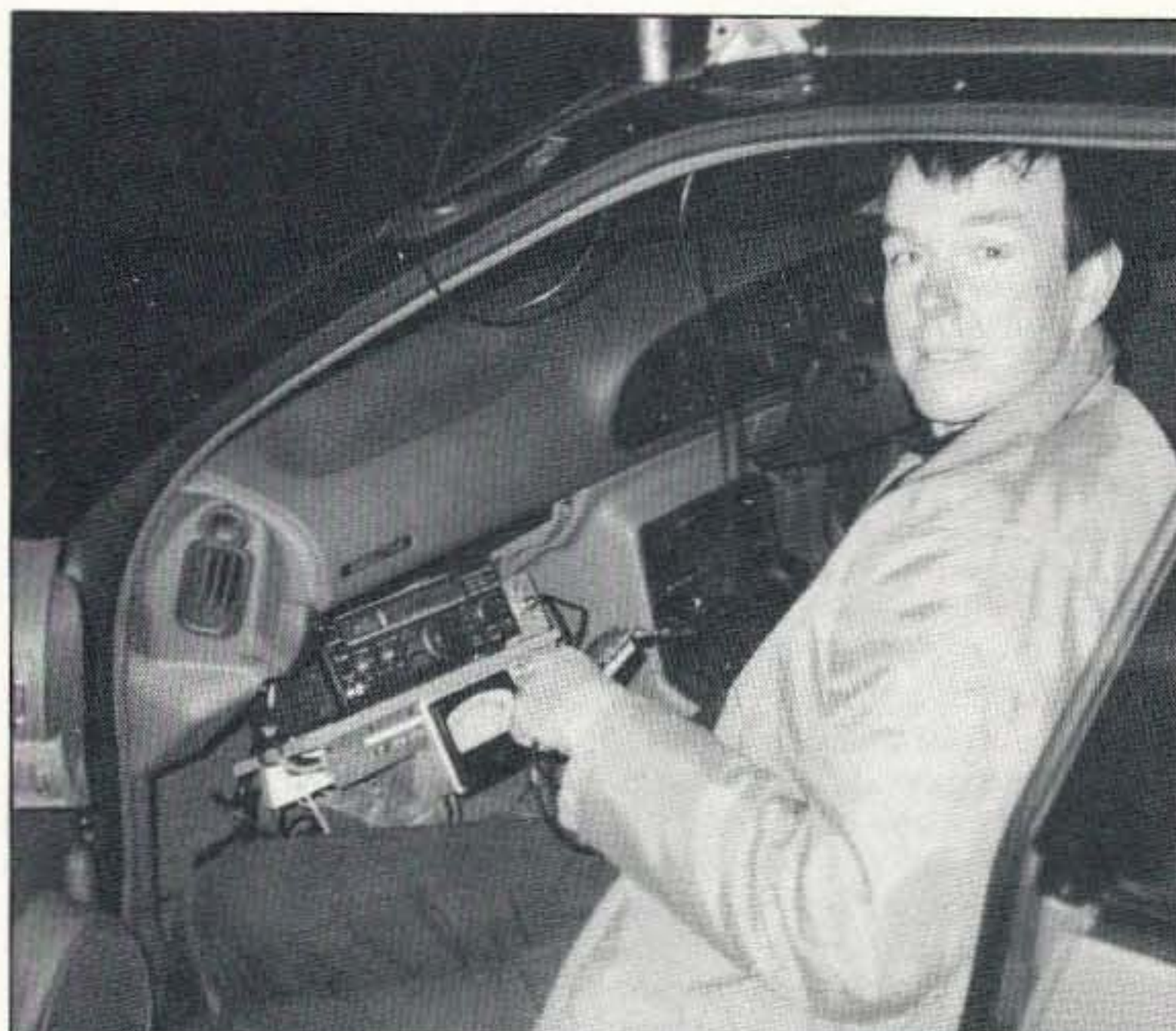


Photo D. VK3CHR handles the controls for the VK3VT RDF team. The HF receiver operates directly on 10 meter hunts, and as a common intermediate-frequency system with downconverters for hunts on VHF bands.

en's sake don't be pulled into side streets, they'll cut your speed dramatically. Use attenuation to reduce the overall system gain so that you can just hear the signal, thereby minimizing distracting reflections."

To save time on hunts where the fox is not right out on the road, back-seat team members jump out and take off on foot when they think they are within rapid hiking distance of the fox. This practice is called dropping run-



Photo E. A chain drive controls the horizontally-polarized beam for the VK3YQN team. They also have a motorized spinning quad and CRT display in back.

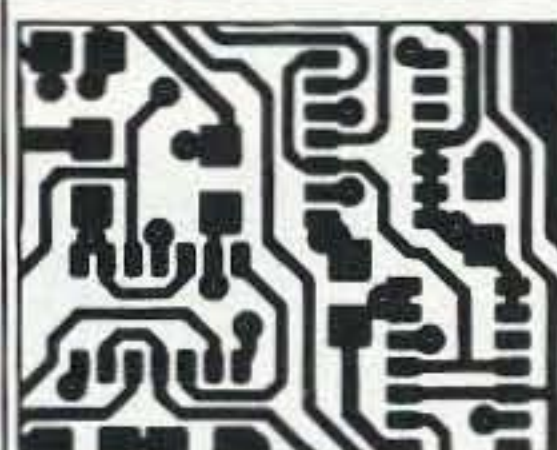
ners. The front-seat hunters then continue, trying to drive closer.

"Don't be tempted to drop runners out purely on the basis of signal strength," Geoff urges. "Just because the signal's getting strong doesn't mean you're close. As you go by the fox, the signal will swing around. Wait until he's behind you—when you have

gone past, you know you're close. Then drop your runners.

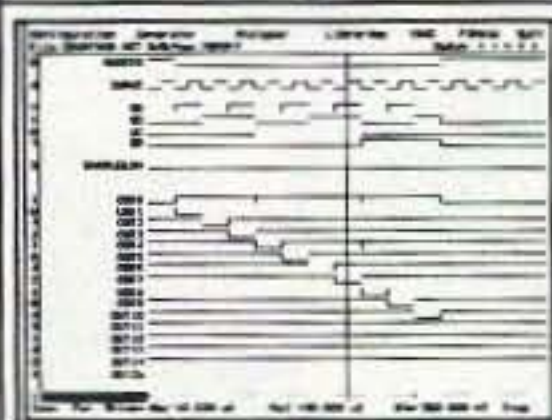
"If you don't have communication to your runners, agree with the guys what you're going to do if they don't succeed. We work on the basis that if a runner can't find the fox, he goes back to where the car dropped him off. Another tip for the runners is to always

PCB / Schematic CAD - from \$195



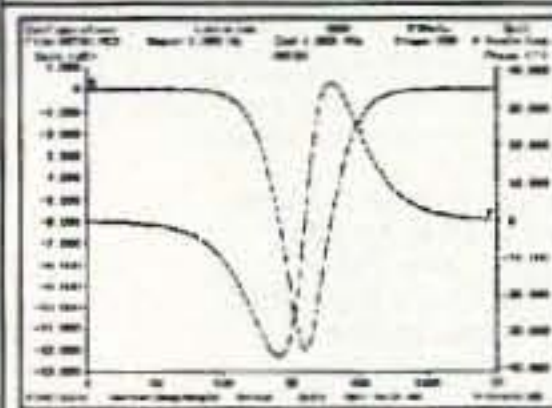
EASY-PC - For single sided and multilayer boards to 17"x17". Phenomenally fast and easy to use. Over 18,000 copies in use worldwide. **EASY-PC Professional** for boards up to 32" x 32" at .001" resolution, 16 layers. Schematic capture and netlist extraction - integrates seamlessly with PULSAR and ANALYSER III. Runs on PC/XT/AT/286/386/486 with EGA or VGA displays.

Logic Simulation - from \$195



PULSAR and **PULSAR Professional** - Full featured digital logic simulators. Allow you to test your designs quickly and inexpensively without the need for sophisticated test equipment. **PULSAR** can detect the equivalent of a picosecond glitch occurring once a week! Runs on PC/XT/AT/286/386/486 with EGA or VGA displays.

Analogue Simulation - from \$195



ANALYSER III and **ANALYSER III Pro**. Powerful linear circuit simulators have full graphical output, handle R's, L's, C's, Bipolar Transistors, FET's, Op-Amp's, Tapped Transformers and Transmission Lines etc. Plots Input and Output Impedances, Gain, Phase and Group Delay. Covers 0.001 Hz to >10GHz. Runs on PC/XT/AT/286/386/486 with EGA or VGA displays.

For information write, fax or call:

Number One Systems

REF: 73, 1795 Granger Ave., Los Altos, CA94024

(415) 968 9306

VISA and MasterCard welcome.

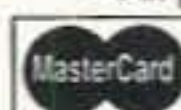
CIRCLE 1 ON READER SERVICE CARD

OAK HILLS RESEARCH QRP Headquarters



QRP CLASSIC DUAL BAND TRANSCEIVER KIT

- Dual band Transceiver kit for the 20M & 40M bands
- Superhet receiver design with diode ring mixer & RF pre-amp
- High side LO injection on both bands for a cleaner signal
- 4 pole crystal ladder filter
- 4 pole audio filter
- AGC circuit
- Vfo tuning with 8:1 vernier dial covering 100 KHz
- RIT w/center detent control providing ± 1 KHz of range
- Sidetone oscillator w/level control
- Silky smooth QSK circuit
- 4 - 5 watts of RF output on both bands
- Tx output power adjustable from 0 to full output
- Both lambic and manual key jacks provided
- 12VDC operation — Current drain is 200mA on Rx and 1 A on TX
- Measures (HWD): 4" X 6 1/4" X 6 7/8" and weighs 48 oz.
- 100% complete kit — All coils are prewound
- All panels prepunched for optional lambic keyer



- Cat # CL2040\$219.95
- Cat # KEY1 Optional lambic Keyer kit....\$ 39.95



9AM to 6PM
Mon.-Fri.
EST.

OAK HILLS RESEARCH

20879 Madison Street
Big Rapids, MI 49307

Michigan
Residents
Add 6%
State Sales Tax

(616) 796-0920

Fax: (616) 796-6633

CIRCLE 82 ON READER SERVICE CARD



Photo F. VK3XAJ heads down the road with his 10-element dual-polarized beam on the roof and scope-tube display in the back seat. "He gets lots of attention from the police," says Mark.

carry 30 cents for a phone call. At least you can phone for a taxi to get home if the buggers don't pick you up!"

Geoff went on to tell about the equipment you need to be prepared to home in, such as a sniffer and a torch (flashlight). Since radio foxes often hide on a riverbank, he carries an inflatable rubber dinghy and com-

pressed gas cylinder in the car, in case his team drives up on the wrong side of the river. That ploy has been foiled, however, when hiders put the T on the bank in heavy brush with thorns.

Home-Brew Homers

When April and I visited down under a few years ago, most of the gear

in almost every ham shack we visited was home-built. The Aussies' love of do-it-yourself continues, as you can tell from VK3JMD's Photos A through F. Commercial RDF sets are not readily available as they are in the USA, so each team has developed its own creative collection of mobile gear. Some are quite advanced, featuring motorized directional antennas, computers, and cathode-ray tube displays like those described in recent "Homing In" articles.

"Sniffers" for on-foot hunting usually consist of a sturdy three-element yagi and a receiver with built-in attenuation. A model by Ian Stirling VK3MZ, designed around the Motorola MC3362 receiver IC, is popular with home builders. Some hunters replace the receiver's analog S-meter with a voltage-controlled audio oscillator and speaker. The pitch of the oscillator's tone goes up and down in proportion to the signal level. They call them 'whoopie sniffers.'

While some hunters employ VHF-FM receivers modified with external S-meters or multimode rigs in the sideband mode, most still prefer to build special RDF rigs. For instance, Greg Williams VK3VT crafted a set with tunable 6 to 8 MHz variable bandwidth IF, noise blanker, and calibrated S-meter in a shielded case. The ruggedly-built cabinet has a rotary RF step attenuator, but for even

more signal reduction when very close it has a switch that open-circuits the antenna input. "Equipment really gets knocked around on a foxhunt," he says.

To encourage constructors, a home-brew competition with judging and prizes is part of the annual fox-hunting championships. There are three categories, novice through expert.

Many NERG foxhunts involve transmitters on three or four ham bands at the same time. With four members on his team, space in VK3JMD's vehicle is at a premium. He wants to replace his small 6 meter loop with a beam antenna for more gain, but he doesn't want to waste valuable hunting time assembling and disassembling the antenna in the field.

"The problem is storing antennas when not in use," he says. "In the back of the Subaru station wagon we carry four 2 meter sniffers, two beam poles, two 70cm sniffers, a 2 meter beam, 70 cm beam, 6 meter sniffer, toolbox, a box of spares, and some other personal stuff. If we add to this a full-size 6 meter quad, assuming we can get it in the car, we won't be able to move in our seats!" To solve the problem, Mark is now building a two-element "shrunken" quad. (See "Homing In," January 1990.)

AMTOR / PacTOR / RTTY

Introducing SPHERE TRON Model RM-2000



High Performance HF Radio Modem / Terminal Unit

For discriminating amateurs who want that extra edge of optimum copy under difficult conditions. Superior hardware to fully complement the best multi-mode software available (BMK-MULTY, below) with "plug and play" interfacing. Works with other software, too. For those amateurs who have wanted the performance of BMK-MULTY but do not already have an RTTY terminal unit, the solution is here. Regular \$399. Special pre-production price \$349. No risk. Ask for complete details.

Use an ordinary RTTY terminal unit such as CP-1, CP-100, TU-170, ST-6, ST-5000, ST-6000, etc. with G4BMK's **BMK-MULTY** software running in your IBM-PC or compatible for performance superior to a TNC. Details available. *Prices: Base communications package with AMTOR, RTTY, CW and QSO/callsign logging database \$95. Base + Pactor \$145. Extended audio package adds Audio Spectrum Analyzer, HF WEFAX and SSTV reception. Base + Extended \$140. Base + Pactor + Extended \$175. Pactor alone \$50. PK232 Adapter \$49. Shipping \$3. VISA/MasterCard.*

*Amateur callsign required with order.
State 3 1/2 or 5 1/4 inch disk preference.*

SPHERE TRON / Schnedler Systems

P.O. Box 5964
Asheville, NC 28813

(704) 274-4646

PC HF FACSIMILE 7.0 \$99



Now under Windows or DOS

PC HF Facsimile is a simple, yet comprehensive shortwave fax system for the IBM PC and compatibles. It includes an FSK demodulator, advanced signal processing software, tutorial cassette, and complete reference manual. With your PC and SSB receiver getting FAX is a snap. Here are just some of the features:

- Mouse or Menu Driven
- Unattended Operation
- Easy Tuning Oscilloscope
- Start/Stop Tone Recognition
- Up to 256 Levels
- Single Scan per Line with EMS Memory
- Programmable Colorization
- Brightness and Contrast Control
- Transmit Option Available
- Image Zoom, Scroll, Pan, Rotation

- Grayscale on all Popular Printers
- Worldwide Broadcast Schedule
- Worldwide Frequency Listing
- CGA, HGA, EGA, VGA & Super VGA
- Time Lapse Frame Looping
- Slide Shows
- Programmable IOC & Line Rates
- Image Cropping
- Automatic Radio Control
- NAVTEXT & RTTY Option Available

Call or write for our free catalog of products. Visa & MasterCard welcome.

Software Systems Consulting
615 S. El Camino Real, San Clemente, CA 92672
Tel. (714) 498-5784 Fax. (714) 498-0568

CIRCLE 250 ON READER SERVICE CARD

Ski to the T

Though summer is coming to VK-land, foxhunters there don't dread the winter months. In fact, many look forward to T-hunting in the snow. VK3JMD's package included a flier on the upcoming SnowDF, which will take place at the Mt. Buller ski area. SnowDF is simply a series of 2 meter sniffer hunts in the snow.

Contestants can use any suitable means of human-powered travel on the slopes. Vehicles are prohibited, but hunters are allowed to use the ski lifts, if they can convince lift operators to let them on with arms full of RDF gear. Most entrants will hunt as individuals. Hunters may team up, but only one piece of RDF gear per team is permitted.

No hunt boundaries were mentioned on the SnowDF announcement, but it probably covers the entire ski zone, which is quite large. Organizers anticipate that many entrants will not be able to find all of the hidden T's before dark. Their ordinary field-strength meter type sniffers may not be sensitive enough to get good bearings.

On the other hand, large RDF antennas are cumbersome when walking and skiing. Extra safety precautions will be in order when in the snow. Smart RDFers will use antenna elements that are designed to bend or break on impact, and include eye protection on the tips.

Bearing-taking in the snow will be a challenge. Snowbanks make good VHF signal reflectors. It has been our experience in Southern California that signal bounces from the mountains are always stronger in winter months when the peaks are snow-covered.

Many thanks to Mark, Bevin, and other RDFers who have sent information on local activities. As always, your T-hunting stories and photos are welcome. Send electronic mail to me via CompuServe (75236,2165) or Internet (joemoell@cup.portal.com). Send "snail mail" to the post office box in my byline.

RDF on the Information Superhighway

When it's 20 below and the snowdrifts are six feet deep, you may not feel like T-hunting in your car or on foot. But you can do the next best thing: Chat about T-hunting. Foxhunters across the country and around the world are online. You can sometimes find them on commercial services like CompuServe, but my favorite place is Fox-List on the Internet. It is sponsored by the Boston Amateur Radio Club and is free of charge, except for your usual E-mail access costs.

Unlike the Usenet ham radio newsgroups, where messages are posted for any Internet browser to see, Fox-List is a special mailing service called

a reflector. After you join the list (subscribe), you automatically receive, at your e-mail address, copies of all messages sent by others to the Fox-List. To send a message to all other subscribers, you simply address it to fox-list@netcom.com. (The hyphen is important.) The server then resends it to all list members.

Fox-List is just like having a worldwide T-hunting BBS, with all postings sent to you automatically. So don't subscribe unless you want lots of messages filling your E-mailbox. Most exchanges are about the technical aspects of RDF. In recent weeks, there have been lively discussions on ad-

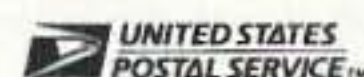
vanced Doppler techniques, East Coast versus West Coast foxhunting, and methods for computerized mapping for use with Global Positioning System receivers.

To become a subscriber, send a one-line E-mail message to list-serv@netcom.com from the address where you want to receive your mail. The text is simply "subscribe fox-list" (without quote marks, of course). Then send a short message to fox-list@netcom.com to introduce yourself and describe your local RDF activities. When you see your message reflected back from the list, you will know that you are a member.

OWNERSHIP STATEMENT

POSTAL BULLETIN

21875, 9-1-94, PAGE 17



Statement of Ownership, Management, and Circulation
(Required by 39 U.S.C. 3685)

1. Publication Title	2. Publication No.	3. Filing Date
73 Amateur Radio Today	1052-2522	9-30-94
4. Issue Frequency	5. No. of Issues Published Annually	6. Annual Subscription Price
Monthly	12	\$24.97

7. Complete Mailing Address of Known Office of Publication (Street, City, County, State, and ZIP+4) (Not Printer)

70 Route 202 North, Peterborough, Hillsborough Cty, NH 03458-1107

8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not Printer)

70 Route 202 North, Peterborough NH 03458-1107

9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor (Do Not Leave Blank)

Publisher (Name and Complete Mailing Address)
Wayne Green, 70 Route 202 North, Peterborough NH 03458-1107

Editor (Name and Complete Mailing Address)
Wayne Green, 70 Route 202 North, Peterborough NH 03458-1107

Managing Editor (Name and Complete Mailing Address)
Hope Carrier, 70 Route 202 North, Peterborough NH 03458-1107

10. Owner (If owned by a corporation, its name and address must be stated and also immediately thereafter the names and addresses of stockholders owning or holding 1 percent or more of the total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address as well as that of each individual must be given. If the publication is published by a nonprofit organization, its name and address must be stated.) (Do Not Leave Blank.)

Full Name	Complete Mailing Address
Wayne Green, Inc.	70 Route 202 North, Peterborough NH 03458
Wayne Green	70 Route 202 North, Peterborough NH 03458

11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities. If none, check here. None

Full Name	Complete Mailing Address
none	

12. For completion by nonprofit organizations authorized to mail at special rates. The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes. (Check one)
 Has Not Changed During Preceding 12 Months
 Has Changed During Preceding 12 Months (If changed, publisher must submit explanation of change with this statement)

PS Form 3526, October 1994

(See Instructions on Reverse)

Page 18, 9-1-94, 21875

POSTAL BULLETIN

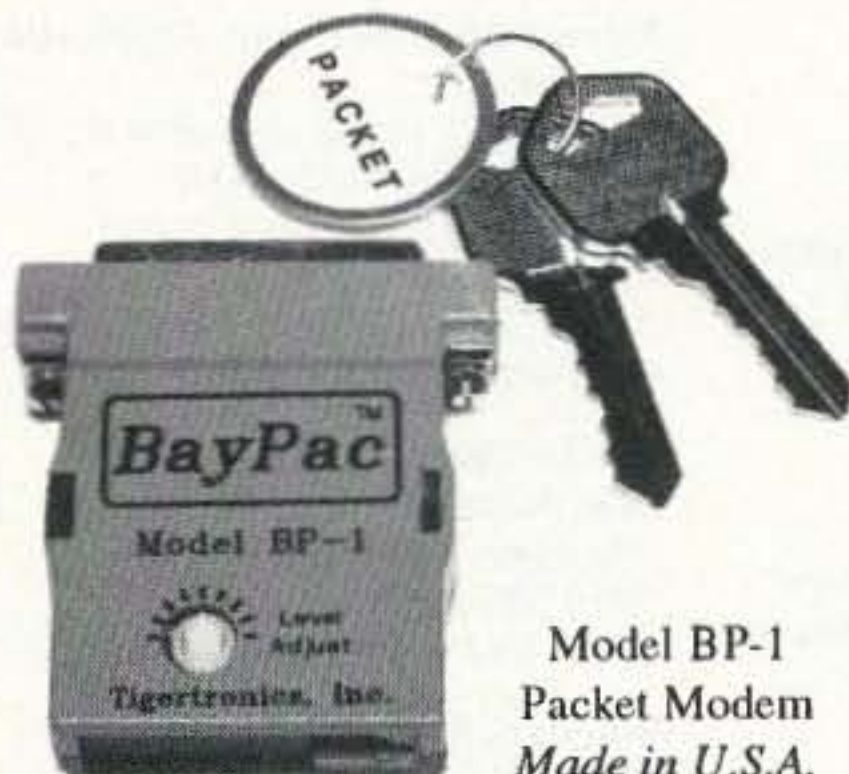
13. Publication Name	14. Issue Date for Circulation Data Below	
73 Amateur Radio Today	September 1994	
15. Extent and Nature of Circulation	Average No. Copies Each Issue During Preceding 12 Months	Actual No. Copies of Single Issue Published Nearest to Filing Date
a. Total No. Copies (Net Press Run)	77,513	75,800
b. Paid and/or Requested Circulation (1) Sales Through Dealers and Carriers, Street Vendors, and Counter Sales (Not Mailed)	18,957	18,293
(2) Paid or Requested Mail Subscriptions (Include Advertisers' Proof Copies/Exchange Copies)	28,831	28,421
c. Total Paid and/or Requested Circulation (Sum of 15b(1) and 15b(2))	47,788	46,714
d. Free Distribution by Mail (Samples, Complimentary, and Other Free)	896	746
e. Free Distribution Outside the Mail (Carriers or Other Means)	0	0
f. Total Free Distribution (Sum of 15d and 15e)	896	746
g. Total Distribution (Sum of 15c and 15f)	48,684	47,460
h. Copies Not Distributed (1) Office Use, Leftovers, Spoiled	1,141	1,021
(2) Return from News Agents	27,688	27,319
i. Total (Sum of 15g, 15h(1), and 15h(2))	77,513	75,800
Percent Paid and/or Requested Circulation (15c / 15g x 100)	98.2	98.4

16. This Statement of Ownership will be printed in the _____ issue of this publication. Check box if not required to publish

17. Signature and Title of Editor, Publisher, Business Manager, or Owner _____ Date 9-30-94

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including multiple damages and civil penalties).

- Packet Radio - Portable & Affordable!



- ★ Simple Installation
- ★ No External Power
- ★ Smart Dog™ Timer
- ★ Perfect For Portable
- ★ Assembled & Tested
- ★ VHF, UHF, HF (10M)

Model BP-1
Packet Modem
Made in U.S.A.

Just...
\$49.95
+Shipping

Whether you're an experienced packeteer or a newcomer wanting to explore packet for the first time, this is what you've been waiting for! Thanks to a breakthrough in digital signal processing, we have developed a tiny, full-featured, packet modem at an unprecedented low price. The BayPac Model BP-1 transforms your PC-compatible computer into a powerful Packet TNC, capable of supporting sophisticated features like digipeating, file transfers, and remote terminal access. NOW is the time for YOU to join the PACKET REVOLUTION!



400 Daily Lane
P.O. Box 5210
Grants Pass, OR
97527

1-800-8BAYPAC

VISA 1-800-822-9722
(503) 474-6700

CIRCLE 269 ON READER SERVICE CARD

ATV Wish List

Well, it's the time of year to think about all of that ATV gear you're going to get under the Christmas tree. I hope you've made it clear that any ATV stuff is a far better present than ties, shirts and sweaters! To help sway the odds in your favor, I've compiled a list of companies that offer ATV related equipment. You might want to leave this list laying around in an obvious place as a subtle hint. Don't be too blatant, you might end up with lumps of coal in your stockings. I'd be careful putting on your shoes and socks during the next few weeks.

Anyways, here's the goodie's list of companies that cater to the ATV enthusiast:

ATV Equipment

ATV Electronics

16807 N. 46th Lane
Glendale, AZ 85306
(602) 843-3585
Transmitter and Receiver boards and accessories.

CCTV Corp., GBC

315 Hudson St.
New York, NY 10013
(800) 221-2240
(212) 463-9758 FAX
Miniature TV cameras.

Communication Concepts, Inc.

508 Millstone Dr.
Beavercreek, OH 45434-5840
(513) 426-8600
(513) 429-3811 FAX
ATV downconverter and amplifier kits.

Down East Microwave

R.R. #1, Box 2310
Troy, ME 04987-9721
(207) 948-3741
(207) 948-5157 FAX
Microwave components, preamps, power bricks and antennas.

Elktronics

12536 T.R. 77
Findlay, OH 45840
(419) 422-8206
Video IDers and kits.

Engineering Consulting

583 Candlewood St.
Brea, CA 92622-1
(714) 671-2009
(714) 255-9984 FAX
Video ID system for the Commodore 64.

Hamtronics, Inc.

65-D Moul Rd.
Hilton, NY 14468-9535
(716) 392-9430
(716) 392-9420 FAX
Preamp kits

HF Technology, Inc.

457 Santa Fe Trail
Carey, IL 60013
(708) 639-4336
Specializing in FM as well as AM ATV systems.

International Crystal Manufacturing Co., Inc.

P.O. Box 26330, 701 W. Sheridan.
Oklahoma City, OK 73126-0330
(405) 236-3741
(405) 235-1904 FAX
Interdigital Filters.

KA9RQC/WB0QCD Antenna Mfg.

412 W. 5th St.
P.O. Box 836
Wilton, IA 52778-0836
(309) 234-5494 or (319) 732-3382
Slot antennas.

Micro Computer Concepts

8849 Gum Tree Ave.
New Port Richey, FL 34653
(813) 376-6575
Repeater Contollers specializing in ATV systems.

Micro Video Products

1334 S. Shawnee Dr.
Santa Ana, CA 92704
(800) 473-0538
(714) 957-9268
Micro and mini-size TV cameras, transmitters and accessories.

M2 Enterprises

7560 N. Del Mar
Fresno, CA 93711
(209) 432-8873
(209) 432-3059 FAX
Antennas.

NCG Co. (Comet Antennas)

1275 North Grove St.
Anaheim, CA 92806
(714) 630-4541
(714) 630-7024 FAX
(800) 962-2611 orders
Antennas.

North Country Radio

Box 53-A, Wykagyl Station
New Rochelle, NY 10804
(914) 235-6611
(914) 576-6051 FAX
Kits for ATV transmitters, downconverters and accessories.

Olde Antenna Labs

4725 W. Quincy
Denver, CO 80236
(303) 798-5926
Antennas, especially omnidirectional "Wheels."

Pauldon Associates.

210 Utica St.
Tonawanda, NY 14150
(716) 692-5451
Transmitters, downconverters, power amps and accessories.

Parabolic

P.O. Box 10257
S-434 23 Kungsbacka
Sweden
46-300-40621 FAX
FM ATV transmitters and receivers for the 24cm band.

P.C. Electronics

2522 Paxson Lane
Arcadia, CA 91007-8537
(818) 447-4565
(818) 447-0489 FAX order line
Wide selection of transmitters, downconverters, transceivers, accessory boards, repeater modules, antennas and amplifiers.

Rutland Arrays

1703 Warren St.
New Cumberland, PA 17070
(800) 536-3268
(717) 774-3570 Info (7-10 p.m. EST)
Antennas.

Science Workshop

Box 310
Bethpage, NY 11714
(516) 731-7628
Poor Man's Spectrum Analyzer kit and other kits related to test equipment.

Scwiech Communications Systems

12218 Greentree Rd.
Poway, CA 92064
(619) 748-2286
Antennas.

Spectrum International

P.O. Box 1084, Dept. S
Concord, MA 01742
(508) 263-2145
(508) 263-7008 FAX
Downconverters, Antennas, WX Satellite receivers, antennas and filters.

Wyman Research

9145 South, 850 West
Waldron, IN 46182
(317) 525-6452
Wide array of transceivers, transmitters, amplifiers and downconverters for both AM and FM ATV.

Publications, Magazines

ATV Quarterly
1545 Lee St.
Des Plaines, IL 60018-1950
(708) 298-2269
(708) 803-8994 FAX

Devoted entirely to Amateur Television with construction articles, news and new product announcements.

The Spec-Com Journal

P.O. Box 1002
Dubuque, IA 52004-1002
(319) 557-8791
(319) 583-6462 FAX
Publication about specialized communications including ATV and SSTV.

Newsletters

ATV Today

412 W. 5th St.
P.O. Box 836
Wilton, IA 52778-0836
(319) 732-3382 Voice & FAX
Newsletter concerning ATV issues and news.

Stratosphere

Edge of Space Sciences, Inc. (EOSS)
376 W. Caley Circle
Littleton, CO 80120
Quarterly newsletter about high altitude balloon ATV experiments. \$10 to join EOSS and receive newsletter.

ESF Copy Services

4011 Clearview Dr.
Cedar Falls, IA 50613
(319) 266-7040
Back issues and reprints available for ATVQ, A5 Magazine, RTTY Journal and Spec-Com.

SSTV Equipment

A&A Engineering
2521 W. LaPalma #K
Anaheim, CA 92801
(714) 952-2114
ViewPort VGA SSTV kit for IBM PCs or compatibles.

Absolute Value Systems

115 Stedman St. #7
Chelmsford, MA 01824-1823
(508) 256-6907
Pasokon TV, SSTV system for IBM PC and compatibles.

Advanced Electronic Applications, Inc. (AEA)

P.O. Box C2160, 2006 196th St., S.W.
Lynwood, WA 98036-0918
(206) 775-7373 Tech support
(206) 774-5554 Office
Amiga AVT (SSTV system), antennas and antenna analyzers.

Harlan Technologies

5931 Alma Dr.
Rockford, IL 61108
(815) 398-2683
SSTV for the Soundblaster card.

Software Systems Consulting

615 S. El Camino Real
San Clemente, CA 92672
(714) 498-5784
(714) 498-0568 FAX
SSTV system for the IBM PC and compatibles.

GIVE YOUR
HR-2510 HR-2600

the same features as the

"BIG RIGS"

CHIPSWITCH

4773 Sonoma Hwy. Suite 132
Santa Rosa, CA 95409-4269

Write or call (707) 539-0512 for FREE information

CIRCLE 265 ON READER SERVICE CARD

CB-TO-10 METERS

We specialize in CB radio modification plans and hardware, Frequency and FM conversion kits, repair books, plans, high-performance accessories. Thousands of satisfied customers since 1976! Catalog \$3.

CBC INTERNATIONAL

LOU FRANKLIN/K6NH Owner
P.O. BOX 31500X, PHOENIX, AZ 85046

HamWindows

Your gateway to the world.
Software that combines the amateur radio
with a personal computer.

HamWindows, Inc., 2121 E. Pacific Coast Hwy., Suite 120C
Corona del Mar, CA 92625
(714) 729-4222 FAX (714) 644-6277

CIRCLE 345 ON READER SERVICE CARD

AMATEUR TELEVISION

GET THE ATV BUG



≥10 Watt pep
Transceiver
Only \$499

Made in USA
Value + Quality
from over 25 years
in ATV...W6ORG

Snow free line of sight DX is 90 miles - assuming 14 dBd antennas at both ends. 10 Watts in this one box may be all you need for local simplex or repeater ATV. Use any home TV camera or camcorder by plugging the composite video and audio into the front phono jacks. Add 70cm antenna, coax, 13.8 Vdc @ 3 Amps, TV set and you're on the air - it's that easy!

TC70-10 has adjustable 10 Watt p.e.p. with one xtal on 439.25, 434.0 or 426.25 MHz & properly matches RF Concepts 4-110 or Mirage D1010N-ATV for 100 Watts. Hot GaAsfet downconverter varicap tunes whole 420-450 MHz band to your TV ch3. 7.5x7.5x2.7" aluminum box.

Transmitters sold only to licensed amateurs, for legal purposes, verified in the latest Callbook or send copy of new license.

Hams, call for our complete 10 pg. ATV catalog including downconverters, transmitters, linear amps, and antennas for the 400, 900 & 1200 MHz bands.

(818) 447-4565 m-f 8am-5:30pm pst Visa, MC, UPS COD

P.C. ELECTRONICS

2522 Paxson Lane Arcadia CA 91007

Tom (W6ORG)

Maryann (WB6YSS)

WE DON'T BUILD THE MOST, WE JUST BUILD THE BEST!

- Our LM-470D is now redesigned to hold 15 ft. of antennae at 70 mph!
- Tri-Ex builds the finest in crank-up, free-standing or guyed towers.
- All towers are complete with rigid concrete base mount.

CALL
OR WRITE
FOR A FREE
CATALOGUE!

Iri-Ex[®]
TOWER CORPORATION

7182 Rasmussen Ave. • Visalia, CA 93291

Where engineering and quality come first!

TO ORDER CALL
800-328-2393

TECH SUPPORT
209-651-7859

FAX
209-651-5157

CIRCLE 22 ON READER SERVICE CARD



OWN THE WORLD'S BEST 32 VALVE, 295 H.P., LEATHER-TRIMMED BASE STATION

Add a QMS Antenna Tuner System to your SSB.

\$895.00

The QMS is an SGC Smartuner[®] automatic antenna coupler, an SG-303 extended full-range antenna, and the special exterior—waterproof—mounting package, all in one.

This is the car that ham dreams are made of. Incredibly quick, luxurious, and Q5. The secret is the QMS strapped to the trunk. Granted, it may look a bit unusual on a luxury car, but the QMS gives any mobile HF-SSB an almost unbelievable jump in reception and transmitting range (3-20 db). Match it with a cutting edge SGC HF-SSB and it will blast holes through major mountain ranges and probably some laws of physics. Power and focus are everything in HF-SSB ham rigs. Buy this and own the best luxury base station on the road.

Mounting the tuner and antenna on the outside reduces engine noise and eliminates power-draining antenna wire runs between the antenna and tuner.

QMS. It's the look of focused power.

LEARN TO LOVE THE LOOK

SMARTUNER
INSIDE

SGC

NO COMPROMISE
COMMUNICATIONS

1-800-259-7331

The SGC Building P.O. Box 3526 Bellevue, WA 98009 USA (206) 746-6310 Fax: (206) 746-6384



CIRCLE 188 ON READER SERVICE CARD

ABOVE & BEYOND

Number 23 on your Feedback card

VHF and Above Operation

C. L. Houghton WB6IGP
San Diego Microwave Group
6345 Badger Lake Ave.
San Diego CA 92119

Microwave Test Equipment

I am always asked the question, "Why is it that microwave test equipment is so expensive?" Well, most of it was made by manufacturers like Hewlett Packard, Anarden, Anritsu, California Microwave and Frequency West. The initial price tag was quite high as a Mil-Spec item, and this pricing carries over to the surplus arena. Do not despair—these items can be duplicated in an amateur workbench setting in a few cases. The difference between our home-constructed unit and the commercial unit is mainly calibration.

Inexpensive surplus microwave items can be found, but most of the surplus dealers try to push the \$\$\$ amount as far as it will go. That's part of the American way—free enterprise. I have always tried to find things for little or nothing, but even with surplus electronics there is a basic value (for scrap) that you can't go below.

The same goes for the surplus dealer. I am told many times in my bargaining and haggling over the final negotiable price that "You can't romance a junk man!" Be that as it may, these dealers seem to know when you are trying to look the part of "Joe Cool" and in reality are quite excited about some item you discovered. They seem to be able to see the sparkle in your eye and set the price accordingly. All you can do is wear sunglasses or become a good poker-face. Look for bargains and price them as to how they can benefit you without

your having to redesign the entire chassis.

Don't pick up microwave odds and ends without some plan of how to use them. Just because it's a microwave item, don't go head-over-heels for it. Set the proper pace—first determine if the item will fit in with your plan of construction. Of course, if the item is better than any other thing you have, pick it up if the price is reasonable. This is especially true of good mixers/detector mounts, amplifiers and miniature microwave relays. Other items require some thought. Even I take some of this advice and as such do not have a collection of waveguide attenuators. They're nice, but I only need one in the test setup I am about to describe.

Microwave Signal Generator

There are quite a few simple pieces that work well when assembled and form useful microwave test equipment. The general appearance of these items is not top-notch (finished) but perform their function well, are dependable and the cost is minimal. The little generator that I will describe is quite simple and is just about as effective as some of the very large microwave test generators. Its components are a Gunn oscillator, a waveguide attenuator and a coaxial transition. N6IZW and I both use this style test generator on our workbenches to retune circuitry for 10 GHz. Both low power (preamplifiers) and high power (10 watt TWT) amplifiers have been tested with this setup. My old HP 10 GHz signal generator (klystron generator) now sits idle and serves as the support for a shelf in the shack.

This little Gunn oscillator is quite useful in bench alignment tasks. When

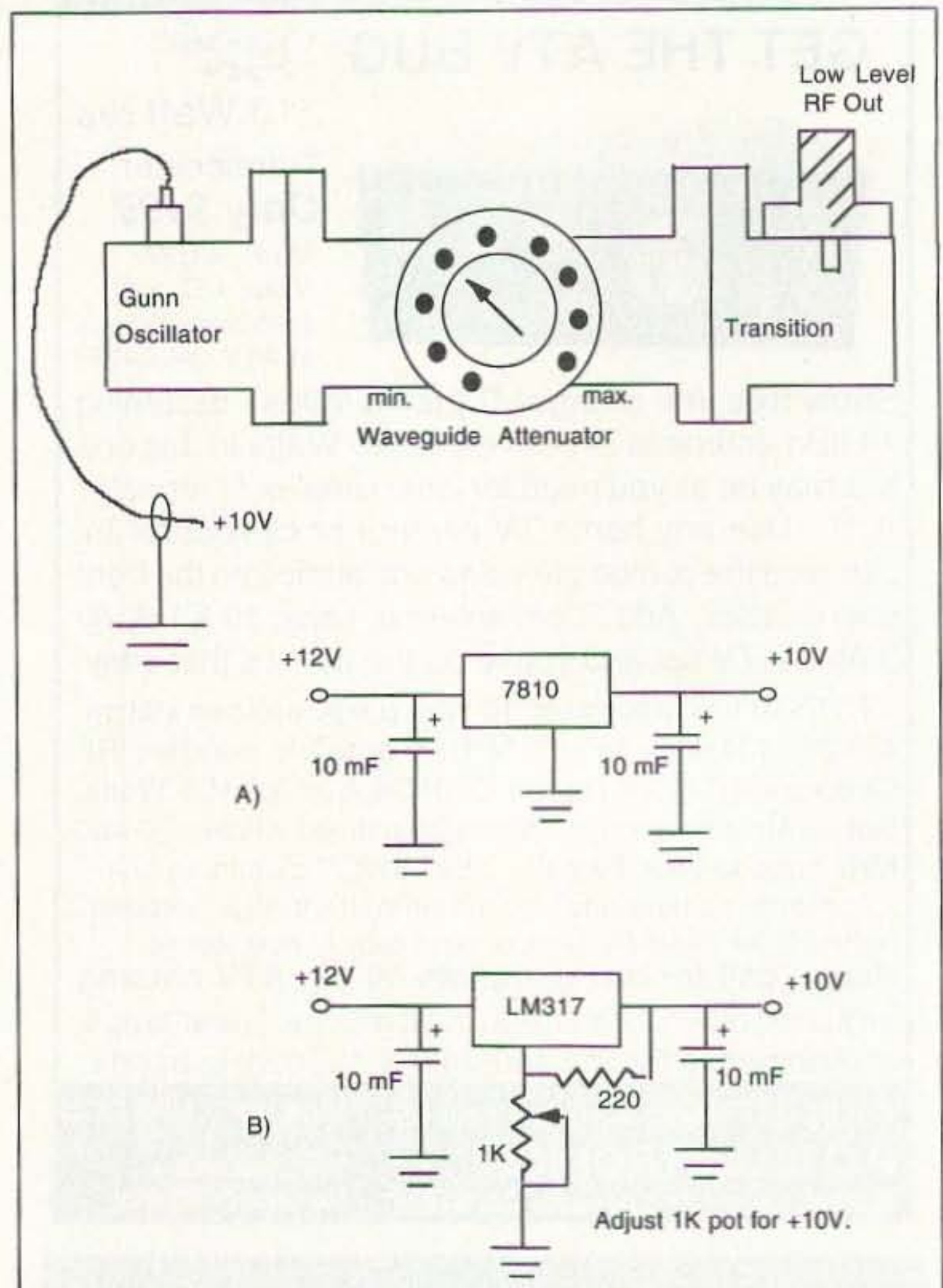


Figure 1. Microwave signal generator/Gunn oscillator power supplies: A) fixed voltage, B) variable.

you stop and think about the 75 lbs. and unstable operation of klystron signal generators, this little adjunct will prove quite attractive. The beauty of this arrangement is that almost any type of Gunn oscillator will work just fine. All you need is some means of connecting a variable attenuator and a transition to a coax connector. Power for the Gunn oscillator can be a battery or a regulated power supply; I generally use my bench-regulated power supply.

The power supply is nothing more than a 9 or 10 volt regulated supply. See Figure 1 for power supply details. A fixed regulator could be used if 10 volts is all that is needed. Some readers might have a Gunn oscillator that requires a voltage of other than 10 volts and they can optimize their circuit with the adjustable LM-317 variable regulator circuit.

The heart of the generator is of course the Gunn oscillator, preferably a low power unit about 10 mW or less. Usually these oscillators use a waveguide flange and are equipped with a small horn antenna in burglar alarm systems. Our conversion is to remove the horn and attach a small waveguide variable attenuator in its place. The output of the attenuator is connected to a waveguide to coaxial transition. This connector on the transition will be our test generator output. Photo A

shows my test generator—that's just how it was constructed many years ago. Variations in attenuator styles are not important; neither is their size. All that is required is that the attenuator be adjustable and have some means of calibration. A logging scale of some sort is quite acceptable. All you want is to be able to reduce power to a very small amount (maximum attenuation) and not overdrive small signal amplifiers with this arrangement.

Cost of components should not be over \$20 for everything. The Gunn oscillator can possibly be scrounged from a burglar alarm company for little or nothing. Check supermarkets and shopping center maintenance shops for door openers that are defective. The Gunn oscillators usually survive; toss the other PC board circuitry away. Waveguide attenuators are a drag on the surplus market and as such don't command a high price. After all, it won't amplify and, other than being scrap brass, it doesn't have much to offer. Three or four dollars seems tops for a good attenuator and adjustable mechanism. You might have to purchase some older WWII radar test set to obtain all the parts. Look around at swap meets and be frugal.

The transition from waveguide to coaxial should not cost more than five dollars in surplus. If you can't locate one, construct one out of a coaxial

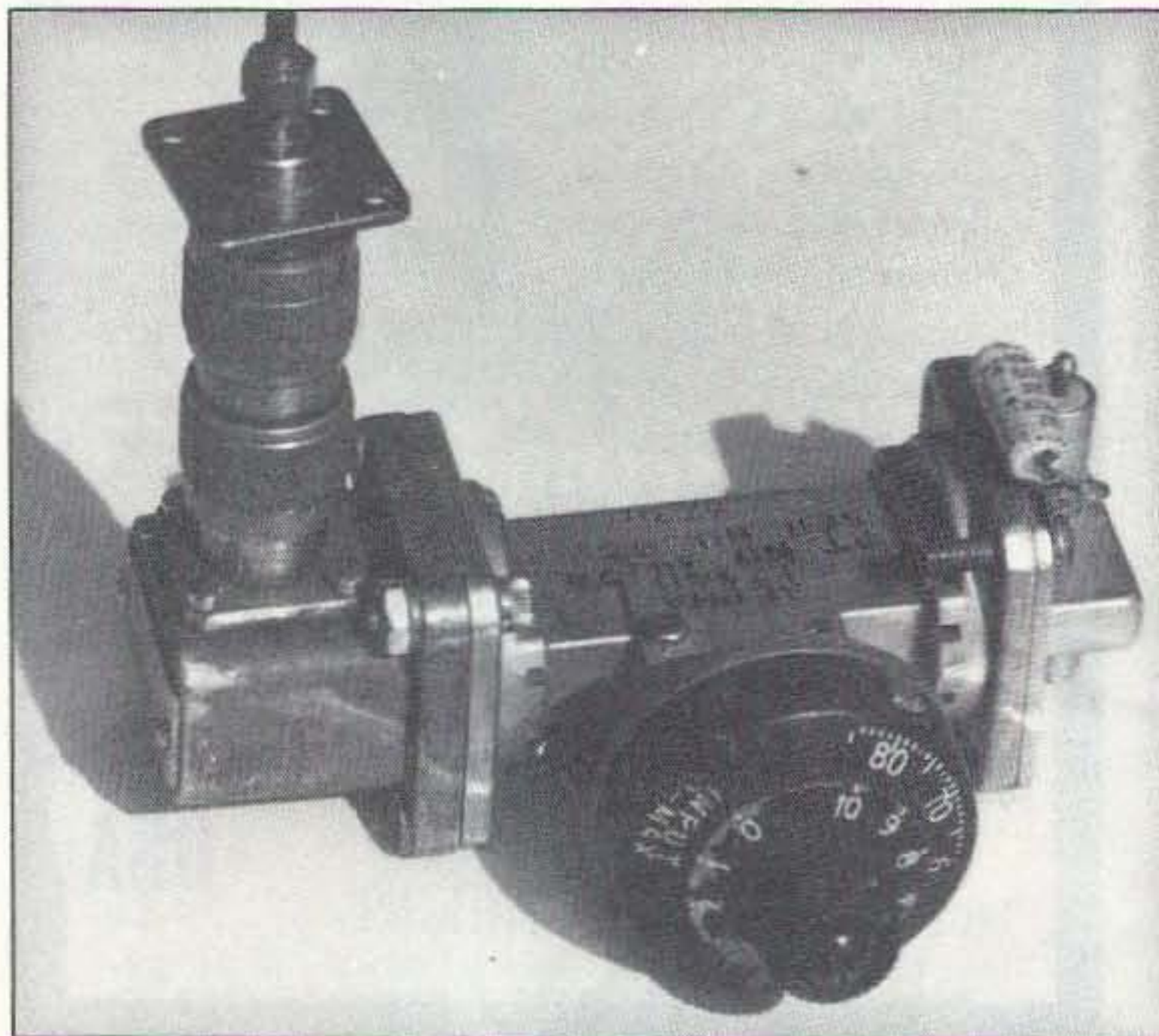


Photo A. WB6IGP's test generator.

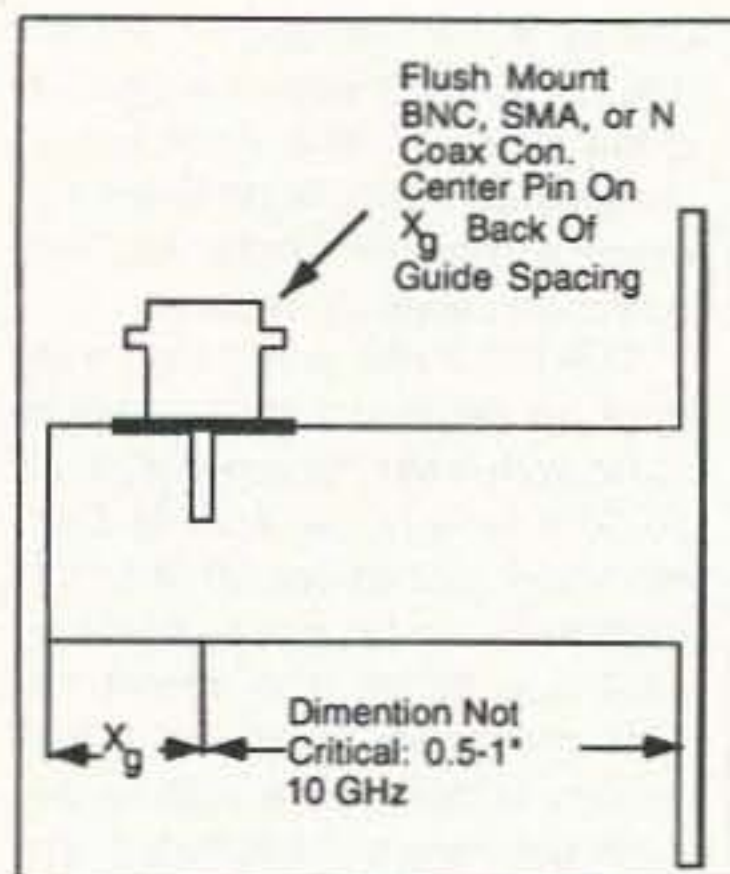


Figure 2. Waveguide transition. $X_g = 1/4$ guide wavelength at frequency. (10 GHz = 0.2")

connector and some scrap brass waveguide. Only an inch of waveguide (same size as the attenuator and Gunn waveguide flanges) is required. See Figure 2 for construction details; dimensions are not critical. Position the coaxial connector on top of the waveguide section with the rear of the connector shoulder just about at the end of the waveguide. Note where the center conductor is located on the top of the guide and drill a large hole to accommodate the connector sitting flush on top of the waveguide.

Drop in your "N" connector and solder to the top of the guide (other con-

nectors are suitable). Place a brass plate on the rear of the waveguide to close off the end of the guide and solder it into place. We want this end of the waveguide to be closed off with the center connector of the coaxial connector spaced $1/4$ wavelength from this rear wall, which is a shorted piece of waveguide (read or end of the guide). The front of the guide—the open section—is fitted with a small brass flange which is soldered into place over the end of the open waveguide. Keep solder out of the inside of the waveguide as much as possible as it's very lossy at microwave frequencies. Finish off the front of the transition by making the waveguide flange constructed "FLAT."

Don't use a file for other than rough finish of this section of waveguide. It is very important to have close tolerance waveguide sections butting up to each other without small cracks—the microwave RF will leak out of poorly-fitted flanges. To make the flange flat, place some medium sand or emery paper on a small piece of glass and rub the face of the flange on the emery-papered surface. In a very short time you'll see high and low spots that need further attention before it becomes flat. In no time at all it will look quite flat and somewhat polished. The Glass flat I use is 6" square and $1/4$ " thick. I used a thick piece of scrap so the small glass would not be

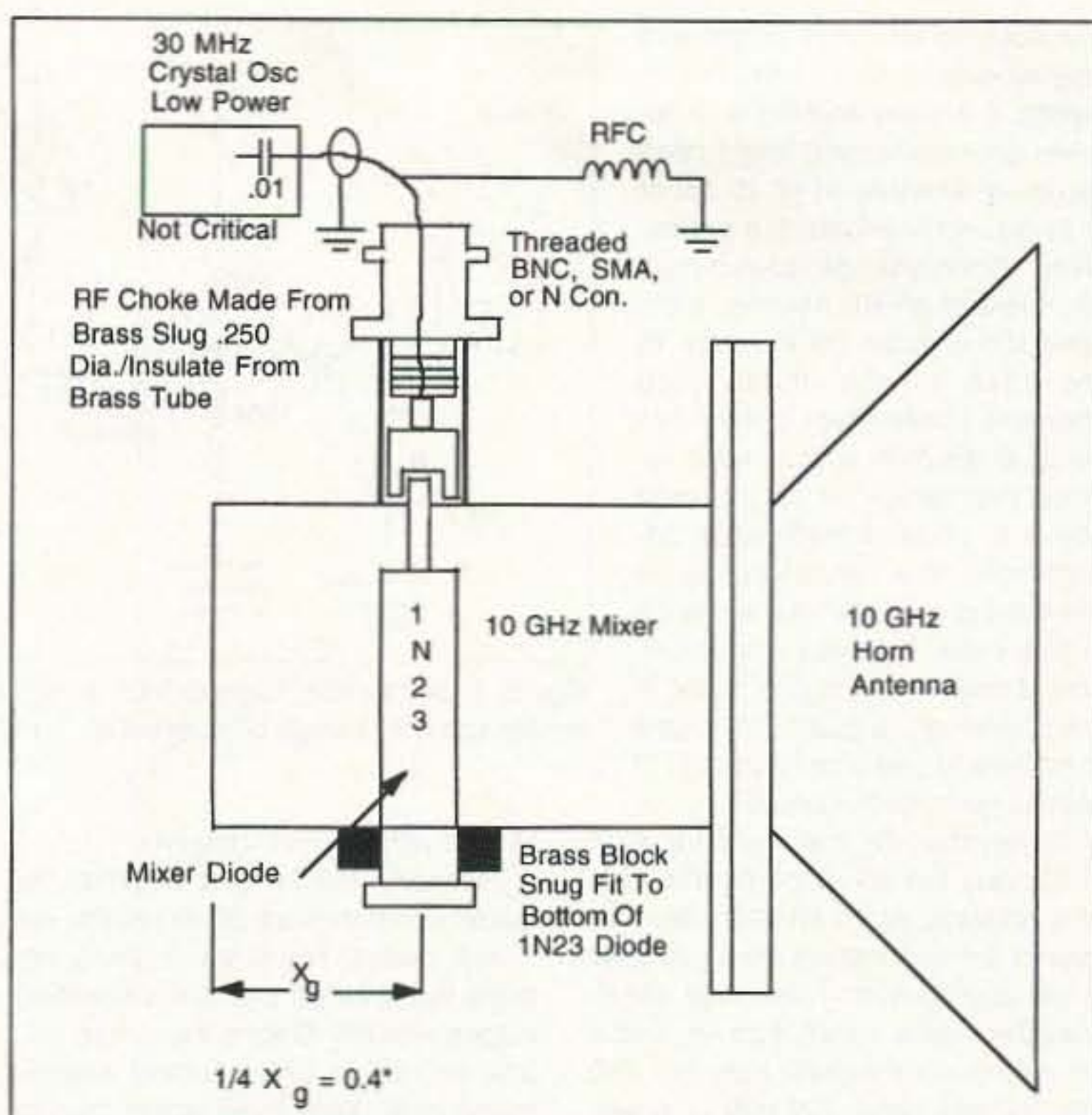


Figure 3. Microwave detector, 30 MHz "Boomerang" reflection antenna. Brass tube size to fit BNC, brass choke 0.259 long with hole to fit 1N23 diode with other end soldered to connector. Insulate with Scotch tape from brass tube, diode bottom grounded in brass block.

very fragile. Back up the glass with a piece of wood or newspaper on a tabletop.

The Gunn oscillator and attenuator and transition are all bolted together, forming the test signal source. Set the

CAT-300 Repeater Controller

Attention Repeater Owners

Finally a repeater controller with a TI voice synthesizer and full feature autopatch incredibly priced at \$299.00.

Features Include:

- ✓ Voice Synthesizer
- ✓ Twelve Voice Messages
- ✓ Two Voice Identifiers
- ✓ Full Feature Autopatch
- ✓ User Speed Dials
- ✓ DTMF Key Pad Test
- ✓ DTMF Repeater Access
- ✓ (56) Control Functions
- ✓ Remote Control Switches
- ✓ DVR Controller Ready *
- ✓ (412) Word Vocabulary
- ✓ Female Voice & Sound Effects
- ✓ CW Identifier
- ✓ Reverse Autopatch
- ✓ Emergency Speed Dials
- ✓ Programmable Courtesy Tones
- ✓ DTMF Repeater Muting
- ✓ Programmable Codes and Timers
- ✓ Hardware Logic Inputs

* (Requires MF-1000 Serial Interface Card \$59.00)

Write or Call for a brochure describing the CAT-300 Controller, including schematic, voice word list, and control functions.

CAT-300 Controller Board \$299.00 Wired and Tested

Computer Automation Technology, Inc.

4631 N.W. 31st Avenue, Suite 142,
Fort Lauderdale, Florida 33309
(305) 978-6171

ID-8 Automatic Morse Station Identifier

Compatible with Commercial, Public Safety, and Amateur Radio applications. Uses include Repeater Identifiers, Base Station Identifiers, Beacons, CW Memory Keyers, etc. Great for FCC ID Compliance.

- Miniature in size, 1.85"x1.12"x0.35"
- Totally RF immune.
- All connections made with micro-miniature plug and socket with color coded wires attached.
- CMOS microprocessor for low voltage, low current operation: 6 to 20 VDC unregulated at 6ma.
- Low distortion, low impedance, adjustable sinewave output: 0 to 4 volts peak to peak.
- Crystal controlled for high accuracy.
- Transmitter PTT output (to key transmitter while ID is being sent), is an open collector transistor that will handle 80 VDC at 300ma.
- Field programmable with SUPPLIED keyboard.
- Confirmation tone to indicate accepted parameter, plus tones to indicate programming error.
- All programming is stored in a non-volatile EEPROM which may be altered at any time.
- Message length over 200 characters long.
- Trigger ID with active high or low.
- Inhibit ID with active high or low. Will hold off ID until channel is clear of traffic.
- Generates repeater courtesy tone at end of user transmission if enabled.
- Double sided tape and mounting hardware supplied for quick mounting.
- Operating temperature range, -30 degrees C to +65 degrees C.
- Full one year warranty when returned to the factory for repair.
- Immediate one day delivery.

Programmable Features

- Eight programmable, selectable, messages.
- CW speed from 1 to 99 WPM.
- ID interval timer from 1-99 minutes.
- ID hold off timer from 0-99 seconds.
- CW tone frequency from 100 hz to 3000 hz.
- Front porch delay interval from 0 to 9.9 seconds.
- CW or MCW operation.

\$89.95 each
programming keyboard included

COMMUNICATIONS SPECIALISTS, INC.
426 WEST TAFT AVENUE • ORANGE, CA 92665-4296
(714) 998-3021 • FAX (714) 974-3420
Entire U.S.A. (800) 854-0547 • FAX (800) 424-3420



attenuator to minimum power and determine attenuator range. For instance, if you are working on a receiver preamplifier you might need maximum attenuation of 40 dB or so to prevent overloading a preamplifier. Once you get preliminary alignment of an RF preamp, more attenuation might be in order. In the case of the multi-stage preamps (three-stage), they can have 26 dB gain and as such require the minus 40 dB of input power to provide meaningful adjustments. You cannot adjust an overloaded amplifier; it's all mush in this case. It's better to under-drive a preamp or amplifier stage in the preliminary adjustment stages to be able to see small amounts of gain as you tune the circuitry.

Remember, RF preamplifiers work in the very low dB range on the input of a antenna. At 10 GHz (or any frequency for that matter) minus 105 dB is the equivalent to 1 microvolt sensitivity. Zero dB is 1 mW of power, and a 10 mW Gunn oscillator puts out +10 dB. For reference: 100 mW of power is +20 dB, 1 watt is +30 dB, and 10 watts is +40 dB. Set your attenuator accordingly to the test amplifier you are working with. I am working on retuning the Qualcomm 14 GHz 1 watt power amplifier a level of about minus 15 dB seems about right. (Amplifier boards are described in the June 1994

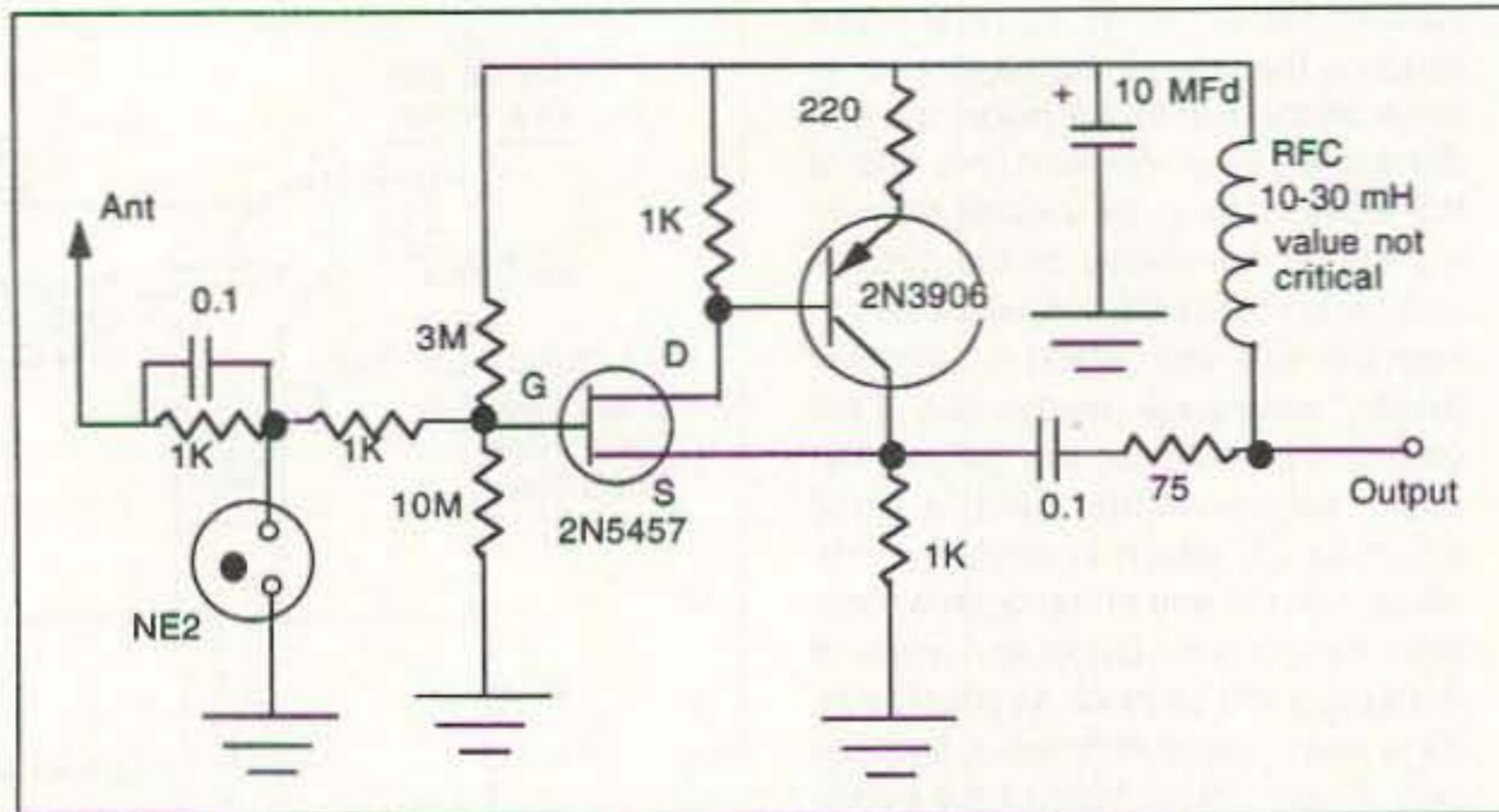


Figure 4. Schematic diagram VLF active antenna amplifier. Mount preamp at base of vertical antenna. Length of antenna is 10 to 20 feet.

"Above and Beyond" column).

Normally, the 14 GHz amplifier requires about minus 5 dB to provide full 1 watt output, but when retuning, reduce the level to prevent saturating stages with RF. Stages that are in saturation do not show tuning adjustments at all. With lower power drive in the -18 dB or so range, small tuning increments are very apparent. This is one topic I will get into next month in detail, after you have had a chance to put the test generator together. Both Kerry N6IZW and I use this method on our workbenches to align or convert circuitry for amateur use.

Diode Detector Mount

Another simple test adjunct that can be put to use in the kit of tools for microwave circuitry is the diode detector mount. This single device can be used in quite a few applications, all very useful. You can make a field-strength meter or relative power meter, or a boomerang for wideband FM test alignment. The basic detector mount is a microwave diode (usually a 1N23) housed internal to a short transition-like holder that is fitted with a coaxial connector. Usually the coaxial connector on a detector is elevated somewhat from the waveguide to al-

low room for the diode connections. Figure 3 shows a typical diode detector. The small tower contains connections between the diode and an RF choke and the connector center connector.

The RF choke is nothing more than an insulated metal sleeve made from brass. Its impedance, at 10 GHz, is very low, making it an RF choke, but at say 30 MHz it's invisible, save for a few pF of capacitance. Its job is to remove 10 GHz energy and allow the IF frequency to pass. One side of the diode connects to the bottom of the choke and the coaxial connector center connector connects to the other side. The side walls are insulated with mylar or scotch tape. I

have constructed detector mounts with copper pipe for the short tower section, drilling holes in the RF choke top and bottom to fit the top of the 1N23 and the coaxial connector center conductor. Adjust dimensions to allow the pin of the connector and the tip of the diode to make a good connection when all is held together.

Insulate the RF choke and make sure nothing shorts out the diode and RF choke connection. It's all above ground. The other side of the diode is grounded in a tight fit. Whether you purchase a detector mount or construct one, both should work well in these two applications. First, a simple

Amateur Software and Hardware for the Commodore User

ART-1

ART-1: A complete interface system for send and receive on CW, RTTY (Baudot & ASCII) and AMTOR, for use with the Commodore 64/128 computer. Operating program on disk included. **\$199.00**

AIR-1: A complete interface system for send and receive on CW, RTTY (Baudot & ASCII) and AMTOR, for use with Commodore VIC-20. Operating program in ROM.

AIR-1

\$99.95

SWL

SWL: A receive only cartridge for CW, RTTY (Baudot & ASCII) for use with Commodore 64/128. Operating program in ROM. **\$69.95**

AIRDISK: An AIR-1 type operating program for use with your interface hardware. Both VIC-20 and C64/128 programs on one disk. **\$39.95**

AIRDISK

AIR-ROM: Cartridge version of AIRDISK for C64/128 only. **\$59.95**

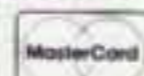
MORSE COACH

MORSE COACH: A complete teaching and testing program for learning the Morse code in a cartridge. For C64 or C128. **\$49.95**
VEC SPECIAL **\$39.95**

G AND G ELECTRONICS
OF MARYLAND

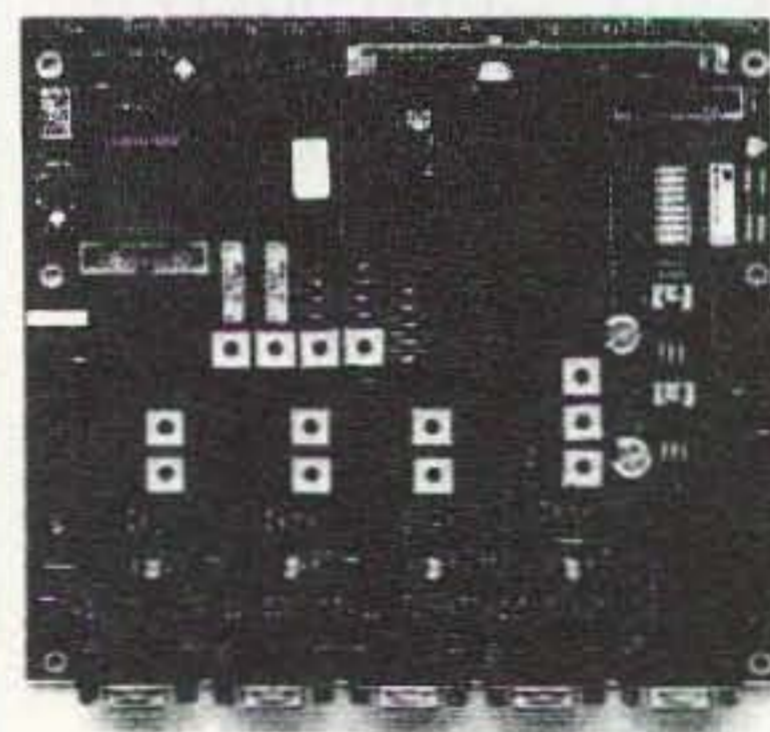
8524 DAKOTA DRIVE, GAITHERSBURG, MD 20877

(301) 258-7373



CIRCLE 169 ON READER SERVICE CARD

4 PORT REPEATER AND LINK CONTROLLER



FEATURES:

- 4-full duplex radio ports
- Optional Autopatch available
- Unique CW for each port
- DTMF control from any port
- 100 user command macros
- 300-9600 baud serial port
- 4-Layer board construction
- Priced for any groups budget

RLC-4 REPEATER CONTROLLER

Benefits:

With DTMF and serial programming features, your controller is more secure from unwanted access. Use only 1 controller at your site to control up to 4 separate repeaters/links with their own personalities and features intact. Make emergency autopatch calls with the telephone option. Only the RLC-4 can make these features available at such a low price.

ONLY \$375.00



Link Communication, Inc.
115 2nd Ave. N.E., Sidney, MT 59270

Call for information about our complete line of controllers
(406) 482-7515 (Voice) (800) 610-4085 (Orders) (406) 482-7547 (Fax)

CIRCLE 47 ON READER SERVICE CARD

detector can be constructed by placing a microamp meter from the detector output to ground. It will respond to incoming RF and give you a simple test of relative RF. For increased sensitivity, connect a single-stage amplifier for more sensitive meter indications.

A single 3130 op amp will do the job. See Figure 4 for schematic details for the amplifier stage. Construction is not critical and can be dead-bug style on the back of your meter to keep the size small. I placed mine in a small metal box to prevent stray interference, and mounted the detector on the output flange of a waveguide frequency meter. I use this setup to calibrate 10 GHz wideband FM Gunn oscillators to proper frequency.

The Boomerang

The detector mount can also be utilized to construct a reflection signal test set. It's been called the "boomerang," and in function it does just that. It reflects a microwave signal back to the source of radiation, but not like a mirror: It will translate your frequency back to your receive frequency. This assumes you are using a 30

MHz IF. If you use other frequencies, change the crystal oscillator to suit your IF frequency.

A boomerang is nothing more than a detector mount at the microwave frequency, to which is coupled a source equal to your IF frequency. In this case, using a 30 MHz IF, a simple 30 MHz TTL-type crystal-can oscillator, will work just fine. High power on the oscillator is not necessary. A feed directly from the oscillator coupled with a 0.01 μ F capacitor will work well. Tie the detector diode to ground return with a 30 MHz type RFC. The value is not critical.

What happens is that when you aim your 10 GHz wideband FM transceiver at the boomerang it detects your incoming RF and mixes it with the 30 MHz oscillator, generating a difference frequency, and reflects that mixed frequency back towards your receiver. If your receiver is sensitive enough and you have not placed the boomerang too far away, the receiver will detect it. As you make sensitivity adjustments in the receiver or antenna system you will see a higher return signal for your efforts. A single station can use the

boomerang for system sensitivity evaluation or antenna aiming tests.

Update: VLF Active Antenna

At present, several simple schematics have surfaced concerning active antennas to be used in the 100 kHz range. Figure 4 shows the simplest type—an FET input to match the very high impedance of a short wire or whip antenna at 100 kHz. The FET is connected in a Darlington configuration with a small-signal PNP transistor. The circuit is set up not for a lot of gain but rather for impedance matching of the very high impedance whip antenna.

A 100 kHz antenna with a feed impedance close to 50 ohms would be 1/4 wavelength long. At 100 kHz you would need a weather balloon to loft that piece of wire. As the length is shortened the impedance increases, and with a very short piece of wire the impedance is very high, requiring matching. The neon bulb, an NE-2, is in the circuit to short the input with high RF input surges like lightning, to protect the amplifier.

Construction is not critical. For best performance, the amplifier should be

mounted at the base of the antenna, being powered from the Loran receiver, which feeds 9 volts DC up the RF coax. An alternate antenna for a quick test is a 20-foot vertical wire or whip tied directly to the receiver. It works for a quick test if signals are strong. This is by no means the last word, but a report on one version of a active antenna for VLF use.

You might want to know why coils are absent from this design. Well, with LORAN pulse operation, any tuned circuit not broadbanded enough would impair the pulse nature of LORAN signals. In other words, a sharp filter-like circuit would cause the receiver to be inoperative.

Well, that's it for this month. In the January issue I plan to describe switching-type power supplies used to power numerous circuits requiring voltages greater than 12 volts. Circuitry will be discussed that will allow you to operate 15 to 24 volts of any polarity from a negative grounded 12 volt battery. As always, I will answer questions concerning this and other related subjects. Please send an SASE for prompt response. 73 Chuck WB6IGP. 73

INSURANCE
Computer & Radio Equipment

HAMSURE coverage follows your equipment wherever you take it. Theft from vehicles, earthquake, water damage and all other hazards including surges. Insure all your equipment and accessories (except towers and antennas but including rotors), media and purchased software.

Low Premium Low Deductible

HAMSURE
7901 Laguna Lane
Orland Park, IL 60462

800-443-6242 800-988-7702
Weekdays Evenings & Weekends

Great Circle Bearings Included

CIRCLE 78 ON READER SERVICE CARD



Handheld Repeater Controller

Spectrum Electronic Products introduces the world's first handheld repeater controller. No larger than most handheld radios, the HRC-10 converts a single or dual-band radio into a full featured simplex or duplex repeater system. Key features of the HRC-10 include voice IDer, DTMF Control and programming, hang and time-out timers, Digital Voice Operated Squelch (DVOST™), telemetry tones, and private voice mail slot.

Phone 408-438-2788
FAX 408-438-6027
\$299

CIRCLE 69 ON READER SERVICE CARD

Do you use a

JURASSIC REPEATER

then fast forward to **1994**

- Add A Digital Voice Messaging System To Your Repeater
- Leave Voice Messages For Each Other
- Get Packet Cluster Info In Voice
- Schedule Voice Announcements
- Computer Board And Software \$259

Call Toll Free For Info Package

1-800-563-5351	Toll Free From USA
1-306-781-4451	Direct
1-306-781-2008	Fax
1-306-781-2070	BBS

DIGITAL Communications Inc.,
P.O. Box 293, White City, SK, Canada S0G 5B0

CIRCLE 181 ON READER SERVICE CARD

30-300 MHZ RECEIVER



R-1283/GRC RECEIVER covers VHF in bands 30-90 and 90-300 MHz AM-FM-CW-Pulse continuously tunable; 21.4 MHz IF. Selectable bandwidths 67 or 300 KHz and 3 MHz. Solid-state; with tuning and level meters, BFO, AGC, video output and N connections. Requires 115 V 60 Hz; 3.5x19x17, 30 lbs sh.

Used-reparable \$145.00

COLLINS 30S1 POWER AMP, 1 KW PEP manually tuned for KWM-2A. Uses 4CX1000A/8168 tube (not included). "Winged" label; 200 lbs sh.

Used-not tested \$900.00

Prices F.O.B. Lima, O. • VISA, MASTERCARD Accepted.
Allow for Shipping • Write for latest Catalog
Address Dept. 73 • Phone 419/227-6573 • Fax 419/227-1313

FAIR RADIO SALES
1016 E. EUREKA • Box 1105 • LIMA, OHIO • 45802

CIRCLE 75 ON READER SERVICE CARD


Say You Saw It In
73 Amateur Radio Today

BATTERIES

Nickel-Cadmium, Alkaline, Lithium, Sealed Lead Acid For Radios, Computers, Etc. And All Portable Equipment

**YOU NEED BATTERIES?
WE'VE GOT BATTERIES!**

CALL US FOR FREE CATALOG

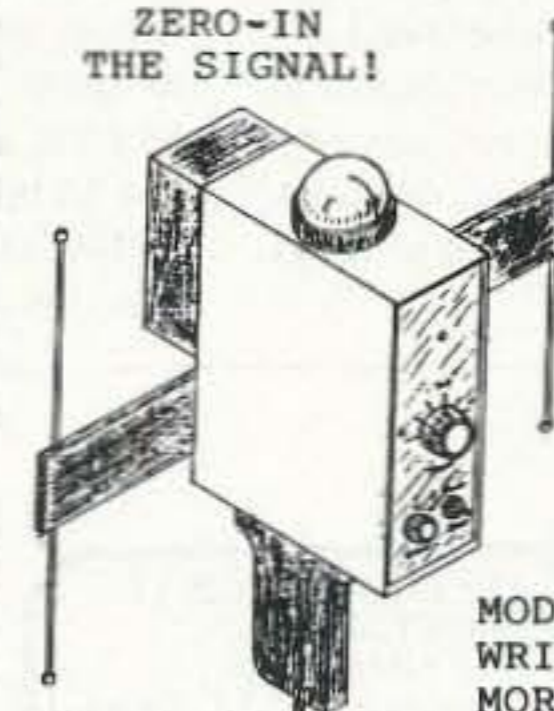


E.H. YOST & CO.
7344 TETIVA RD.
SAUK CITY, WI 53583
(608) 643-3194
FAX 608-643-4439

CIRCLE 114 ON READER SERVICE CARD

VECTOR FINDER

ZERO-IN THE SIGNAL!



HAND-HELD PHASE SENSE ANTENNAS FOR VHF DIRECTION FINDING. USES ANY FM XCVR. COMPASS GIVES DIRECTION. ARMS FOLD FOR STORAGE. TYPE VF-142 COVERS BOTH 2-MTRS & 220MHZ. OTHER MODELS AVAILABLE. WRITE OR CALL FOR MORE INFO.

\$3.50 SHIPPING & TYPE VF-142
CA. ADD TAX) \$139.95 619-

RADIO ENGINEERS 565-1319
3941 MT. BRUNDAGE AVE.
SAN DIEGO CA. 92111

CIRCLE 58 ON READER SERVICE CARD

ASK KABOOM

Number 24 on your Feedback card

Your Tech Answer Man

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

Troubleshooting Kits

Since this month's theme is kit-building, I thought it might be fun to take a look at the process of fixing those kits. At first thought, it might seem as if servicing a kit would be no different from repairing anything else. There is a difference, though, because with a piece of commercial equipment, you know that it once worked! With a kit, you have no such guarantee. Also, with factory-made gear, the quality of construction is expected to be at least fairly good. (Of course, that isn't always the case!) With kits, the construction can vary from great (you built it yourself, and you never make mistakes) to atrocious (that guy at the hamfest said the guy he got it from had a 12-year-old nephew whose friend put it together). So, how do you start when you're confronted with a dead kit?

Who Made-a da Radio?

Well, who *did* build the darned thing anyway? If you did, you're way ahead. At least you know you didn't put any parts in backwards, or make solder bridges, or leave something out, or misread the color code and put a 100k ohm resistor where a 1k ohm part was supposed to be. What, you aren't so sure about that? Surprise—you're not alone. In fact, lots of experienced, competent kit-builders make mistakes they'd be shocked at if someone else made them. It really pays to go back over the thing, step by step, until you have eliminated human error from the possibilities.

The best way is to pretend to build it all over again. Get the instructions and start from step one. OK, you don't need to inventory all the parts. It wouldn't hurt, though, because your unit's trouble could be due to an incorrect part that came with the kit. If you didn't notice it the first time, you might catch it now. And, from what I've seen and heard, most people don't bother to do the initial parts inventory anyway. So, I take it back; you *should* check that each part called for is the same as the one actually there.

OK, they're all present, but did they wind up in the right places? Inadvertent swapping of components is a big cause of kit failure. Check each part, paying particular attention to resistors, because of the color code issue. It's very easy, even for experienced techs, to make errors, especially on the multiplier band. No one is likely to mix up a 4.7k ohm resistor with a 33k, but the only difference between 10k and 100k is that the final band goes from orange to yellow. I don't know about you, but I sure have made that mistake when the light wasn't bright; the two colors just aren't that far apart.

Check also that capacitors haven't gotten mixed up. Most kits' schematics specify caps in the standard American format, such as 0.1 μ F or 100 pF. But, lots of parts come in the Japanese format and have markings like 104. What's a 104? That's a 0.1 μ F! And 103 is 0.01 μ F, and so on. Unfortunately, kits containing such parts often have no mention of the different markings in the instructions. The same problem can exist for inductors, but not that many inductors are marked using the Japanese system.

Another common cause of kit problems is reversed components. Polarity isn't an issue, of course, with resistors, non-electrolytic capacitors and most inductors. But, with electrolytics and semiconductors, it's crucial. An incorrectly oriented transistor, diode or integrated circuit just isn't going to work. With the electrolytic and the IC, the first application of power most likely will destroy the part. Transistors and diodes fare better; often, reinstalling them properly will correct the difficulty with no harm done. But not always. If you see or smell smoke, expect to need some new parts. There's a big secret the manufacturers don't tell you: Electronic parts run on smoke. Once you let it out, they don't work anymore!

If all the parts are in the right places and correctly oriented, why the hangament doesn't this thing work? Well, the number one cause of all kit problems is poor soldering. It's not hard to learn to solder, but many people just never take the time to learn, or they have no one to teach them. As the number of technically inclined Americans dwindles, the lack of Elmering is getting to

be a serious problem.

So, go over the kit, joint by joint, looking for cold solder joints and, especially, solder bridges. You'll almost never find a bridge in commercially-built equipment, but kits are very prone to this problem. There are three reasons. First, manufactured gear is wave-soldered, not hand-soldered. It's a much more controlled process and, in conjunction with the solder masking on the boards, makes bridges nearly impossible. Second, many kits have little or no solder masking, exposing much more copper to the likelihood of a bridge. Finally, many people don't have the manual dexterity to solder today's tight boards, or they're just plain careless.

Once you're sure the kit is properly soldered, you should be in business. If it still won't work, you're left with some analysis. If you built the kit, then you know its history. If it worked at first and then died, you've got a standard troubleshooting case on your hands. If, though, it never worked, then you can assume a mistake somewhere. Sometimes, those errors can be pretty obscure.

Oops, a Mistake

I remember one rather complex Heathkit I put together years ago. It had lots of ICs in sockets. I was very careful over the many hours of construction, and I sure was disappointed when the darned thing wouldn't work properly. After lots more hours of oscilloscope troubleshooting, I found that some of the IC pins weren't making contact inside the sockets. Turns out I had used a little too much heat when soldering them, causing some of the plastic inside to melt and form a film around the little metal receptacles for the pins. Some new sockets fixed it all up. Was it my fault? Maybe, but I'll never be sure. Perhaps they were overly cheap sockets intended for wave soldering. I don't know.

While I'm strolling down memory lane, I recall another kit I made. This one smoked big time when I plugged it in. I was very upset, assuming I'd done something terribly wrong. It turned out that the power transformer was completely shorted. A call to Heathkit brought another transformer in a couple of days (how's that for service?), and the unit worked fine. I miss those people.

I Didn't Do It

If someone else built the kit, you

have no idea whether it ever worked. For that reason, I often avoid buying used kits at hamfests. But, if you do buy one, take a good look at it. If it's very new but doesn't work, it's a safe bet it never did. If it's older, it probably did work at one time and died later. Also, the quality of construction should be obvious. If the soldering looks lousy, or the unit is covered with yellow tobacco tar, you're in for a real job. (I don't know why those two things so often go together, but I've seen it time and again. Perhaps people who won't take care of their own bodies also don't take care of their equipment.)

Whether the kit ever worked or not, consider that it may have been improperly adjusted. That's especially true with radio equipment, which often has lots of oscillators and tuned circuits to adjust. Even in commercial gear, the consistency of adjustment leaves a lot to be desired. With home-built gear, it's almost a given that the thing will be at least somewhat out of whack. So, while I always strongly suggest that people not diddle with their commercial radios' adjustments, the opposite is true with kits, especially when you don't know their origin. Some of those old Heathkit receivers can seem quite dead if they're out real far, and a few quick turns of some coil slugs can bring them back to life in a jiffy. But, don't start doing that unless and until you are quite sure nothing else is wrong. Also, don't do it unless you have the manual and whatever test equipment is required to set things right. Otherwise, you run a great risk of making things worse than they already are, with no way to undo the mess.

Do It!

If you've never home-brewed anything, a kit is a great way to start. Even if you've built lots of things, kits can be fun, and they also can get you things you want at reasonable prices. In particular, there's lots of QRP gear available in kit form, and it's very nice. Frankly, if I wanted a small QRP transceiver, I'd rather build one from a kit than start from scratch. What the heck, why reinvent the wheel when somebody else has already figured out a good one?

So, I wholeheartedly recommend kits. Just remember, when you're faced with a broken one, some of the troubleshooting rules are different. Until next time, 73 de KB1UM.

"ONLINE" U.S. & INTERNATIONAL
CALL DIRECTORY
OVER A MILLION CALL SIGNS
Hamcall online service gives you ALL hams
via your computer & modem. Updated each
month! Only \$29.95 per year. Unlimited use -
24 hours a day - you pay for the phone call.
800:282-5628 * 703:894-5777 * FAX 703:894-9141

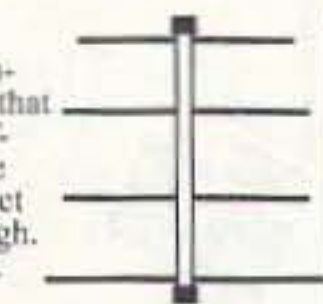
Route 4, Box 1630
Mineral, Virginia 23117
Internet: info@buck.com

CIRCLE 7 ON READER SERVICE CARD

Fox Hunting Yagi?

Hold it in your hand—it's a walking stick
made of aluminum with rubber ends. But inside
are all the elements of a 4 element yagi that
goes together in 2 minutes. Ready for the T-
Hunt. Ready to get your signal out of a hole
into the repeater. No little bits to drop and get
lost. Everything fits clean and tight and tough.
2meters \$79, 70 cm \$49. Weighs only 1 lb.
Add \$6 Shipping & Handling. Info \$1.

AntennasWest
Box 50062-S Provo UT 84605



Order HotLine
801 373 8425

CIRCLE 324 ON READER SERVICE CARD

THE
ISOTRON
COMPACT ANTENNAS FROM 160-10 METERS

NO TUNERS
NO RADIALS
NO RESISTORS
NO COMPROMISE

FIVE EXCELLENT REVIEWS JUST
DON'T HAPPEN BY CHANCE
CALL US FOR A FREE CATALOG.

*See review in Oct. 73, 1984 *Sept. 73, 1985 *March 73, 1986
CQ, Dec. 1988 Mar. W.R. 91

BILAL COMPANY
137 Manchester Drive
Florissant, Colorado 80816
(719) 687-0650

CIRCLE 42 ON READER SERVICE CARD

ADVERTISERS

R.S.#	page	R.S.#	page	R.S.#	page	R.S.#	page
• A & A Engineering	82	• CABLE X-PERTS, INC.	85	234 Lentini Communications	31	• Rayovac	5
18 A.S.A.	17	• CB City International	66	47 Link-Com	70	254 Ross Distributing	39
18 A.S.A.	57	265 Chipswitch	66	• Maggiore Electronics Lab	82	• RT Systems	38
351 Absolute Value Systems	17	186 Coaxial Dynamics	77	• Meadowlake Corp.	17	32 S & S Engineering	73
164 Ace Communications of Indianapolis	59	156 Commpute Corporation	84	86 MFJ Enterprises	11	• SAMS	38
149 Advantage Instruments Corporation	2	99 Communication Concepts	85	86 MFJ Enterprises	29	153 Satellite City	88
281 Agrelo Engineering	84	10 Communications Specialists, Inc.	69*	86 MFJ Enterprises	37	• Schnedler Systems	64
194 All Electronics Corporation	81	268 Computer Automation Technologies	69	86 MFJ Enterprises	49	36 Scrambling News	85
• Alphalab	83	15 Comtelco	84	160 Micro Computer Concepts	61	167 Sescom, Inc.	44
76 Amateur Networking Supply	38	274 Comtek	60	144 Micro Control Specialities	53	188 SGC Inc.	67
• Amateur Radio Excellence	75	181 Digital Communications	71	30 Micro Video Products	82	250 Software Systems	64
113 Amsoft	82	• Down East Microwave	17	193 Morse Tutor Gold	75	244 Software Systems	31
57 Antennas West	41	114 E. H. Yost	71	248 Motron	42	51 Spectrum Communications	13
340 Antennas West	46	8 Elktronics	84	64 Mouser Electronics	53	69 Spectrum Electronics	71
380 Antennas West	55	75 Fair Radio Sales	71	114 Mr. Nicad	71	183 Spectrum International	50
324 Antennas West	72	169 G & G Electronics	70	47 NCG	43	247 Startek	1
135 Antennas West	81	193 GGTE	75	25 Novatech Instruments	38	• The Ham Center	17
275 Antennas West	82	280 Grove Enterprises	47	1 Number One Systems Ltd.	63	384 The Ham Contact	57
349 Antennas West	83	348 Grove Enterprises	55	82 Oak Hills Research	63	384 The Ham Contact	78
332 Antennas West	84	• Ham Radio & More	27	96 Orlando Hamcation	59	269 Tigertronics	65
5 Antennas West	85	286 Hambrew Magazine	36	321 Patcomm Corp.	15	374 TNR	31
• Antique Radio Classified	83	78 Hamsure	71	• P.C. Electronics	42*	11 Transel Technologies	40
80 Arrow Antenna	55	• Hamtronics, Inc.	7	• P.C. Electronics	67*	11 Transel Technologies	51
16 Astron Corporation	19	345 HamWindows	66	• Peet Bros.	83	22 Tri-Ex	67
27 AVCOM	58	187 Harlan Technologies	52	68 Periphex	40	50 Tropical Hamboree	35
272 Azden Corporation	59	293 IC Engineering	85	198 Personal Computer Repeater Controller	85	• Uncle Wayne's Bookshelf	86, 87
21 B & B, Inc.	55	179 Icom	CV2*	• Personal Database	36	32 Universal Electronics	73
• B B & W	46	283 Innotek	52	249 Phillips Industries, Inc.	60	• Universal Radio	17*
41 Barry Electronics Corporation	23	42 Isotron	72	311 Pioneer Hill Software	61	102 UNV Safety Belt	61
42 Bilal Company	72	55 J-Com	45	49 Polyphaser	28	• Vanguard Labs	36
45 Bonneville Music	51	228 Jade Products	52	145 QSO Software	43	• Vanguard Labs	44
56 Buckmaster Publishing	17*	240 Jan Crystals	77	257 Quorum Communications	25	259 Versatel Communications	84
7 Buckmaster Publishing	72*	285 JPS Communications	20	147 R.L. Drake Company	9	104 Vis Study Guides, Inc.	83
168 Buckmaster Publishing	31*	• K-Comm	17	110 Radio Amateur Satellite	53	191 W & W Associates	57
• Butternut Electronics	50	2 Kawa Productions	81	58 Radio Engineers	71	38 W9INN Antennas	82
222 Byers Chassis Kits	83	151 KDC Sound	60	• Radio Fun	73	• Yaesu Electronics Corporation	CV3
184 C & S Sales, Inc.	61	• Kenwood USA Corporation	CV4	• RAI Enterprises	81	268 Zero Surge Inc.	44
				34 Ramsey Electronics	21*		

Great Gift Ideas!

The Advertisers in this issue are available to help you with your Holiday Shopping! Call them Today!

Radio Fun

"The beginner's guide to the exciting world of amateur radio."

Radio Fun is packed full of information to help you get more fun out of amateur radio. Basic "how-to" articles will get you up and running on packet, ATV, RTTY, DXing, and the dozens of other activities that make amateur radio such a great hobby. You'll get equipment reviews geared toward the newcomer. We'll help you upgrade to a higher class license with monthly columns

designed to teach you what you need to know in a fun and exciting way. You'll find it all, and more, in the pages of *Radio Fun*.

Don't wait another minute. Subscribe today for only \$12.97 for one year. That's 12 issues of the only ham magazine that is geared especially for the newcomer, or any ham who wants to get more fun and excitement out of amateur radio — *Radio Fun!*

COAX-SEAL
"The Original Connector Sealant!"

The Only Material That Will Adhere to Polyvinyl or Vinyl Outer Coax Jackets!

- Forms around and seals odd-shaped fittings.
- Non-contaminating and non-conductive.
- Wide ambient temperature range (-30° F to +180° F).
- Stays flexible for years insuring moisture-proof connections.
- Reusable—quick disconnection and resealing with same material.
- A must for satellite TV—microwave work.
- Hundreds of uses.
- Moistureproofs all connections.

EVERY LNB AND COAXIAL CONNECTOR NEEDS COAX-SEAL

Trial packet for 4 connectors - \$1.00 ppd.

UNIVERSAL ELECTRONICS, INC.
4555 Groves Road, Suite 12 Columbus, OH 43232
Phone (614) 866-4605 • FAX (614) 866-1201

CIRCLE 32 ON READER SERVICE CARD



12 issues for only \$12.97
1-800-257-2346

YES! Sign me up right now! 12 issues of *Radio Fun* for \$12.97.

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Check _____ MC _____ Visa _____

CARD # _____ EXPIRES _____

Class License _____ Year Licensed _____ 73 Subscriber _____

QST Subscriber _____ CQ Subscriber _____

Mail to: *Radio Fun*, P.O. Box 4926, Manchester, NH 03108
[Or Call 800-257-2346 (in NH Call 625-1163), FAX:603-669-2835]

Canada add \$7.00 plus .70 GST. Foreign add \$12.00 surface, \$36.00 airmail. Newsstand Rate \$18.00. Basic subscription Rate \$14.97.

Arnie Johnson N1BAC
c/o 73 Magazine
70 Route 202 North
Peterborough NH 03458

Notes from FN42

It's that time of year again as I sit down to write this month's episode, my semiannual pilgrimage to Hosstraders in Rochester, New Hampshire. It's a happening, a fun time, time to greet old friends and meet new ones, check out the new gear and the old "boat anchors," and wish that you had brought more money for those treasures that they just don't make like that anymore.

It's an outdoor event, with the commercial interests located inside buildings. It can be hot (in the 80s or 90s in May) or below freezing at night in October. The sun can be shining brightly all day (bring the sunscreen), or there may be blowing rain, sleet, or snow. It doesn't make any difference—there will be thousands of dedicated hams lining up at the gates to enter.

And last, but not least, one of the best reasons to attend is that all the proceeds (beyond expenses) go to the Shrine Hospital in Boston. All entrants give the money directly to the Shriners at the gate, and many of them are your fellow hams.

Before we continue on to the latest in the happenings around this great world of ours, my hearty congratulations to Hans van de Groenendaal ZS5AKU for his appointment as the IARU Satellite Adviser. Hans has contributed information from South Africa as 73 Ambassador and as a satellite contributor. I'm sure that he will do a great job for all of us in this post.

More news next month from Lorbie DU1CHD, Cho Byong-Joo HL5AP, and whatever else shows up in the mailbox.

Roundup

Australia Submission by Richard Murnane VK2SKY: "DX-ING WITHOUT PREJUDICE" or "The Carefully-Worded QSO."

I cast a bloodshot eye toward the station clock. 18:35 UTC. Just gone half-past four in the morning. I couldn't let go, not just yet.

It had been a good night for DXing. Despite the generally declining conditions, 20 metres had been open to all continents, and I had made the most of it. Several hundred logbook entries, each harder to read than the one before, but there would be a good haul of QSL cards out of that lot. Not bad for one night's work.

As dawn approached, the bands had closed, and my eyes felt ready to do the same. My last CQ had gone unanswered, and a final listen around the band turned up nothing but background noise, hushing me to sleep . . .

As I reached for the power switch, a

lone voice appeared, calling in the wilderness. Had it been something mundane, like a JA or a W6, I would probably have let it go, but it was an unfamiliar prefix: L1. Now, where the heck was L1? Perhaps one of those new Yugoslav republics . . . I'd check later. Hmm, and he was operating portable. Not a bad signal, considering. I returned his call.

"L1TIG/8, this is VK2SKY. You're five by four in Sydney, Australia, over."

"VK2SKY, I think it was, you are five by three here. The name here is . . ." He broke off. After a long pause, he came back again, somewhat hesitantly, "umm, I mean, without prejudice, your signal is five by nine, I think."

This took a moment to sink in . . . there was no fading on the band, so the dramatic change in the report was a bit of a surprise. But that curious phrase, without prejudice, what did he mean by that? Perhaps I had misheard him. I resorted to the old trick used by every Amateur who gets caught not paying attention; I blamed it on QRM. Before I could pick up the microphone again, another station came on the air.

"Break—This is L1BEL . . . the VK station, you're a good 59+20dB at my QTH. It appears that the other L1 is experiencing a temporary technical problem with his station. I can see no other reason for his allegation that your signal was any less than perfect, old man . . ."

For a moment, I was speechless. Then, yet another new prefix, a CØ, broke in.

"Break—I object to the age-ist and sexist language used by L1BEL . . . 'old man', indeed! The VK, if you wish to pursue the matter through the courts, I think you have the makings of a pretty solid legal case . . . CØURT on the side."

I had no idea what the last station was on about, but I was suddenly wide awake, frantically searching for my pen to write down all these new callsigns. I scrambled among the callbooks and notepads before I finally found it. I started scribbling, but as Murphy would have it, the pen wouldn't write.

"All stations from VK2SKY, please stand by, my biro isn't working . . ."

Suddenly, all three DX stations howled back in unison, **THAT'S DEFAMATORY!**

I blinked, several times. What had I said?

A new voice chirped up (D3FAM, I think), "You should be aware that 'Biro' is a registered trademark. Your inference that the products made by that company are defective in any way leaves you wide open to prosecution under international law. What kind of Amateur are you, anyway?"

"I . . . I . . ." What answer can any Amateur give to that one?

"D3FAM from CØURT, just what are you implying? Your last comment has defamatory implications as well, so watch your step."

"Hey, you can't threaten me on air—that puts you in breach of ITU regulation number . . . um . . . hang on, I've got a copy of them right here. Stand by one . . ."

"L1BEL here. I think we're getting off the track . . . We haven't resolved the issue of L1TIG/8's derogatory signal report to the VK station. It implies that the VK's ability to maintain the technical standards of his station is less than satisfactory, not to mention the totally unjustified criticism against . . . uh, the VK, what make of rig are you using there?"

"Yaesu," I replied, as a dull throbbing developed around my temples.

" . . . yes, against Yaesu. Now we all know the good standing of Yaesu in the area of field of Amateur communications, but here we have L1TIG/8," he paused for breath, *allegedly* saying words to the effect that the VK's equipment is performing badly, due to some unspecified failure of the manufacturer to adhere to generally accepted principles of industrial quality control, and/or the failure of the VK station to operate the equipment in accordance with the manufacturer's directions. It appears that L1TIG/8 is calling the VK an idiot and, in my opinion, the VK has an excellent case . . ."

"Hey, look, I never sa . . ."

"Charlie Alpha Five Echo here—did somebody call me?"

"Hey, CA5E's jamming the L1 station. There's potential there . . ."

"You mean, it appears that CA5E is jamming . . ."

"Yes, of course, thanks for that . . ."

"No problem. I'll send you my bill."

"Get lost! I didn't ask for your advice."

"True, but you *accepted* it. By implication, we have a contract . . ."

"We do not!"

"L1BEL from TØRT, it sounds like he's calling you a liar, and we all know that . . ."

Once again, they all chorused, **"THAT'S DEFAMATORY!"**

"Hey everyone, I've got a JA on the packet cluster who says he works for Yaesu's legal department . . ."

"Allegedly works for . . ."

"Before I acknowledge that last station, how much is it going to cost me? . . ."

"Break from TR1AL . . . can I remind you all that it's illegal to conduct business on the Amateur bands?"

I felt I was now on shaky legal ground coming back on the air . . . for a while, I considered taking legal advice, but it was still too early in the day to call my solicitor. Instead, I lapsed into a troubled sleep. When I awoke, 20 metres was once again a jungle of static.

Later that day, I finally threw away my copy of *The ARRL Handbook*, and took out a subscription to *The Australian Lawyer*.

[The end—usual disclaimers, all callsigns (except mine) are fictitious,

any similarity, etc., etc.]

Sent in by Richard Murnane VK2SKY, 7/15 Grafton Crescent, Dee Why 2099, previously published in his local ham rag, "Amateur Radio Action."

Taiwan FAX from the Chinese Taipei Amateur Radio League (CTARL): We are very pleased to announce that the 1st club radio station is now available in Taiwan by CTARL Hq. The callsign is BV5Y. QSL via CTARL Bureau, PO Box 73, Taipei 100, Taiwan, R.O.C. 73 de Bolon Lin, BV5AF, President of CTARL.

USA Downloaded from the WA1YTW Packet BBS:

From: K5ARH@K5ARH

To: SAT@AMSAT

Subject: IARU APPOINTS SATELLITE ADVISOR

HR AMSAT NEWS SERVICE BULLETIN 274.01 FROM AMSAT HQ

SILVER SPRING, MD OCTOBER 1, 1994

TO ALL RADIO AMATEURS BT

IARU Appoints Satellite Adviser

In a news release dated 26-SEP-94, the International Amateur Radio Union (IARU) announced that it has appointed Hans van de Groenendaal (ZS5AKV) [73 Ambassador to South Africa and regular contributor] to the newly created post of IARU Satellite Adviser. According to the IARU release, the principal task of this position will be to keep the IARU Administrative Council informed on all technical and operational aspects of the Amateur Radio Satellite Service in order to enable the Council to adopt appropriate policies to advance the interest of the Amateur Satellite Service before the International Telecommunication Union (ITU) and regional telecommunications agencies.

The IARU release noted that ZS5AKV, as past President of Southern African AMSAT and an Executive Committee member of IARU Region 1, brings many years of satellite-related experience to this appointment. The IARU release further noted that the appointment is a direct result of recommendations made to the IARU Administrative Council by the IARU Ad Hoc Satellite Advisory Committee, which took up the interim report at the recently completed IARU Administrative Committee meeting in Singapore. The IARU release commented that this action is "tangible proof" of the IARU's interest and involvement in the Amateur Satellite Service.

The release continued by citing IARU's many-year role in protecting the Amateur Satellite Service, in particular its work during the 1979 World Administrative Radio Conference, which led to most of the present Amateur Satellite Service frequency allocations.

The IARU release also stated that the "exponential development of new technologies and ever increasing complexity of the Regulatory Agencies, the IARU Administrative Council deemed it necessary to involve itself closer with the Amateur Satellite Service in order to represent it effectively on a coordinated world-wide basis while cementing its relationship with the AMSAT and other

Amateur Radio Satellite groups."

In the release, the IARU said that in his new capacity and by the powers delegated to him by the IARU, ZS5AKV will have the task of appointing someone to the post of IARU Satellite Frequency Coordinator.

The IARU said that ZS5AKV is now soliciting nominations for volunteers willing to serve the function of IARU Satellite Frequency Coordinator. Such nominations should be sent to him by FAX at +27-31-765-6456 or via INTERNET at amsat@uctvax.uct.ac.za before 31-OCT-94. Hans said that each nomination should include a comprehensive summary of the nominee's background and qualifications. He stated that it is his intention to discuss the various nominations with major AMSAT groups in order to seek their recommendations. He underscored the importance of finding the right person to be appointed to this very important job.

AUSTRALIA

David Horsfall VK2KFU
P.O. Box 257
Wahroonga NSW 2076
Australia

The "hot news" in Australia is that licence fees are no longer payable for CB Radio (known more formally as the Citizens Radio Service). What has this got to do with Amateur Radio? Well, it seems that the regulatory body—the Spectrum Management Agency (SMA)—has to make up the shortfall somehow, and rumours are abounding that all "fixed" radio sites (e.g. Amateur repeaters) will attract a fee of AU\$800! Naturally, I will report on subsequent news in a future column.

There is some concern that offensive and possibly defamatory messages can be distributed via the packet radio system, and it appears that the "Sysop" of every BBS in the path can be held responsible. The Wireless Institute of Australia (WIA) is looking at this problem, with a view to making a recommendation to the SMA (before they do it for us). It is likely to involve some form of authentication at the originating BBS, and the system in the USA (where only the first BBS is responsible) is being looked at. It is a shame that such measures are deemed to be necessary, but it seems to be a reflection of society as a whole.

Cheers for now. Those with access to packet or Internet can contact me as "VK2KFU @ VK2AAB.SYD.NSW.AUS.OC" and "dave@esi.COM.AU" respectively.

PEOPLE'S REPUBLIC OF CHINA

Rick Nui BZ1QL
Room 316 Building 25
Tsinghua University
Beijing 100084
People's Republic of China
KATMANDU . . . A goodwill package

of RTTY Digital Journals was airmailed to the Nepal Amateur Radio League (NARL) from TUARC in early August, relaying our "good luck" message to the developing 9N1 amateur community. Satish 9N1AA has been active on Factor these days and is also the key person getting things going in NARL. He can be reached via digital as 9N1AA @ JA5TX.JPN.AS or by airmail at PO Box 4292, Katmandu, Nepal.

HAM EXAM . . . The first-ever national Amateur Radio License Examination was held July 10 and 17 in Beijing, Shanghai, and other big cities. Thousands of people participated in the exam, and every testee must be a formal member of CRSA, the Chinese Radio Sports Association. Four different classes of licenses are available this time, with Class 3 (CW/SSB) the highest. A good number of BG licenses may be released soon.

AMP & MIKE . . . Right now we are in dire need of a 70cm amp for satellite uplink and a Yeasu microphone that fits the FT-726R transceiver. Both amp and mike presently used are malfunctioning and are hard to repair. We would appreciate your aid or donation to help China obtain a satellite of better quality.

STATS . . . As of September 3, 1994, BY1QH has worked a total of 309 stations in 37 countries on satellites.

TUARC can be reached via any of the following paths: Pager—204-6677 beep 5552 (local only); Digital—BZ1QL @ JA5TX.JPN.AS; Internet—bz1ql%ja5tx@bbs.arasmith.com or bz1ql%ja5tx@bbs.lbc.com.

MONACO

Daniel Plett 3A2LZ
B.P. 349
MC 98007
Monaco

Greetings from Monaco. This summer has seen a wide variety of ham

activities in the Principality, especially with visiting amateur radio operators. F1IXQ and F1RWD came and very ably ran a long weekend of satellite operations from Monaco. They were fortunate enough to have a friend from their CB days who had somewhere to put some antennas. In spite of tall surrounding buildings and quite noisy conditions, they kept a reasonable rate of QSOs flowing. They had a rather attractive QSL card printed for the occasion.

OE7HPI came and operated mobile, handing out QSOs on 40 and 20 meters. W5ZPA came with the intention of operating RTTY and helping a number of U.S. hams add Monaco to their list of countries worked on RTTY. Unfortunately, he was not able to get the gear operating correctly on RTTY and resorted to operating some SSB and CW.

When Monaco hams visit the U.S. we are always asked for three types of contacts: 1) Monaco on top band; 2) a YL contact; and 3) a RTTY contact. Top band is quite difficult, primarily because it is difficult to put up any kind of antenna for 160 meters. There are a few 3A hams who have RTTY gear, but to my knowledge, I am the only one active on RTTY. A YL contact is another story. Most of the YLs licensed in Monaco have VHF-only tickets. The few

who have full privileges don't like the heavy pileups when they operate. For a long time I have offered European YLs help getting on the air here if they come. It looks now as if a YL from the U.S. will come and operate for a little while towards the end of October.

Finally, I regret to inform you of the death of Jean Bardos 3A2EE. "Echo Echo" was one of Monaco's best-known hams and was very active on a wide variety of modes. He was a long-time member of the council of the A.R.M. and will be deeply missed. Best 73!

WANT TO LEARN CODE?

Morse Tutor Gold is the answer for the quickest and easiest way for beginners and experts alike.

From the moment you start the easy and speedy self loading procedure to the day you reach your goal, **Morse Tutor Gold** will gently coach you through the learning process.

Since 1987, GGTE has guided nearly 20,000 hams and prospective hams around the world through proven structured lessons and a variety of character, word and conversation drills. Straight forward menus make the process simple and fun.

You select the characters and **Morse Tutor Gold** will prepare a random character drill with those characters. **Morse Tutor Gold** makes it easy to create your own drills or import text files. You can now type what you hear or copy by hand and see, one line at a time, what the computer sent or what you typed. Pick the Farnsworth or the standard method; select the tone frequency most comfortable for you or select your code speed in tenths of a word per minute.

You are always in command.

Morse Tutor Gold uses your internal speaker or sound board (certified by Creative Labs for all Sound Blaster products). And, if you use a sound board the program supports volume control.

Get the software the ARRL sells and uses to create practice and test tapes. Morse Tutor Gold is approved for VE exams at all levels.



Attention Morse Tutor and Morse Tutor Advanced Edition registered users. Make sure we have your current address. Special upgrade offers will be mailed shortly. Don't miss out

"Bought it on Friday-passed my 5 words on Sunday". A Peters "Great program-does all it was said to-it was loaded and in use within 15 minutes of its arrival. Truly user friendly." KD6MYL "Better than my wildest expectations! Sorry I didn't have it years ago. It's much better than any code tapes." KB6YNR "By far the best Morse Code program I have ever seen! I'm an ARRL VE." KFBSY "This is a crackerjack way for this newcomer to learn the Morse Code. Well worth the price." W.B. Marks

For all DOS computers. Available thru dealers. 73 Magazine, QST, or send \$29.95 + \$3 S&H (CA residents add 7.75% tax) to: GGTE, P.O. Box 3405, Dept. MS, Newport Beach, CA 92659 Specify 5¼ or 3½ inch disk

Morse Tutor Gold is a trademark of GGTE. Sound Blaster, the Sound Blaster Logo and the Sound Blaster Compatibility Logo are trademarks of Creative Technology Ltd.

CIRCLE 193 ON READER SERVICE CARD

For The Ultimate Shack!



100%
made in
the U.S.A.

Imagine your call sign on the A.R.E. Classic Clock!

- Beautiful, laminated original artwork.
- Quality quartz movement.
- Suitable for wall or desk (approx. 9"x9"x2").
- Runs on one AA battery (included).
- Only \$39.99 (plus \$4.50 shipping in U.S./foreign orders FPO New Hampshire).
- Specify call sign and choice of simulated walnut, light oak or black frame.
- Send check or money order to:

**Amateur Radio Excellence
Box 1551•Manchester, NH•03105**

NEVER SAY DIE

Continued from page 4

Heck, I've visited all of these countries, have operated from most, have friends there, and still there are a couple I'd have to make an educated guess on the capital. Well, what did you expect, something easy like Paris or Montevideo?

Step one is to get your Advanced license. Step two is to move your family to some place where you can put up a nice big tower and a beam. Remember what's important in life. You're going to need a kilowatt, however a home-built linear or one bought secondhand will keep the cost down. Linears are easy to build. Then, you're going to need to have your own business so you'll be able to take time off when the bands are open or DXpeditions are on.

Sure, you can work 'em with 100 watts and a dipole, but you'll be trading a bunch of time for your chintziness. For instance, when I operated from Kabul I could hear the Big Guns almost every night. The kilowatts with triband beams came through about ten nights a month. The 100-watters could only be heard one or two nights a month.

Worse, when your signal is weak and you're fighting hundreds of other equally weak DXers, you are unlikely to get more than a signal report. It's no fun for someone in a rare country to try and hear your puny signals for long contact.

I remember visiting Mike Ercolino, the president of Telrex Antennas. He had a Collins KW-1 rig and one of his big Telrex antennas. He called CQ Burma and we sat and listened to several XZs answering his call. I was impressed. Little did I imagine that ten years later I'd be visiting these hams. If you can get a four-element 20m beam up around 70 feet, and put a pair of shoes on your rig, you too can have 'em answering your CQs from rare spots around the world. And you can actually sit there and have real conversations with some fascinating people.

The hard part is getting a good location. You're never going to be a Big Gun if you live in an apartment. You need some room for that tower.

Ho Ho Ho

Yes, kindly Santa, that cheap old codger, will be around, nagging you to give presents in his name. Well, it is the time of year to remind friends that you haven't yet won that coveted QST Silent Key Award. You're probably expecting me to suggest you take care of this with twelve monthly reminders of your thoughtfulness, namely a gift subscription to 73, right? Hmm, if I'd thought about it, that would have been my recommendation. I'd have mentioned that I have a choice for you, the el cheapo gift subscription, which is \$19.97, or the deluxe gift subscription, which is

Capital	Country	Prefix	You've Worked It	Been There
Apia				
Mbabane				
Katmandu				
Bandar Seri Begawan				
Kota Kinabalu				
Noumea				
Kingstown				
Papeete				
Kabul				
Colombo				
Dar es Salaam				
Maseru				
Suva				
Road Town				
St. Johns				
Roseau				
Point-a-Pitre				
Fort-du-France				
Bridgetown				
Pago Pago				
St. George's				
Castries				
Port of Spain				
Scarborough				
Willenstad				
Kingston				
Plymouth				
Basse Terre				
Charlestown				
The Valley				
Kuching				
Kuala Lumpur				
Charlotte Amalie				

Figure 1.

\$24.97. Your choice. They get the same magazine either way. This is just a test of how cheap you are. If you've read any of my travel booklets you know how thrifty I am. Thrifty, not cheap.

There's another gift you might consider for your ham friends. This is the first compact disc of ham music. Ham music? The songs were written and sung by Andrew Huddleston and Lissa Ladefoged, OZ1ADL and OZ1XY, and they're good. Darned good! There's one on DXpeditions, another on Morse Code, and the XYL's lament that he's "Always on the air." Andy says, "I'm not climbing up the

zine threatened to sue them, so they had to change it at the last minute. I wish they'd called it "73." Maybe their next CD will go that route. The disc is by Last Resort Records. You'll be able to buy it direct from Last Resort, or from Uncle Wayne's Bookshelf.

Now, let's get the CD and start sending the digital information on the CD over the air. Yes, it's legal to send music over the air . . . if you do it digitally.

Incentive Licensing?

Since "Incentive Licensing" was the biggest disaster to ever hit ham radio, with the fallout still being felt, I

"I'd like to see one license exam which tests for technical knowledge and not code skill, and which would then entitle everyone to use all ham frequencies."

tower anymore!" There's one about "The trip to Dayton," where Andrew and Lissa spent their honeymoon at the HamVention. And I loved "Rootuma Bound," another DXpedition song. The music varies from country to soft rock and it's great stuff. Give yourself one of these for Christmas, and then get some for friends. Ham friends, of course. But then, what else have you?

The CD title is "Seek You." They wanted to call it "CQ" but CQ maga-

zine tend to mention it frequently. And since this catastrophe took place 30 years ago, newer readers are often confused, tending to think it has something to do with the current licensing system, which seems innocuous enough.

I've printed all this stuff before. Many times. But for those who are new, I'll cover the ground again so you'll know more about why the hobby is in the shape it's in today.

It was the perception of "incentive

licensing" that did the damage, not the actuality. It all started with an editorial in the February 1963 issue of QST which said that the League felt something was wrong with amateur radio and something ought to be done about it. They didn't say what was wrong exactly, so there was no way to argue. The implication was that by going back to the pre-WWII licensing system of two license classes, A and B, that the problems, whatever they were, would be fixed. This all came about when the Hudson Division director, multimillionaire Mort Kahn W2KR, who actually was running the League after his successful overthrow of General Manager Budlong W1BUD, proposed the change.

The ARRL Board refused to touch this hot potato at their yearly board meeting, putting it in the hands of the executive committee, which was dominated by Kahn. Kahn then sent a petition to the FCC without even informing the board, much less getting their okay. The petition asked that General Class licensees be forced to get an Advanced Class if they wanted to continue to operate on the 15-20-40-80 meter phone bands, as it was before The War. The "incentive" part was that if you wanted to continue operating on phone you had to upgrade. With over 90% of hams operating on phone, this was a devastating blow to the Generals.

Tens of thousands, who didn't want to have to take the test, just gave up and sold their ham stations for whatever they could get. Ham gear was soon going for 10¢ on the dollar, which caused the sale of new ham gear to plummet by almost 90%. This not only put virtually every ham manufacturer out of business, it also killed off over 85% of the ham radio stores, and all this happened in about one year. Blown away were Hallcrafters, Hammarlund, National, Millen, Multi-Elmac, Gonset, B&W, Lakeshore Industries, Central Electronics, Sideband Engineers, Thor-darson, Stancor, and so on. Collins stopped all further development of new models and moved their manufacturing for the military to Japan.

It took five years for the FCC to finally act on the petition. The bitter fight I put up against it in 73 magazine resulted in the FCC taking away only half of the phone bands from the General Class instead of all of them, and this despite tremendous pressure from the ARRL and what was left of their ever-obedient affiliated clubs. The end result was that Generals, if they wanted to work much DX, had no choice but to get their Advanced or Extra Class licenses. That's the incentive of "incentive licensing."

Frankly, I see no good reason today for so many license classes. I'd like to see one license exam which tests for technical knowledge and not code skill, and which would then entitle everyone to use all ham frequencies. I'd like to see ham clubs recruit,

SPECIAL EVENTS

Number 26 on your Feedback card

Ham Doings Around the World

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

DEC 3

GREENSBORO, NC The 14th annual Greater Greensboro Hamfest and Computer Show will be sponsored by the 76 Group at Greensboro Coliseum Complex Special Events Center, 1921 West Lee St., 9 AM-4 PM. Flea Market, Commercial Booths, VE Exams (pre-register), Computers, more. Talk-in on 145.250(-) and 146.760(-) Contact 76 Group, P.O. Box 7862, Greensboro NC 27417-0862, or call REALTALK, (910) 299-2525. Enter 0076 at the prompt.

MESA, AZ The Superstition ARC Hamfest will be held at Mesa Community College Campus, NE corner of Dobson Rd. & SR 60 (Superstition Freeway). For info, call (602) 898-9158.

NORTH OLMSTED, OH The North Coast ARC Fall Hamfest will be held at St. Clarence Church, 30106 Lorain Rd., 8 AM-2 PM. Setup at 0600 AM. Vendors purchasing four or more tables may set up Fri. eve. 7 PM-10 PM. Reservation payments must be received (with SASE) by Nov. 26th. Send to Dan Sarama KB8A, 15591 Rade-maker Blvd., Brook Park OH 44142. Tel. (216) 267-5083, or connect to the NCARC Packet BBS, "C NO8M" on 145.73. Dial (216) 779-6350 and use the commands: D NCARC/HAMFEST. LOC and D NCARC/HAMFEST.INF.

Talk-in on 145.29 and 224.76 Rptrs.

DEC 4

HAZEL PARK, MI Hazel Park H.S., 23400 Hughes St., will be the location for the 29th Annual Swap and Shop sponsored by the Hazel Park ARC. Admission \$4, tables \$13 (check must be sent, no reservations by phone). Talk-in on 146.64(-) (DART). For info, tables, tickets, write to HPARC, Box 368, Hazel Park MI 48030.

DEC 10

FARIBAULT, MN The annual Courage Center Handi-Ham Winter Hamfest will be held at the Eagles Club, starting with registration at 8:30 AM. There will be a Handi-Ham Equipment Auction, Flea Market, Dinner at Noon, and Program. Talk-in on 19/79. Contact Don Franz W0FIT, 1114 Frank Ave., Albert Lea MN 56007.

JACKSONVILLE, IL Three major clubs are coming together to sponsor a Superfest at 8 AM in the Turner Jr. H.S. VE Exams, Flea Market. Crafts welcome. Contact Tim Childers, (217) 245-2061. Talk-in on 146.775 Rptr., and on 146.52.

JAN 8

MILWAUKEE, WI The 23rd annual Mid-Winter Swapfest will be held at the

Waukesha Co. Expo Center Forum from 8 AM-2 PM. Advance reservation deadline is Dec. 23rd. VE Exams; please pre-register. Sponsored by the West Allis RAC. Write with SASE to WARAC Swapfest, P.O. Box 1072, Milwaukee WI 53201.

SPECIAL EVENT STATIONS

DEC 2

SAN ANGELO, TX The San Angelo ARC will operate W5QX Dec. 2nd 1500Z-2200Z Dec. 4th, to celebrate Christmas at Old Fort Concho. Operation will be in the General portions of the 40, 20, 15m subbands, and the Novice 10m subband. For a certificate, send 9" x 12" SASE to AB5BG, 1210 Ardmore, San Angelo TX 76905.

DEC 10-11

BETHLEHEM, IN The Clark County ARC will operate W9WWI to celebrate the Holiday Season. Operation will be in the General 80-15m phone band, the Novice 10m subband, and on 2m. For a certificate, send QSL and SASE to CCARC, P.O. Box 532, Jeffersonville IN 47130.

KIMBERLING CITY, MO The Kimberling ARC will operate NQ0G from 1500Z-1900Z both days (Dec. 10 & 11).

Operation will be from the Port of Lights, a 1 1/2 mi. drive through an animated Wonderland of Lights. This event is being sponsored by Table Rock Lake/Kimberling City Area Chamber of Commerce. Look for them in the lower portions of the 80, 40, 20, and 15m bands. For a certificate, send QSL and SASE to Chamber of Commerce, P.O. Box 495, Kimberling City MO 65686.

DEC 17-18

NAZARETH, PA The Delaware-Lehigh ARC will operate W3OK 1400Z-0200Z Dec. 17-18 from the Christmas City. Frequencies: 3.965, 7.265, 14.265, 21.365 and 28.365. For a certificate, send QSL and SASE to DLARC, RD4, Greystone Bldg., Nazareth PA 18064.

JAN 1

LOS ANGELES, CA The Spanish Int'l Western ARC will operate from Los Angeles CA USA, and from Central and South America 1600 UTC-2400 UTC to celebrate "Feliz Año Nuevo America." Frequencies: 21.340 USB and 7.260 LSB MHz. Listen for Stations N6TOO, KC6GJD, N6TBX/TG8 and LU9FAN. For a certificate, send QSL to Spanish Int'l Western ARC, P.O. Box 2082, Seal Beach CA 90740 USA.

Why Take Chances?



HIGH QUALITY,
GREAT PRICES,
PLUS—

EXPEDITED ORDER
SERVICE FOR:

General Communication • Industry • Marine VHF
Scanners • Amateur Bands • Microprocessor
Experimental

Get your FREE 1994 Catalog!
CALL TOLL FREE: 1-800-JAN-XTAL

JAN Crystals

P.O. BOX 60017 • Fort Myers, Florida 33906

(813)936-2397

CIRCLE 240 ON READER SERVICE CARD

Measure Up With Coaxial Dynamics Model 81000A RF Directional Wattmeter

Model 81000A is a thoroughly engineered, portable, insertion type wattmeter designed to measure both FWD/RFL C. W. power in Coaxial transmission lines.

81000A is comprised of a built-in line section, direct reading 3-scale meter protected by a shock-proof housing. Quick-match connectors, plus a complete selection of plug-in elements, gives the FRONT RUNNER reliability, durability, flexibility and adaptability with a two year warranty.

Contact us for your nearest authorized Coaxial Dynamics representative or distributor in our world-wide sales network.



COAXIAL
DYNAMICS,
INC.

15210 Industrial Parkway
Cleveland, Ohio 44135
216-267-2233
1-800-COAXIAL
FAX: 216-267-3142



Service and Dependability... A Part of Every Product

CIRCLE 186 ON READER SERVICE CARD

teach the theory and operating skills, and license newcomers . . . and to be responsible for their recruits. I'd like to see clubs have the power to license and de-license, and get the FCC out of our hair as much as possible.

When we get interested in RTTY we have to learn about it. Ditto satellites, packet, slow-scan, and so on. These interests are an incentive for continued learning.

Mort Kahn's "incentive licensing," which was enthusiastically promoted by Bill Orr W6SAI, was the worst disaster ever suffered by the hobby. It put all the American manufacturers out of business at the right time to open it up for the Japanese to dominate the industry worldwide. Worse, one other result was the demise of over 95% of our school radio clubs, thus stopping the recruiting of teenagers into the hobby. There went the infrastructure which brought us most of our new licensees. Before Kahn's petition, over 80% of our new hams were teenagers. Now it's around 11%. This has stopped over two million youngsters from pursuing high-tech careers who otherwise would have. How much of a difference would two million more scien-

tists, engineers and technicians have made to the growth of our American electronics industry?

While we were stopping ham growth in America the Japanese were moving in the opposite direction. They introduced a no-code license which allowed 10 watt phone operation on the low bands. This helped spur the

"It's my goal to get radio clubs going in schools again, and to get our schools to teach the fundamentals of radio and electronics, just as they do physics, chemistry, and biology."

development of ham radio clubs in every school in Japan. They soon had twice as many licensed amateurs as we, and with only half our population. This resulted in millions of their youngsters going for high-tech careers, making possible their world domination of the consumer and other electronics industries.

Now stop asking about "incentive licensing." It's my goal to get radio clubs going in schools again, and to get our schools to teach the funda-

mentals of radio and electronics, just as they do physics, chemistry, and biology. If we can get millions of kids interested in the hobby, we'll not only keep our ham bands, we'll be able to rebuild our electronics industry.

We know that electronics is a key to our success in competition with the other developed countries, yet we're

doing almost nothing to build the needed high-tech workforce.

The 73 International Column

Having visited hams in over a hundred countries, and having DXed from most of them, I'm guilty of trying to force the 73 readers to be more interested in DX than is reasonable. And now, with an ever higher percentage of hams being Techs, the general interest in DX has been falling off, as we've noticed in our reader polls.

When I stop to think about it and put it in perspective, I can understand. DXing is only a small facet of amateur radio, and a good deal of the ops interested in working DX are after DXCC and other awards. Few seem to be really interested in talking with DX ops. Hello, send a card, bye. Thus the low scores for the "73 International" column.

Amie Johnson N1BAC has done a fine job of getting reports from DXers all around the world for the column for the last five years. And before him Dick Phenix handled it, but then he retired to a cabin in the super boon-docks. I first met Dick when I visited the San Francisco Mensa group about 20 years ago. He then moved back to New Hampshire and was part of the Mensa group here, where I was the Local Secretary for around 15 years.

I do hope our Hambassadors will continue to send us news of what's going on that we can use in our Letters column. And, if I can get things working smoothly again, maybe I'll be able to visit more of them personally. I still want to visit at least 70 more countries before winning my Silent Key Award from QST. 73



Serving the LORD
Since 1987

\$49.95!

THE POWER STATION

The POWER STATION is a 12V x 7 AmpHr gel-cell battery complete with voltmeter, wall charger and a cord for charging via automobiles. It will power most HT's at 5 Watts for 2-4 weeks (depending upon how long-winded you are). Also VHF, UHF, QRP, or HF mobiles such as the KENWOOD TS-50 (at 50W). There are no hidden costs, all you need is your mobile, HT power cord or cigarette lighter adapter.

The POWER STATION provides 12V from a cigarette plug and has two recessed terminals for hardwiring. A mini-phone jack with regulated 3V, 6V, or 9V output can be used separately for CD players, Walkmans, etc. THE POWER STATION can be charged in an automobile in only 3 hours, or in the home in 8 hours. The charger will automatically shut off when the battery is completely charged, so you can charge it even when it has only been slightly discharged, (unlike Ni-Cads that have memory). Our charging circuit uses voltage sensing circuitry, other brands are timed chargers which always charge the battery a full cycle, this damages their battery and shortens its' life if it only needs a partial charge. The POWER STATION has a voltmeter that shows the exact state of charge of the battery, not worthless idiot lights that tell you "YOUR BATTERY IS NOW DEAD." The voltmeter can even be used to measure voltages of other sources.



To order, send check or money order for \$49.95 + \$8.50 for shipping, along with your shipping address and telephone number to:

**Guaranteed
Best
Prices**

Joe Brancato

THE HAM CONTACT
P.O. Box 3624, Dept. 73
Long Beach, CA 90803.

CA Residents Add 8 1/4% Sales Tax. Alaska, Hawaii, and Candian Residents, please send U.S. Money Order & \$17.10 Shipping.

If you wish more information please send a SASE to the above Address. For COD orders, call (310) 433-5860, outside of CA Orders only call (800) 933-HAM4 and leave a message. Dealer Inquires Invited.

CIRCLE 384 ON READER SERVICE CARD

PROPAGATION

Number 27 on your Feedback card

Jim Gray W1XU

Jim Gray W1XU
210 East Chateau Circle
Payson AZ 85541

I'm sure that you will notice that "conditions" this month leave much to be desired... particularly on weekends. This is due to several factors, which include general decline in the sunspot numbers, seasonal conditions, and just plain chance. You'll also notice that there aren't many days which can be classified as GOOD, so you'll have to make the best out of what's available from the chart. Your best chances are on days that show GOOD or FAIR to GOOD trends. The really POOR days are expected to be the 4th and 23rd, while the rest are trending toward or away from GOOD. If you wish to make the best use of this chart, check WWV at 18 minutes past any hour for their propagation reports and use the information you get which describes today's and tomorrow's forecasted "conditions." Cycle 22 looks as if it may reach its nadir sooner than most forecasters had originally thought, meaning sometime in 1995. That means that Cycle 22 has been a shorter than normal cycle since the last low point of Cycle 21 in December 1986... just nine years instead of the average 11.2 years. Some sun watchers are now saying that the cycles are really 22 years in length and that the 11-year periods are just perturbations in the larger cycle... something I don't yet believe, but am willing to consider. Here's your band-by-band forecast this month.

10 and 12 Meters

Only occasional F2 openings to the tropics on GOOD days during daylight hours. Not much sporadic E or short skip propagation can be expected. Skip is where you find it, so keep looking and hoping. Sometimes results are spectacular on a supposedly "dead" band. Really good "gain" antennas can help a lot this month. A good local band.

15 and 17 Meters

Fairly good DX into the Southern Hemisphere during daylight hours from noon to sunset local time, and short skip from sunrise to sunset, but expect the band to close soon after—abruptly!

20 Meters

Daylight hours should be pretty good for DX this month in spite of depressed conditions in general, and you may even find the band open until midnight. Peaks ought to occur just after sunrise and late afternoon locally. If the band does stay open after dark, look for openings into South America and even Antarctica. Also, during the day, you will find considerable short skip. All of which means that 20 meters should be your PRIME DX BAND. (See 80 meters, too.)

30 and 40 Meters

Expect late afternoon and evening openings into Europe and Africa swinging south after sundown for a few hours, but the MUF falls below 7 MHz later in the evening. Short skip

will occur during most days out to 1,000 miles or so, and to 2,000 miles at night until the band closes.

For you newer operators who have not lived through a complete sunspot cycle, there will be some great surprises in store. Listen and learn.

80 Meters

This will also be a very good DX band after dark, and since QRN is low, signals ought to be very readable... even weaker ones. Peak DX occurs around midnight local time and just before sunrise. Insomniacs will love 80 meters this month. Short skip at night will occur frequently out to 2,000 miles. Isn't it interesting how two of our "oldest" bands, 80 and 20, are the best in these times? The old-timers knew what they were doing when they "got" these bands for amateurs way back when.

160 Meters

You "top band" operators will love this band in December: DX openings to the east from your locations, peaking around midnight (Europe, etc.), and toward the south and west before sunrise. Nighttime short skip should also be good from dusk to dawn, getting longer later. On this band, use vertical antennas to transmit and horizontal antennas for receiving, preferably Beverage antennas if you have the room. Low noise and minor static will make you happy.

EASTERN UNITED STATES TO:												
GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA							20	20				
ARGENTINA	20	40	40	40	80	80					20	15
AUSTRALIA	20		20		40	40	20	20				15
CANAL ZONE	15	20	20	40	40		20	20	15	15	15	15
ENGLAND	20	40	80	40	40		20	20	20	20	20	20
HAWAII	20		20		40	40	80	20				15
INDIA	20					20	40	20				15
JAPAN	20						20	20				20
MEXICO	15	20	20	40	40		20	20	15	15	15	15
PHILIPPINES							20					
PUERTO RICO	15	20	20	40	40		20	20	15	15	15	15
SOUTH AFRICA			40	40					15	15	15	20
U.S.S.R.	40	80	80	40			20	20	20			40
WESTCOAST		80	80	40	40	40	20	20	20			

CENTRAL UNITED STATES TO:												
GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA							80	40	20			
ARGENTINA	20		40	40	40							15
AUSTRALIA	15					40	20	20	20			15
CANAL ZONE	20	80	40	40	40	40	20	20	15	15	15	20
ENGLAND	40	40	40	80					20	15	20	40
HAWAII	15	20			40	40	40					15
INDIA	15	20	20				40	20	20			15
JAPAN							80	40	20			
MEXICO	20	80	40	40	40	40	20	20	15	15	15	20
PHILIPPINES								20				
PUERTO RICO	20	80	40	40	40	40	20	20	15	15	15	20
SOUTH AFRICA	20	40							15	15	20	20
U.S.S.R.	40		40	40					20	20		

WESTERN UNITED STATES TO:												
GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	15	20			40	40	40	40				20
ARGENTINA	15	20			40	40	40	40			15	15
AUSTRALIA	15	20	20				40	80	40	15	15	15
CANAL ZONE	20	20			40	40	40			20	15	15
ENGLAND			80	40						20	20	
HAWAII	15	15				20	20	20	20			15
INDIA	20											
JAPAN	15	20			40	40	40	40	40			20
MEXICO	20	20			40	40	40			20	15	15
PHILIPPINES	15	20						40	40		20	20
PUERTO RICO	20	20			40	40	40			20	15	15
SOUTH AFRICA	20	40	40							15	15	20
U.S.S.R.	40	40	40	40						20	20	
EAST COAST	80	80	40	40	40	40	20	20	20			

1-May be open only once or twice during month. *15-20 next higher band. G=Good, F=Fair, P=Poor.

DECEMBER 1994						
SUN	MON	TUE	WED	THU	FRI	SAT
				1 G	2 G-F	3 F-P
4 P	5 P-F	6 F	7 G-F	8 F	9 F-G	10 F
11 F-G	12 G	13 G-F	14 F	15 F-G	16 G-F	17 F
18 F	19 F-G	20 F-G	21 F	22 F-P	23 P	24 P-F
25 F	26 F	27 F-G	28 F-G	29 G-F	30 F	31 F-G

BARTER 'N' BUY

Number 28 on your Feedback card

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 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 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 the 73 Magazine, Barter 'n' Buy, 70 Rt. 202N, Peterborough NH 03458 and get set for the phone calls.

The deadline for the January 1994 classified ad section is November 10, 1994.

ALL ABOUT CRYSTAL SETS. Theory and construction of crystal set radios. \$9.95 each, ppd USA. Send to: **ALLABOUT BOOKS**, Dept. S, P.O. Box 22366, San Diego CA 92192. BNB200

SUPERFAST MORSE CODE SUPEREASY. Subliminal cassette, \$12.00. LEARN MORSE CODE IN 1 HOUR. Amazing supereasy technique, \$12.00. Both, \$20.00. Moneyback guarantee. Free catalog: SASE, **BAHR-T7**, 150 Greenfield, Bloomington IL 60108. BNB221

ROANOKE DOPPLER PC BOARDS \$49.95 ea. **AB5CK**, 6721 Rolling Hills Dr., North Richland Hills, TX 76180. BNB240

WANTED: AUDIO EQUIPMENT. Tube, Solid State, McIntosh, Marantz, Tannoy, EV-Patricians, Western Electric, Nakamichi preferred. John, (410)465-2699. BNB268

KPC-3 WINDOWS TERMINAL PROGRAM User friendly Split Screen, 400 line Scrollback Buffer, Save & Send files easily, 3D Command Buttons, \$29.95 or SASE for FREE details. **COMTREK** P.O. Box 4101, Concord NH 03302-4101. BNB271

QSL SAMPLES- 50 cents. **SAMCARDS**, 48 Monte Carlo Dr., Pittsburgh PA 15239. BNB275

DWYER WIND SPEED INDICATOR only \$55.00 plus \$4.00 S/H. For home or office. Accurate, low-cost, practical. Roof mounted pickup. Send check or M.O. to: **RAD-MON COMPANY**, Dept A, Box 751, Marathon NY 13803-0751. (NY Residents add Sales Tax) BNB285

ATTENTION HAMS! Subscribe to 6-50 Worldwide for Six Meter Enthusiasts, DX Digest for DX Chasers, or The Novice/Tech Report. Call (817)694-4047 or FAX (817)694-2522.

COMMODORE 64 REPAIR. Fast turn around. **SOUTHERN TECHNOLOGIES AMATEUR RADIO**, 10715 SW 190th Street #9, Miami FL 33157. (305)238-3327. BNB295

KIT BUILDERS—NEW, SYNTHESIZED qrp Transmitter/Transceiver, the ARK4. Full Transceiver Kit w/case only \$199.95. One board, no wiring, top quality components & PCB. **GUARANTEED TO WORK.** For info send SASE; Call/Write to order: **S & S ENGINEERING**, 14102 Brown Road, Smithsburg MD 21783; (301)416-0661. BNB304

WANTED: Electron Tubes, ICS, Semiconductors. **ASTRAL**, P.O. Box 707ST, Linden NJ 07036. Call (800)666-8467. BNB307

KENWOOD AUTHORIZED REPAIR. Also ICOM, Yaesu. **GROTON ELECTRONICS**, Box 379, Groton MA 01450. (508)448-3322. BNB310

UNIQUE INDOOR/OUTDOOR ANTENNA gives 30 dB gain on 160m-10m. Plans: \$6.95. **BOB CHRISTIE AA2KE**, 215-28 Spencer Ave., Queens Village NY 11427. BNB319

GMRS: ALTERNATIVE TO CB AND HAM RADIO. Great for traveling, camping or other family use, 2ed. Send \$3.00 to: Neiferd, KG8EP, 2695 Haystack Dr., Colorado Springs CO 80922. BNB326

PROGRAMMABLE COUNTER - Works with ANY VFO Rig! Get a digital display for your rig, 100 Hz resolution. You can read the tuned frequency directly, no need to calculate offsets. Counts to 40 Mhz, up OR down. Counter Kit, \$69.95; Kit w/case, \$99.95; Assembled w/case, \$139.95. **GUARANTEED TO WORK.** For info send SASE; Call/write to order: **S & S ENGINEERING**, 14102 Brown Road, Smithsburg MD 21783; (301)416-0661. BNB334

Continued on page 81

NEW PRODUCTS

Number 29 on your Feedback card

Compiled by Charles Warrington WA1RZW



CABIN FLAT ENTERPRISES

Now amateur radio operators can identify themselves when working communications for public events or emergency services. These new Cab-

in Flat T-Shirts feature front breast "Federally Licensed Radio Operator" logo insignia. The back reads "Emergency Communications" in large letters to identify your status.

The shirts are high quality 100% cotton, available in sizes L, XL, and XXL in navy blue with white printing. They are priced at \$17 each. Special matching caps and jackets are also available. For more information or to order contact *Cabin Flat Enterprises, 23236 Cardinal Road, Box 2423, Wrightwood, CA 92397; (619) 249-5832, (800) 435-3528, FAX (619) 249-4667. Or circle Reader Service No. 203.*

JADE PRODUCTS

The new series of Jade-Pole Antennas from Jade Products is based on a conventional J-pole design using ladder-line technology. They are available for the 2 meter, 220 MHz, and 6 meter bands.

The Jade-Poles are constructed of heavy-duty #18 copper-clad steel conductor and comes with a standard SO-239 connector. The antenna is rated at 300 watts and is usable over the entire band of operation using a 50 ohm coax feedline.

The 2 meter and 220 MHz versions come completely assembled and ready for installation; minor assembly is required for the 6 meter version—complete instructions are included. The an-

tenna is colored white and comes ready to mount on a wall or onto a mast with the optional mast mounting kit. The 2 meter version is priced at \$28.95, the 220 MHz version is priced at \$27.95, and the 6 meter version is priced at \$37.95. For more information contact *Jade Products, P.O. Box 368, E. Hampstead, NH 03826-0368; (603) 329-6995, FAX (603) 329-4499. Or circle Reader Service No. 202.*



MFJ ENTERPRISES

Are you a true ham who loves to build his own gear? True hams will love the new MFJ-8400K Repeater Monitor Receiver Kit for the 2 meter band. With MFJ's build-your-own instructions, you'll enjoy a fun evening building your own high quality tunable receiver and you'll enjoy the finished super-sensitive receiver monitor that'll rival others costing hundreds of dollars more.

The 8400-K features a low-noise, high gain RF preamp which gives you excellent 0.1 microvolt sensitivity. An air variable tuning capacitor with a velvet smooth 6:1 reduction drive makes tuning easy and comfortable with no noticeable drift. The dual conversion superhet design has sharp ceramic filters and a crystal controlled second oscillator for excellent selectivity and sensitivity.

The MFJ-8400K is a complete kit priced at \$69.95, and uses a 9 volt battery, 9-12 VDC or 110 VAC with optional MFJ-1312B (priced at \$12.95.)



The MFJ-8400W is the same radio, prewired and tested, and priced at \$89.95. The instruction manual is available free of charge. For more information or to order visit your favorite dealer or contact *MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762; (voice) (601) 323-5869, FAX (601) 323-6551, (orders) (800) 647-1800. Or circle Reader Service No. 201.*

RADIO DEVICES

Radio Devices is the sole US importer of the new PC705 Power Checker from Revex. This little gadget is a handy RF measurement device that shows the RF power output of low power transmitters (less than 10 watts) in the 20-1300 MHz range. The Power Checker illuminates up to 8 LEDs based on the power applied through the BNC connector.

Simply attach the Power Checker to any HT and you can immediately read the power output and evaluate the status of your batteries. It can also be

used as an antenna for short-range communications. No external power is required; the Power Checker is powered purely by the RF applied.

The PC705 is priced at \$39.95 (plus \$2.90 First Class shipping). For more information or to order contact *Radio Devices, 32 Queens View Road, Marlboro, MA 01752; (508) 480-0502. Or circle Reader Service No. 204.*



OPTOELECTRONICS

Here's a new device not intended to be used as a test instrument, but rather to detect radio transmitters in the near field. The Scout automatically finds and records frequencies and tunes a



receiver. It is the first such device created for this purpose.

For walk-by applications, the Scout can automatically detect and record 200 unique frequencies and up to 250 repeat hits on any that were previously recorded. When used with the miniature DB32 antenna, the Scout will fit in the pocket, operate completely automatically, and will signal the operator when a signal is recorded with a

pager-style vibrator. After recording, the data can be downloaded into a computer using the software supplied and an optional TTL to RS-232C converter.

In drive-by mode, the built in beeper signals when the Scout records a new frequency with a double beep. A single beep indicates a repeat hit. Because the Scout is automatic, the driver is not distracted, but can easily monitor activity.

The Scout runs on a high capacity NiCd battery pack has a wide variety of power options, and comes with an AC adapter charger, 3.5" disk with PC compatible utilities, and a comprehensive owner's manual. The Scout is priced at \$399. For sales or technical information contact *Optoelectronics, Inc., 5821 NE 14th Ave., Ft. Lauderdale, FL 33334; (305) 771-0250, FAX (305) 771-2052. Or circle Reader Service No. 207.*



S & S ENGINEERING

Okay guys, here it is! For those of you with offset VFOs who want to read the tuned frequency, S & S Engineering has developed the PC1 Programmable Frequency Counter. Just set the DIP switches for the offset, connect it to your VFO (instructions are

free when you provide the schematic for your VFO), and attach 7-15 VDC. You will then know your tuned frequency with accuracy.

The PC1 counts to 40 MHz up or down. It handles any IF offset and backward tuning VFOs. It makes using a VFO rig a pleasure.

The case is just 4" W x 2.5" H x 5.5" D, and the easy to read LED display draws only 150 mA. The PCB is solder masked for easy assembly. The PC1 (kit, no case) is priced at \$69.95; the PCC1 (kit with case) is \$99.95; the PCA1 (assembled with case) is \$139.95, and the AC adapter is \$6.95. For more information or to order contact *S & S Engineering, 14102 Brown Road, Smithburg, MD 21783; (301) 416-0661, FAX (301) 416-0963. Or circle Reader Service No. 205.*

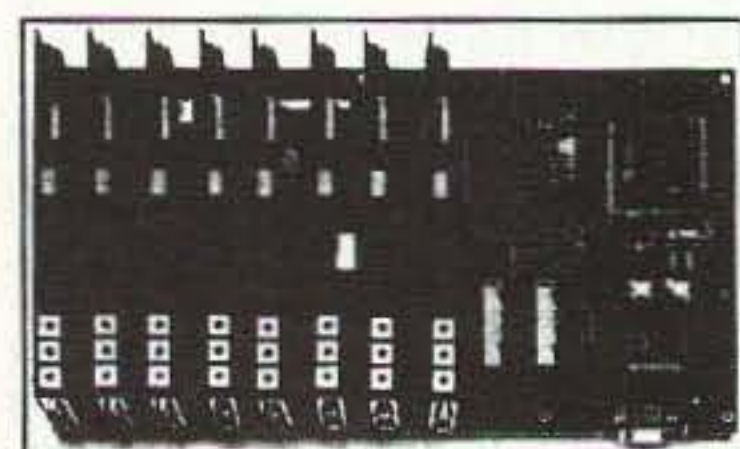
LINK COMMUNICATIONS

Link Communications Has announced the release of the new RLC-3 Repeater, linking and remote base controller. The RLC-3 supports up to 8 separate or connected radio ports, on one controller system. Each radio port can function as a repeater, link or remote base. The RLC-3 supports sepa-

rated DTMF decoders, Icom, Kenwood, and Yaesu remote base support, 1000 telephone autodial slots, and over 500 macros. Up to 16 analog inputs, 16 outputs and 16 input lines are supported.

The RLC-3 with four radio ports and a cabinet is priced at \$1200; the

autopatch option is \$100; analog input and output card is \$75; and additional radio cards are \$250. For more information contact *Link Communications, Inc., P.O. Box 1071, Sidney, MT 59270; (406) 482-7515, (800) 610-4085. Or circle Reader Service No. 206.*



BARTER 'N' BUY

Continued from page 79

RCI-2950/2970: New modification manual including Power increase. Clarifier modification. Modulation increase. Operating hints, and more. Parts included. Only \$20.00 ppd in U.S. (Missouri residents add \$1.15 tax). **SCOTT**, P.O. Box 510408, St. Louis MO 63151-0408. (314)846-0252. Money Orders or C.O.D.

BNB340

HR2510, RCI2950, CONNEX 3300, COBRA 148, GALAXY SATURN, plus many more kits to increase your modulation, \$19.95. (800)536-0109. BNB350

Icom R-9000 Receiver, 4 months old, orig. box, under manufacturer warranty, 100 kHz-2GHz. **Collin B. Anderson**, (H) 703-524-5530; (W) 703-697-4712. (I work 2 p.m.-11 p.m. M-F ET. BNB360

QSL CARDS — Standard and custom. Your ideas or ours. Excellent quality. Foil stamping available. Many designs and type styles. Catalog and samples \$1.00 refundable. **WILKINS**, Dept. A, Box 787, Atascadero CA 93423. BNB370

CALLSIGN WRISTWATCH - Free details. **KC6UEC**, 9438 Broadway, Temple City CA 91780. BNB379

NEW NN1G CW SUPER-HET SINGLE BAND TRANSCEIVER KIT. Available in 20M, 30M, 40M, 80M. \$59.95 plus \$3.75 S/H. (Catalog-2 Stamps). **DAN'S SMALL PARTS & KITS**, 1935 South 3rd West #1, Missoula MT 59801. BNB385

CW'ers, USN FLAMEPROOF KEY, new, packed 1955, \$59 (shipping included). Collectors, 15 pages, mostly telegraphic, refundable \$2.00 plus 2 Stamps. **Joseph Jacobs**, 60 Seaview Terr., Northport NY 11768. BNB393

IT'S BACK! The return of the HW-8 Handbook! Second printing. Modifications for the Heath QRP rigs. First class mail \$11. DX add \$4 for air mail shipping. **Mike Bryce, WB8VGE**, 2225 Mayflower NW, Massillon OH 44647. BNB404

47 FOOT ANTENNA WORKS ALL BANDS. Only \$40.00 ppd in 48 states. Fully assembled, not a kit. Superb results! Satisfaction guaranteed 100%. SASE for catalog and information sheet. **THE ANT FARM**, P.O. Box 3196, Wescosville PA 18106. BNB409

ULTIMATE CONSTRUCTION directions for inexpensive project to determine accurate beam direction for DX from your QTH. For plans send SASE and \$5.00 to: **KA1EHG/1**, Box 11, North Bridgton ME 04057-0011. BNB417

MAHLON LOOMIS, INVENTOR OF RADIO; (patented 1872) by Thomas Appleby. (Copyright 1967). 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

BROWNIES QSL CARDS SINCE 1939. Catalog & samples \$1 (refundable with order). 3035 Lehigh Street, Allentown PA 18103. BNB430

BUTTERNUT ANTENNAS, NEW—in box. (2)HF6-VX, \$125.00; (2)HF5B, \$200.00; (2)HF2V, \$110.00; (1)HF7VX, \$150.00. (210)435-6190. BNB435

RADIO DOCTOR VIDEOS for Repair and Alignment of HF Transceivers. Reviewed by Gordon West, January—73 Magazine. Videos for popular **KENWOOD, YAESU, and ICOM**. ORDERS: (800)788-1416 MC/VISA. Catalog: SASE (2 stamps): **RADIO DOCTOR**, 710 Teague Dr., Kennesaw GA 30144. BNB442

TNT FIELD DAY ANTENNA

complete, assembled/ready to use.

No pruning.
TNT is No-tune on 80 cw, 40, 20, 17, 12, 10. TNT/2 is No-tune on 40, 20, 10. Work other bands w/ tuner. DX & Gain rise w/ frequency.

Ready to Use
Includes isolation balun & 99 ft RG8x
The modern coax-fed version of the classic off-center fed window.
Technote 128—\$6.95 ppd

No tuning.
Kink-proof
Wx-Sealed
Low Noise

No knots to twist.
No Traps or Resistors
Insulated to 3000 V
Rated 500 Watts

Antennas West
Box 50062S, Provo, UT 84605

TNT \$89.95 + \$8 P&H
Window 135ft. long

TNT/2 \$79.95 + \$7 P&H
Window 67 ft. long

Order Hotline 801-373-8425

CIRCLE 135 ON READER SERVICE CARD

Say You Saw It In
73 Amateur Radio Today

MORSE CODE MUSIC!

SENSATIONAL NEW WAY TO LEARN CODE—Do Aerobics, Sing, Jog, or Drive while learning code! A fun & easy way to learn or retain Morse Code skills. Now the secret is yours with this amazing synchronized breakthrough! Great fun tape for all licenses and classrooms! Order:

"THE RHYTHM OF THE CODE"
Version 2 cassette today!

Send \$9.95 and include \$2.00 S/H to:

KAWA RECORDS

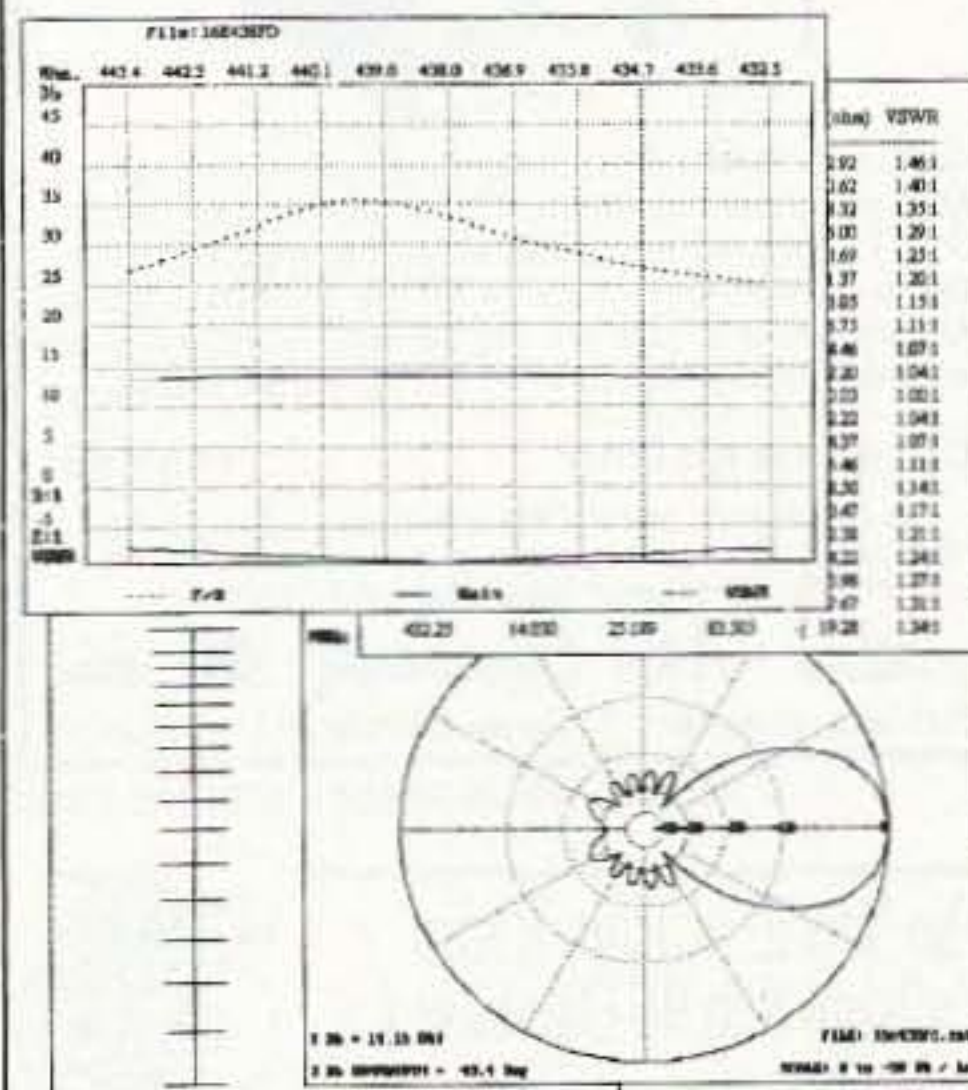
P.O. Box 319-ST
Weymouth, MA 02188

Check or money order only. We ship all orders within 5 days.
MA residents add 5% sales tax.

CIRCLE 2 ON READER SERVICE CARD

"DESIGNING A YAGI HAS NEVER BEEN SO EASY!"

... 73 Amateur Radio Today, April '94



Why spend big \$\$ on unfriendly, overpriced and very slow optimize-only software ???

Quickyagi, the high speed, low cost, easy-to-use software features auto design & optimize plus performance analysis. With amazing accuracy, it will accommodate 17 elements. Freq. to 1 Ghz., mntg/boom and tapered element modeling, folded dipole, scaler, and prints all files, polar plots and graphs. Both co-roc. & no co-roc. versions are included. For PC-AT w/ 640 K RAM, VGA, EGA, CGA, Herc and DOS 3.0 or higher.

Quickyagi™ v3.1 \$39.95*
By WA7RAI

Add \$3.00 s&h or \$5.00 for non-USA orders • Incl. Callsign w/order
Send SASE for complete info. • US Check or Internat'l Money order
Arizona orders add 5.5% state tax • Specify 3.5" or 5.25" floppy disk

RAI Enterprises (602) 435-9523
5638 W. Alice Av. Glendale, AZ 85302

ALL ELECTRONICS

FAST SERVICE • DISCOUNT PRICES

UNIVERSAL IR REMOTE CONTROL

The Fox 400™ wireless infrared remote control works with most TVs, VCRs, cable and audio devices. Works with all



CAT #
IR-400

\$11.75
each

major brands and lots of not-so-major brands. Use it to replace lost IR remotes or to combine up to four remotes into one unit. User friendly. Includes complete instructions and an 800 phone help-line if problems should occur. Fully guaranteed. Requires 3 AAA batteries (not included).

MINIATURE TOGGLES

S.P.D.T. (ON-ON)

Right-angle, pc mount.
0.25" threaded bushing
Rated 5 amps @ 125 Vac.

75¢
each

CAT# MTS-4RT

10 for \$7.00 • 100 for \$65.00

D.P.D.T. (ON-ON)

ALCOSWITCH # MTM206NPC
Short bat handle, 0.25" long.
PC terminals.

\$1.25
each

CAT# MTS-82PC

25 for \$25.00 • 100 for \$90.00

9 VOLT 60 MA SOLAR PANEL



These 6" X 6" glass enclosed photovoltaic panels produce 9 Vdc at 60 ma. Ideal for charging batteries and powering small devices. Put two or more together for more current and voltage. Includes hook-up instructions. **\$5.25** each

CAT # SPL-960

ORDER TOLL FREE

1-800-826-5432

CHARGE ORDERS to Visa, Mastercard or Discover

TERMS: Minimum order \$10.00. Shipping and handling for the 48 continental U.S.A. \$4.00 per order. All orders including AK, HI, PR or Canada must pay full shipping. All orders delivered in CALIFORNIA must include local state sales tax. Quantities Limited. NO COD. Prices subject to change without notice.

CALL, WRITE or FAX for a FREE
64 Page CATALOG
Outside the U.S.A. send \$2.00 postage.

MAIL ORDERS TO:
ALL ELECTRONICS CORPORATION
P.O. Box 567
Van Nuys, CA 91408
FAX (818)781-2653

CIRCLE 197 ON READER SERVICE CARD

No-Hands!

When your hands are busy, where do you want your HT? Ask firefighters, police, construction workers, forest rangers, ski patrols, SWAT teams, and paramedics. They designed our chest mounted Rescue-Pouch so they could listen without an earpiece and talk straight into it no-hands. Diagonal positioning of HT places antenna over the shoulder not in your face. Made of padded rot-proof Cordura with quick-release buckles. Adjusts to grab any size HT. Unique Double model holds two HTs or HT and spare battery.

Single \$31. Double \$41. Add \$3 P&H

AntennasWest
Box 50062-E, Provo UT 84605



Order Hotline:
801-373-8425

CIRCLE 275 ON READER SERVICE CARD

HI-PERFORMANCE DIPOLES

Antennas that work! Custom assembled to your center freq. ea. band - advise ht. of center and each end - hang as inverted "V" - horizontal, vert. dipole, sloping dipole - commercial quality - stainless hardware - legal power - no-trap, high-efficiency design. Personal check, MO or C.O.D. (\$3.00)

MPD-5'	80, 40, 20, 15, 10M Max-Performance Dipole 87' or 78' long	\$110.00
MPD-2'	80, 40M Max-Performance Dipole 85' long	\$72.00
MPD-3712	30, 17, 12M Max-Performance Dipole, 31' long	\$73.00
HPD-3'	160, 80, 40M Max-Performance Dipole, select 113' or 125'	\$83.00
SSD-6	160, 80, 40, 20, 15, 10M Space-Saver Dipole 71' long	\$148.00
SSD-5'	80, 40, 20, 15, 10M 42' long	\$114.00
*Tunes 9 Bands with Wide-Matching-Range Tuner		\$5.00 per Antenna \$8.00

\$52 BASE for catalog of 30 dipoles, slopers, & unique antennas

W9INN ANTENNAS

Box 393 Mt. Prospect IL 60056 708-394-3414

CIRCLE 38 ON READER SERVICE CARD

FREE...Ham Radio Gospel Tracts: DX Contact and Christian Helps, SASE: N1GDP, RAR-OFC, P.O. Box 8, Harmony ME 04942. BNB443

SKED-ALARM A Windows based alarm to track your radio schedules. Keeps up to 5 skeds with dual-digital clocks in UTC/local time/date. Records Time/Date/Frequency. Send \$22.50 check or M.O. to: **SOFTSPARKS SOFTWARE**, 2601 Cartwright Rd., Suite D-306, Missouri City TX 77459. (Include Name and Call. Texas residents include state tax.) BNB446

ICOM IC-736 RAFFLE: One hundred tickets ONLY at \$30.00 a piece. Drawing to be held at 1 p.m. on December 23 at the RC of JHS 22 in NYC. Tickets/Questions - WB2JKJ, RC of JHS 22, P.O. Box 1052, New York NY 10002. Phone (516)674-4072, Fax (516)674-9600. This will go fast, ACT TODAY. BNB455

COMPUTER PRINTER RIBBONS BY MAIL High quality, low cost. Black or color. Tell us your needs. Free quote. **HARCLY(A)**, P.O. Box 830, Coquille, OR 97423. BNB457

COLLINS RX 75S3C, Wing, Serial 10494. Needs some work. Excel physical condx. \$200; **TX32S3**, Wing, Serial 12704. Needs some work. New finals. Excel physical condx. \$250; **PWR SPLY 516F-2**, Wing, Serial 15842, \$75 (with 32S3, \$50); **STN CTRL 312B-4**, Wing, Serial 54818. Excel condx. \$100; **XTAL PAK** (16 missing) \$75. Entire package for \$600. U pay shping. **ERIK SHAFER** (801) 771-5613. BNB470

DACRON ROPE, WHY RISK FAILURES with aerial supports? High UV resistant, non-stretch Military Type black **DOUBLE** (unlike our competitors' single) braided. 1-800-328-4773. BNB557

HF TRANSCEIVER, IC-781, mint, in Box, only used 10 hours, manuals included, \$3,700.00. Mike, (408)227-7460 after 6 p.m. BNB590

WANTED: Western Electric tubes and other tube audio equipment. (800)251-5454. BNB615

MODIFICATION REPORTS HR2510, RCI 2950, Ranger 3300/3500—frequency, RF power modulation, RIT, etc., \$10 ea. or \$25 for all three. Four-hour video on VCR. Repair \$19.95. Send to **JACK FISHER**, POB 612, Oceano CA 93445. BNB620

DUPLEXER TUNING GUIDE. A complete booklet showing step-by-step instructions on tuning all types of duplexers. Included is theory of operation, detailed diagrams and much more. Send \$9.95 plus \$2.50 s&h to **RGM PUBLICATIONS**, 533 Main Street, Hillsboro NM 88042. For faster service using a major credit card call (505)895-5333 and order today. 30 day money back guarantee. BNB635

SATELLITE EQUIPMENT Best \$\$\$ USA. (800)851-6534. BNB640

VHF-UHF-SHF Large SASE. **VHFer**, P.O. Box 685, Holbrook AZ 86025. BNB660

FOR SALE Icom IC-2SAT, IC-W2A, PK-88 Laptop computer, personal autopatch, Epson Printer. Anthony Nota, (201)284-1105. BNB675

HAM RADIO REPAIR- All makes and models. Fast, Professional Service. **AFFORDABLE ELECTRONIC REPAIR**, 7110 E. Thomas Rd., Scottsdale AZ 85251. (602)945-3908. BNB700

ROSS' \$\$\$ NEW DECEMBER (ONLY) SPECIALS. HEATH HW-2P, \$240; TELEX HI GAIN EX-14, \$370; CD-45II, \$235; AEA PK-64A/HFM, \$145; KANTRONICS KAM, \$250; ALINCO ALM-203T, \$209.99; YAESU

MAGGIORE ELECTRONIC LAB.

600 WESTTOWN ROAD, WEST CHESTER PA 19382

Phone (610)436-6051 Fax (610)436-6268

Hi Pro Repeaters

Repeaters - VHF - UHF - Transmitters - Receivers - Controllers - Links - Antennas - Duplexers - Remote Base - 2 Year Hi Pro Repeater Warranty

PLEASE CALL OR WRITE FOR OUR COMPLETE FREE CATALOG

Sell your product in **73 Amateur Radio Today**
Call Dan Harper today. . . 1-800-274-7373

LIVE TV VIDEO

Micro TV Cameras, Micro Video Transmitters, Receivers and low cost Downconverters.

Amateur TV, Industrial, Security products. We have a system for you. Our video



camera connected to our *MiniLink™ transmitter/ receiver make a perfect combination for industrial security uses. We now carry Underwater cameras for you sailors, and color units for that true life

view. With our PlaneTalk™ Airborne systems you can now be the pilot! All cameras standard 1v p-p video, 7-14 vdc.



We also carry Computer capture boards fiber optic systems and video support.

MICRO VIDEO PRODUCTS

ORDER LINE CANADA USA MEXICO

800 473-0538

FAX LINE 714 847-4486

16201 OSBORNE ST

WESTMINSTER, CA. 92683

MO. VISA MasterCard intl bank wire

CIRCLE 30 ON READER SERVICE CARD

PORTABLE QRP CW TRANSCEIVER DEC. '90 & JAN. '91 QST BY GARY BREED K9AY



Features: SINGLE-SIGNAL receiver, VFO tuning, AGC for listening comfort, 5 Watts output, Semi-QSK TR switching and CW sidetone. Add a battery, key and antenna and you're on the air. FULL 100% KIT including a custom pre-painted, punched and lettered metal enclosure. 20, 30, 40 Meter available.

Complete Kit Only \$159.95

CA Residents add 7.75% sales tax. S&H: \$5.00 (insured). Foreign orders add 20%. For more info or price list; send legal size SASE (52¢) to:

Fax 714-952-3280 **A&A Engineering**  
2521 W. LaPalma #K • Anaheim, CA 92801 • 714-952-2114

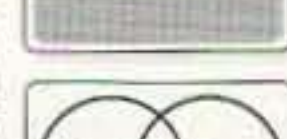
CIRCLE 109 ON READER SERVICE CARD

The World of Ham Radio Callsign Sep 94 Database

The World of Ham Radio CD-ROM includes the FCC amateur call sign database. Scan over 750,000 US ham calls in just seconds with CALLSIGN. A D-Base data file is also included for all your special callsign application needs. You will receive the latest releases in ham radio software programs covering all the amateur categories from programmers all over the world. Let CDVIEW guide you while viewing over 7,000 IBM program files, over 1,000 radio mods, and thousands of SWL frequencies. Available by subscription three times a year in May, September, & January for \$99 US, \$109 Foreign. May 94 issue \$40 plus shipping: USA \$3, Overnight USA \$10, Foreign airmail \$5, AmSoft, PO Box 666, New Cumberland, PA 17070-0666 USA FAX: 717-938-6767



\$40
CD-ROM



AmSoft 717-938-8249

CIRCLE 113 ON READER SERVICE CARD

FT-416/25B, \$255; ICOM W-21A, \$313.50; 47A, \$390; 707-, \$680; MFJ 815 B, \$50; 949EY, \$120; AMERITRON ALS-600, \$1,080; BENCHER BY-1, \$60; BUTTERNUT HF6VX, \$185; CUSHCRAFT 230-VPK, \$120; RF CONCEPTS VHF1-60, \$200; MIRAGE C1012, \$230; LARSEN, IN STOCK; 500 Ft. RG-213, \$150; ROBOT 800CH, \$500. Send 3 3 stamps for more specials. LIMITED TIME OFFERS. LOOKING FOR SOMETHING NOT LISTED OR HARD TO FIND? CALL OR WRITE. OVER 9000 ham-related items in stock for immediate shipment. Mention ad. Prices cash, F.O.B. Preston. HOURS TUESDAY-FRIDAY 9:00 TO 6:00, 9:00-2:00 P.M. MONDAYS. CLOSED SATURDAY & SUNDAY. ROSS DISTRIBUTING COMPANY, 78 SOUTH STATE, PRESTON ID 83263. (208)852-0830. BNB707

ELECTRON TUBES: All types and sizes. Transmitting, receiving, microwave . . . Large inventory = same day shipping. **DAILY ELECTRONICS**, 10914 NE 39th ST. Suite B-6, Vancouver, WA 98682. (800)346-6667 or (206)896-8856. BNB719

MINIATURE POLICE RADAR TRANSMITTER One mile range, \$41 assembled, \$31.00 kit. 9025 Coldwater Rd. Bldg. 100A, Fort Wayne IN 46825. BNB725

HAM RADIO REPAIR—Prompt service. **ROBERT HALL ELECTRONICS**, 1660 McKee Rd., Suite A, San Jose CA 95116. (408)729-8200. BNB751

GET YOUR "FCC COMMERCIAL GENERAL RADIODIOTELEPHONE LICENSE". Electronics Home Study. Fast, inexpensive! "Free" details. **COMMAND PRODUCTIONS**, D-174, Box 2824, San Francisco CA 94126-2824. BNB761

WANTED: HAM EQUIPMENT AND OTHER PROPERTY. The Radio Club of Junior High School 22 NYC, Inc. is not only the Big Apple's largest Ham club but also the nation's only full-time, non-profit organization, working to get Ham Radio into schools around the country as a theme for teaching using our EDUCOM-Education Thru Communication-program. Send your radio to school. Your donated amateur or related property, which will be picked up ANYWHERE or shipping arranged, means a tax deduction to the full extent of the law for you as we are an IRS 501 (c) (3) charity in our fourteenth year of service. Your help will also mean a whole new world of educational opportunity for children around the country. Radios you can write off, kids you can't. Enjoy the coming holiday season by helping someone else and yourself. Please, write-phone-or FAX the WB2JKJ "22 Crew" today: The RC of JHS 22, P.O. Box 1052, New York NY 10002. Telephone (516) 674-4072 or FAX (516) 674-9600. Young people, nationwide, can get high on Ham Radio with your help. Meet us on the WB2JKJ CLASSROOM NET: 7.238 MHz. 1200-1330 UTC and 21.395 MHz. 1400-2000 daily. BNB762

ICOM IC-736 RAFFLE: One hundred tickets ONLY at \$30 apiece. Drawing to be held at 1 p.m. on December 23 at the RC of JHS 22 in NYC. Tickets/questions-WB2JKJ, RCof JHS 22, POB 1052, New York NY 10002. Phone (516) 674-4072, FAX (516) 674-9600. This is going fast, but there is still time-ACT TODAY. BNB763

PACKET RADIO Join TAPR, connect with the largest packet/digital group in the US. Creators of the TNC-2 standard. Benefits: newsletter, software, discount on kits/publications. \$15/year US, \$18 Can/Mex, \$25 elsewhere Visa/MC. When joining, mention 73, receive TAPR's Packet Radio Info booklet (\$7 value) FREE! (817)383-0000. Mail:8987-309 E. Tanque Verde Rd. #337, Tucson AZ 85749-9399. BNB765

QUICK, EASY, & COMPACT
Flash cards "NOVICE thru EXTRA" theory Key words underlined. Over 4000 sets in use! For beginner, OMs, XYLs & kids.

NOVICE	\$11.95
TECHNICIAN	\$10.95
GENERAL	\$9.95
ADVANCED	\$15.95
EXTRAS	\$14.95
Shipping	1-\$3.00
2 or more	-\$4.00
CLUB DISCOUNTS	

Order Today!
from

VIS STUDY CARDS
P.O. BOX 17377
HATTIESBURG, MS 39404

CIRCLE 104 ON READER SERVICE CARD

G5RV All-Band QuickKits™
created by AntennasWest Box 50062F, Provo, UT 84605

• Fast & Easy to Build	• Double Size G5RV	\$59.95
• Fail-Safe visual instructions	• 204 ft 160-10 Dipole	\$35.95
• No measuring or cutting	• Full Size G5RV	\$25.95
• Everything included	• 102 ft 80-10 Dipole	\$21.95
• Finish antenna in minutes	• Half Size G5RV	\$11.95
• Quality Components	• 51 ft 40-10 Dipole	\$11.95
• Presoldered Silver Fittings	• Quarter Size G5RV	\$11.95
• Kinkproof QuietFlex wire	• 26 ft 20-10 Dipole	\$11.95
• Fully insulated, wx sealed, no-corrode, low noise design	• Marconi Adapter kit	\$11.95
• Tune All Bands Incl WARC	• converts any dipole to Marconi	\$11.95
• Build your own from scratch. Order TechNote #124-C \$5.95 ppd USA	• 200' Dacron 250# line	\$11.95

Order Hot-Line: 1-801-373-8425

CIRCLE 349 ON READER SERVICE CARD

▼ ELECTROMAGNETIC FIELD METER ▼

Reduce exposure to potentially harmful electromagnetic fields. AlphaLab's handheld TriField™ Meter measures AC electric fields, AC magnetic fields and radio/microwave power density. Find ground faults, AC current wires or measure high-field generators with the *Magnetic* setting (.2 - 100 milligauss, 60 Hz); identify poorly grounded or shielded equipment, high VDT or fluorescent light fields, distinguish hot vs. ground wires with *Electric* setting (.5 - 100 kV/m, 60 Hz); measure antenna radiation patterns, leaky microwave ovens, etc. on *RF/microwave* setting (50 MHz to 3 GHz, .01 to 1 mW/cm²).

Electric and magnetic settings are omnidirectional, measuring full magnitude of fields without the need to reorient the meter. Price of \$145 includes delivery and one-year warranty.

AlphaLab, 1272 Alameda Ave, Salt Lake City, UT 84102
Call (801) 532-6604 for speedier service or free literature on electromagnetic radiation health risks.



SELL YOUR PRODUCT IN 73 MAGAZINE
CALL DAN HARPER 800-274-7373

All Aluminum

Chassis Kits	Rack Shelves
Cabinet Kits	Rack Equipment Cabinets
Assembled Cabinets	Antenna Grounding Kits
Slope Box Kits	Tower Mounted Box Kits
UHF & VHF Antenna	Dipole Hangers
Power Divider Kits	Other enclosures

Small sheets Aluminum and Brass

Byers Chassis Kits
Charles Byers K3IWK
5120 Harmony Grove Road, Dover, PA 17315
Phone 717-292-4901
Between 6PM and 9:30PM EST. Eves.
"Distributorship Available"

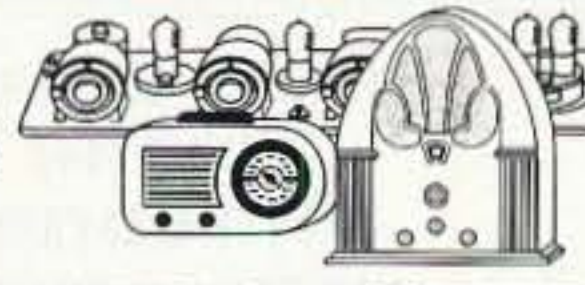
CIRCLE 222 ON READER SERVICE CARD

FREE SAMPLE COPY!

ANTIQUE RADIO CLASSIFIED
Antique Radio's Largest-Circulation Monthly Magazine

Articles - Classifieds - Ads for Parts & Services
Also: Early TV, Ham Equip., Books, Telegraph, 40's & 50's Radios & more...
Free 20-word ad each month. Don't miss out!

1-Year: \$29.95 (\$47.95 by 1st Class)
6-Month Trial - \$16.95. Foreign - Write.
A.R.C., P.O. Box 802-E9, Carlisle, MA 01741
Or Call: (508) 371-0512



Now you can do something about the weather

Our **ULTIMETER™II** Weather Station protects your equipment, gives you up-to-the-second data to transmit on SKYWARN and A.R.E.S. networks.

Tells you when high winds threaten so you can crank down your tower and safeguard other equipment. You get over 20 weather functions:

- Wind Speed and Direction (40 ft. cable)
- Temperature (25 ft. cable)
- Chill Factor
- Alarms • Highs/lows/times/dates • Metric/English • Optional self-emptying rain gauge • 30-day money back guarantee • One-year warranty

HOME WEATHER STATION Only \$179.00
Add a Second Keyboard/Display Unit...Only \$69.00
NEW! Add our PC DATA LOGGER Only \$69.00
Del. in US, add \$8.25 shipping & insurance. NJ res. add 6% tax.
For information or to order with VISA/MC:
TOLL-FREE 1-800-USA-PEET (872-7338)
FAX orders: 908-517-0669
Or send check, m.o. or credit card no. and exp. date to:

PEET BROS. COMPANY 601-4127 Woodland Rd., W. Allenhurst NJ 07711
Free Brochure Our 18th Year ©1993 Peet Bros. Co.



Where's the Beam?

Unobtrusive DX Gain Antennas for 80 thru 10
• Easily hidden • Install Fast • Fixed or Portable •

There's a 20 meter antenna with real DX Punch hidden in this picture. You can't see it, and your neighbors can't either. But it works DX barefoot anyway. How about a low profile 50:40:30 tri-band? Or a 2 element monobander for the attic? All easily fit the pocketbook—Priced \$29 to \$99.

Work DX without telling the neighbors

Infopack \$1

AntennasWest
Box 50062-R, Provo, UT 84605 (801) 373-8425

CIRCLE 332 ON READER SERVICE CARD

UHF REPEATER

Make high quality UHF repeaters from
GE Master II mobiles!

- 40 Watt Mobile-Radio \$199
- Duplexing and tuning information \$12
- Information without radio \$40

Versatel Communications

Orders 1-800-456-5548 For info. 307-266-1700
P.O. Box 4012 • Casper, Wyoming 82604

CIRCLE 259 ON READER SERVICE CARD

SLY LIKE A FOX

NEW

ONLY \$99.95

LET THE MICRO 2B KEY
UP THE VFC400 AND
DO THE TALKING



1145 CATALYN STREET
SCHENECTADY, NY 12303

ORDER BY PHONE OR MAIL
IN U.S.A. ADD \$5 FOR S&H

C.O.D. CHARGES APPLY
NYS RESIDENTS ADD SALES TAX

VFC400 FOX HUNT TRANSMITTER/KIT

ONLY \$99.95

- SMALLEST 400 MILLIWATT TRANSMITTER (1.5" X .56")
- RELIABLE CRYSTAL CONTROL OSCILLATOR
- LINE LEVEL AUDIO INPUT (1-2 VOLTS P to P)
- ELECTRET MICROPHONE INPUT
- 400 MW @ 6 VOLTS, 200 MW @ 4.5 VOLTS
- EASY ASSEMBLY
- TRUE FM (VARACTOR MODULATION)
- INCLUDES TRANSMITTER, CRYSTAL, BATTERYHOLDER, MICROPHONE, ANTENNA, & INSTRUCTIONS



MICRO 2B VOICE RECORDER

- 20/60 SECONDS REC/PLAY
- KEY OUT
- 5-13.8 DC VOLT SUPPLY
- AUTO TIMER (.1 SEC-10 MIN.)
- AUDIO OUT, SPEAKER OR LINE.

- THE MICRO 2B IS THE PERFECT COMPANION TO THE VFC400 FOX HUNT TRANSMITTER
- NATURAL SOUND VOICE PLAYBACK

- THE MICRO 2B WILL KEY THE VFC400 FOX HUNT TRANSMITTER VIA THE KEY OUT FEATURE AND SAY (YOU CAN'T FIND ME) OR WHATEVER YOU LIKE

TECH. FAX: 518-381-1058

TO ORDER: CALL 1-(800)-588 4300

TECH. SUPPORT: 518-381-1057

CIRCLE 281 ON READER SERVICE CARD

Use Your
Reader Service Card Today!
Our Advertisers
Want To Hear From You!



VIDEO I.D. BOARD



- Custom Graphics with your Call Sign
- 4 Screens (2 Hi-res/2 color bar)
- 12 VDC Operation
- Instant Video ID
- Video Relay for switching in Live Camera Video
- Built-in Automatic Sequencer-Timer (steps through all four screens)

VDG-1 with pre-programmed calls:
\$99

Call or write for catalog of available graphics

ELKTRONICS

12536 T.R. 77 • Findlay, OH 45840
(419) 422-8206



ELKTRONICS
12536 T.R. 77
Findlay, OH 45840
(419) 422-8206



CIRCLE 8 ON READER SERVICE CARD

C.P.I.

Dealers for Kenwood, Yaesu, Icom, Cushcraft, AEA, Kantronics, Bencher, Diamond, Astron, MFJ, Hustler, Ameritron, Larsen, ARRL, and more...

Service is also available.

*Get your best price
then call us LAST!!*

(801) 567-9494 - (800) 942-8873
7946 South State Street
Midvale, UT 84047

CIRCLE 156 ON READER SERVICE CARD

COMTELCO INDUSTRIES

Dual Band Mobile Antenna

140 MHz, 440 MHz

MAGNET MOUNT \$21.95

150 watt 12ft. RG58 + connector

PERMANENT MOUNT \$23.50

with NMO/TAD mount 17ft RG58

BNC or PL259 connector

DBD2 DUPLEXER \$49.00

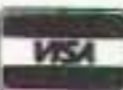
UHF connectors 8" leads

Add 3.50 S&H

1-800-634-4622

COMTELCO INDUSTRIES, INC.

501 Mitchell Rd., Glendale Hts., IL 60139



CIRCLE 15 ON READER SERVICE CARD

SERIOUS ABOUT SOLAR POWER? The PVSP starter kit comes with a 32 watt Solarex VLX panel and a ten amp Sunlogic charge controller. Special introductory price \$275 plus \$7 shipping. **SUNLIGHT ENERGY SYSTEMS**, 2225 Mayflower NW, Massillon OH 44647. BNB774

WE REPAIR BROKEN RADIOS!!! Quality Sales & Service. Icom, Kenwood, Yaesu, Ten-Tec, Azden, KDK & Atlas repaired at reasonable cost. Our famous optimized alignments are available from our sophisticated lab, with 15 years ham-only repair experience. Authorized Kenwood warranty service center. 8-pole and 10-pole Crystal Filters for Kenwood, Icom & Yaesu. Fox-Tango Filters available. Kits & Upgrades. Icom & Kenwood separate Newsletter/supplements. Ship equipment with letter detailing problems and preferred method of payment to: **INTERNATIONAL RADIO & COMPUTER, INC.** 3804 S. US #1, Ft. Pierce FL 34982. (407)489-0956. Send for your free catalog today! BNB776

AGGRESSIVE SALES REPRESENTATIVE seeking additional employment. Would like to sell amateur radio equipment. (910)299-1298. BNB800

R-390A—SALES—SERVICE—PARTS. Info SASE: **MILTRONIX**, P.O. Box 3541, Toledo OH 43608. BNB813

FREE IBM SHAREWARE AND HAM CATALOG. Morse Code Computer Interfaces, \$49.95. **DYNAMIC ELECTRONICS**, Box 896, Hartselle AL 35640. (205)773-2758, FAX (205)773-7295. BNB815

MORSE CODE MUSIC!—Do Aerobics, Sing, or Jog, while learning code! Sensational new discovery and now the secret is yours! Order **THE RHYTHM OF THE CODE** cassette today! \$9.95 ppd **KAWA RECORDS** P.O. Box 319-S, Weymouth, MA 02188. The HIT of the Dayton Hamvention! BNB824

THE ANARCHIST'S BBS is a resource for Anarchists, Investigators, Researchers, Computer Hackers and Phone Phreaks. Categories include: Computer Hacking, Investigation Techniques, Telecommunications Technology and Surveillance. Call (214)289-8328 for free trial access. BNB831

FCC COMMERCIAL LICENSE PREPARATION RADIOTELEPHONE-RADIOTELEGRAPH. Latest home study fast easy audio video. Q & A pool disks. FREE details **WPT PUBLICATIONS** (800)800-7588. BNB840

EARTHQUAKE Forces sale of Lifetime Collection. Make offer! Johnson Viking Invader 2000; Viking 500; Collins 75A-2; R-388/URR; R-391/URR; RME; CEI; other Ham, CB, Military transmitters, receivers, parts, etc. For information send large SASE: Steve Phillips, P.O. Box 4916, Chatsworth CA 91313, (818)998-5654; (818)704-6306. BNB850

ELECTRONICS GRAB BAG! 500 pieces of new components: inductors, capacitors, diodes, resistors. \$5.00 postpaid. **ALLTRONICS**, 2300 Zanker Rd., San Jose CA 95131. BNB855

FREE! 100 PAGE CATALOG WITH PRICES Communications Receivers, Portable Receivers, Amateur Transceivers, HT's & Mobile Transceivers. Amateur & SWL Antennas, Scanners, RTTY and FAX equipment, Computers, Test equipment, Books, Manuals, Accessories. Call (800)527-4642, Fax (214)348-0367, write P.O. Box 551419, Dallas TX 75355-1419. **TUCKER ELECTRONICS & COMPUTERS.** BNB890

HEATHKIT WANTED! S.B. Series "Green Front" for parts. Robert Schlegel, 2302 286th St. East, Roy WA 98580. BNB910

WANTED: BUY AND SELL All types of Electron Tubes. Call (612)429-9397, Fax (612)429-0292. **C & N ELECTRONICS**, Harold Bramstedt, 6104 Egg Lake Road, Hugo MN 55038. BNB915

COMMODORE 64 HAM PROGRAMS-8 disk sides over 200 Ham programs \$16.95/\$29 stamp gets unusual software catalog of Utilities, Games, Adult and British Disks. **HOME-SPUN SOFTWARE**, Box 1064-BB, Estero FL 33928. BNB917

LOW COST HAM EQUIPMENT. Send stamp for list. **WA4DSO**, 3037 Audrey Dr., Gastonia NC 28054. BNB927

RADIO REPAIR Amateur and commercial, professional work. Fred Fisher WF9Q, 6866 W. River Rd., South Whitley IN 46787. (219)723-4435. BNB930

RF TRANSISTORS, Japanese transistors and tubes need dealers, repair shops, kit makers, etc. for 2SC1969, 2SC2312, MB8719, MRF455, MRF454, 2SC2879 and more. **WESTGATE** (800)213-4563. BNB950

FREE HAM GOSPEL TRACTS. SASE. N3FTT, 5133 Gramercy, Clifton Heights PA 19018. BNB960

AMIGA, MACINTOSH HAM 12-disk collections of amateur radio PD/shareware software \$29.95 ppd. Morse, packet, electronics, more! SPECIFY COMPUTER TYPE. **Kinetic Designs**, Box 1646, Orange Pk, FL 32067-1646. BNB965

PRINTED CIRCUIT BOARDS for projects in 73, *Ham Radio*, *QST*, ARRL Handbook. List SASE. **FAR CIRCUITS**, 18N640 Field Ct., Dundee IL 60118. BNB966

PORTABLE 2 METER BEAM Easy assembly, ruggedly made, all parts store in boom, 7.5 dBd gain, \$50.00 US + shipping. SASE for info. **AURORA ANTENNAS** Box 477, Penticton BC Canada V2A 6K6, (604)492-5084. BNB975

AZDEN SERVICE by former factory technician. **SOUTHERN TECHNOLOGIES AMATEUR RADIO, INC.**, 10715 SW 190 St. #9, Miami FL 33157. (305)238-3327. BNB979

1995 ANTIQUE RADIO calendar; 1995 Classic Amateur Radio calendar, \$9.95 each. **ACCESSORIES UNLIMITED**, 160 N. Church, Mt. Pleasant PA 15666. BNB990

ROTOR PARTS ROTOR SERVICE, ROTOR accessories: Brak-D-Lays, Quik-Connects, Pre-Set mods. NEW models for sale. Free catalog. **C.A.T.S.**, 7368 State Road 105, Pemberville OH 43450. BNB996

NEW! THE HANDY HAMBOOK BY K2EWA. 200 pages, 5-1/2" x 8-1/2". Technical data and practical info including formulas, tables, nomographs, charts, operating aids and much more. Only \$12.00 + \$2.50 S/H. NJ residents add 6% tax. **Romanco**, POB 34, Milltown, NJ 08850-0034. BNB997

Wanted: Squires-Sanders receiver, SS-1V band-scan. **Weber**, 4845 West 107th Street, Oak Lawn IL 60453-5252. BNB998

Wanted: Owner's service manuals for Sears Comm. receiver #412-3638-07000. Jose Varas, 514 3rd St. 1B, Union City NJ 07087; (201) 863-8759. BNB999

Home Automation Become a dealer in this fast-growing field. Free information, (800) 838-4051. BNB1000

Wanted For Museum: Apple-1 and other pre-1980 microcomputers. also early microcomputer journals, newsletters and advertising literature. **KK4WW**, (703) 231-6478/763-2321. BNB 1001

Emergency Communications T-shirts in large letters on back with Federally Licensed Radio Operator insignia on front. 100% cotton in Large, XL, XXL. \$18.00. 1-800-435-3528. BNB 1002

PAY TV AND SATELLITE DESCRAMBLING
All New Info VOLUME 6 All New Info

• Volume 6 — our best yet — details all known fixes for all cable, wireless and satellite systems. Many do-it-yourself. Schematics included, only \$15.95.

• Pay TV Volumes 1-5 (all different) • Hacker Video(VHS)
• Wireless Cable Hacking • Build Satellite Systems (includes DBS)
• Complete Wizard (VC2+) • All these titles. \$15.95 each. 3/\$34.95, 5/\$52.95
• Monthly newsletter \$29.95/yr. • new catalog \$1 • All our info \$129.95

SCRAMBLING NEWS
1552 Hertel Ave. #123, Buffalo, NY 14216
Voice/FAX/BBS 716-874-2088
C.O.D.'s are OK Add \$6

CIRCLE 36 ON READER SERVICE CARD

Next Day **QSLs**
Two-Color Rainbow Assortment

Baraboo, Wisconsin Salt Co. **KOZZ**

Call Today & We Ship

Next Day	2nd Day	ASAP
100	\$29.95	\$24.95
200	\$39.95	\$34.95
400	\$49.95	\$44.95
500	\$54.95	\$49.95
1000	\$99.95	\$89.95

Info \$1
Antennas West
(801) 373-8425

All orders ppd 2nd day air! priority mail.
For overnight air delivery add \$10.
Box 50062-S, Provo, UT 84605

CIRCLE 5 ON READER SERVICE CARD

ATV CONVERTERS • HF LINEAR AMPLIFIERS

DISCOVER THE WORLD OF FAST SCAN TELEVISION

70 CM



33 CM

AMATEUR TELEVISION CONVERTERS
ATV3 420-450 (GaAS-FET) \$ 49.95 Kit
ATV4 902-928 (GaAS-FET) \$ 59.95 Kit

2 METER VHF AMPLIFIERS
35 Watt Model 335A \$ 79.95 Kit
75 Watt Model 875A \$119.95 Kit
Available in kit or wired/tested

HF AMPLIFIERS per MOTOROLA BULLETINS
Parts List for HF Amplifiers (2-30MHz)
Described in the MOTOROLA Bulletins
AN758 300W AR313 300W
AN762 140W AR305 300W
AN779L 20W EB63 140W
AN779H 20W EB27A 300W
EB104 600W

New!! 1K WATT 2-50 MHz Amplifier

POWER SPLITTERS and COMBINERS 2.39MHz
600 Watt PEP 2-Port \$ 69.95
1000 Watt PEP 2-Port \$ 79.95
1200 Watt PEP 4-Port \$ 89.95

100 WATT 420-450 MHz PUSH-PULL LINEAR AMPLIFIER - SSB - FM ATV
KEB67-PK (Kit) \$159.95
KEB67-PCB (PC Board) \$ 18.00
KEB67-I (Manual) \$ 5.00

UNIVERSAL DIGITAL FREQUENCY READOUT
TK-1 (Wired/tested) \$149.95

HEAT SINK MATERIAL
Model 99 Heat Sink (6.5 x 12 x 1.6) \$ 24.00
CHS-8 Copper Spreader (8 x 6 x 3/8) \$ 22.00

We stock Hard-to-Find parts
CHIP CAPS-Kemet/ATC
METALCLAD MICA CAPS-Unelco/Semco
RF POWER TRANSISTORS
ARCO TRIMMER CAPACITORS
BROADBAND HF TRANSFORMERS

MINI-CIRCUIT MIXERS
SBL-1 (1-500Mz) \$ 6.50
SBL-1X (10-1000Mz) \$ 7.95

Low Pass Filters
for Harmonics (Up to 300W)
10m, 15m, 20m, 40m, 80m & 160m

For detailed information and prices, call or write for our free catalog.

CCl Communication Concepts Inc.
508 Millstone Drive • Beavercreek, Ohio 45434-5840
(513) 426-8600 • FAX (513) 429-3811

CIRCLE 99 ON READER SERVICE CARD

PERSONAL COMPUTER REPEATER CONTROLLER
PCRC
Speaks for Itself



- ✓ Full Duplex Autopatch
- ✓ 911 Emergency Access
- ✓ Reverse Autopatch
- ✓ Voice Mail
- ✓ Voice/Tone/DTMF Paging
- ✓ Links
- ✓ Hardware Logic I/O
- ✓ Morse Code Practice
- ✓ Toll Restriction
- ✓ Voice ID's
- ✓ BSR X10
- ✓ Scheduler
- ✓ Programmable Courtesy Tones
- ✓ HF Remote Control
- ✓ Remote Base

PCRC/2 Combines the power of your XT/ATplatform with a high quality play and record voice digitizer creating the ultimate repeater controller. *from \$695*

516-563-4715
Fax: 563-4716 BBS: 286-1518

CIRCLE 198 ON READER SERVICE CARD

Perfect Holiday Gift

RF HUNTER TESTER!
DIGI-FIELD
DIGITAL FIELD STRENGTH METER

- Measure your antenna strength
- Check your property for EMF
- Hunt for radio interference
- Pattern your antennas
- Test your house (microwave, 60 cycle noise)
- DC to 12 GHz!

MODEL "A" NORMAL USE at 100MHz -38 dBm (150 nanowatts)
MODEL "B" ULTRA SENSITIVE at 100MHz -57 dBm (2 nanowatts)
NEW! MODEL "C" "A-B" switch
Combines both Models!
TELESCOPIC ANTENNA INCLUDED
EXT. ANT. OPT. LOW BAT. IND.
CALIBRATION CURVES IN dBm, VOLTS and POWER.

\$139.95 Plus \$6.50 s/h



To order call - (800) FIELD 58 (343-5358)
I.C. Engineering 16350 Ventura Blvd.
Suite 125, Encino, CA 91436 PH.(818) 345-1692 • 818-345-0517 Fax

CIRCLE 293 ON READER SERVICE CARD

CABLE X-PERTS, INC.

COAX	100FT/UP	500FT
FLEXIBLE 9913 UV RES DIRECT BURIAL JACKET	.62/FT	.59/FT
9913 EQUAL UV RESISTANT JACKET	.47/FT	.43/FT
RG 213/U MIL-SPEC DIRECT BURIAL JACKET	.34/FT	.32/FT
RG 8/U FOAM 95% BRD UV RESISTANT JACKET	.32/FT	.30/FT
RG MINI-8X BLK, CLR or SILVER JKT (UV RES)	.16/FT	.15/FT
RG 58/U SOLID CENTER CONDUCTOR	.15/FT	.13/FT
RG 58A/U STRANDED CENTER CONDUCTOR	.17/FT	.15/FT
RG 142/U DBL SILVER BRD TEFLON	1.30/FT	1.10/FT
RG 214/U DBL SILVER BRD IIA JACKET	1.50/FT	1.30/FT
RF 11/U FOAM PE SOLID CENTER 95% BRD	.42/FT	.40/FT
450 OHM LADDER LINE 18GA SOLID CW COND.	.12/FT	.11/FT
LMR 800 LOW LOSS (LIKE 1/2" HARDLINE)	1.47/FT	1.45/FT
LMR 400 LOW LOSS (SIMILAR TO 9913)	.62/FT	.60/FT

ROTOR CABLE

	20/FT	18/FT
STANDARD DUTY (8 COND) 2/18 6/22 UV RES	.20/FT	.18/FT
HEAVY DUTY (8 COND) 2/18 6/20 UV RES JKT	.35/FT	.33/FT
EXTRA HVY DUTY (8 COND) 2/14 6/18 UV RES JKT	.48/FT	.46/FT
18GA 4/C GRAY PVC JACKET	.15/FT	.13/FT
18GA 5/C GRAY PVC JACKET	.17/FT	.15/FT
18GA 7/C GRAY PVC JACKET	.19/FT	.17/FT

ANTENNA WIRE

	14/FT	12/FT
14 GA 168 STR SUPERFLEX UNINSULATED	.14/FT	.12/FT
14GA 7/22 HARD DRAWN BC UNINSULATED	.08/FT	.07/FT
14GA SOLID "COPPERWELD" UNINSULATED	.07/FT	.06/FT
14GA SOLID BC UNINSULATED	.07/FT	.06/FT
12GA 19/25 BC UNINSULATED	.13/FT	.11/FT
18GA 26/30 BC INSULATED	.07/FT	.06/FT
14GA 41/30 BC INSULATED	.09/FT	.08/FT
12GA 65/30 BC INSULATED	.13/FT	.12/FT
DACRON ROPE DBL BRD 3/16" 770# TEST	.12/FT	.10/FT

BALUNS

	PRICE
W2AU 1:1 OR 4:1 1.8-40MHz TRANSFORMER TYPE	\$21.00/EA
W2DU 1:1 1.8-30MHz CURRT TYPE DIPOLE OR BEAM	\$23.00/EA
ORIGINAL G5RV KIT	\$25.00/EA
LADDER-LOC	\$11.95/EA

D.C. POWER SUPPLIES

4AMP W/LIGHTER PORT	\$29.95/EA
11AMP W/BANANA PLUG TERMINALS	\$61.95/EA
14AMP W/BANANA PLUG TERMINALS	\$71.95/EA
20AMP W/BANANA PLUG TERMINALS	\$86.95/EA

WIRE

	25FT \$10.00	50FT \$20.00	100FT \$38.00
100GA 2/C RED/BLK	25FT \$10.00	50FT \$20.00	100FT \$38.00
12GA 2/C RED/BLK	25FT \$7.50	50FT \$15.00	100FT \$28.00
1" TINNED COPPER BRAID 10 FT \$10.00	25FT \$20.00	100FT \$75.00	
1/2" TINNED COPPER BRD 25FT \$12.00	50FT \$24.00	100FT \$40.00	

CONNECTORS

PL 259 SILVER/TEFLON/GOLD TIP	10PKS \$11.00	25PKS \$25.00
"N" CONNECTOR SILVER/GOLD TIP	10PKS \$32.50	25PKS \$75.00

MORE ITEMS STOCKED...
CABLE & WIRE CUT TO YOUR SPECIFIC LENGTH!
ORDERS ONLY: 800-828-3340
TECH INFO: 708-506-1886 FAX: 708-506-1970
113 McHenry Rd., Suite 240
Buffalo Grove, IL 60089-1797
For Complete Literature Mail SASE

Uncle Wayne's Bookshelf

REFERENCE

TAB2701 Transmitter Hunting by Joseph Moell and Thomas Curlee Radio direction finding simplified. \$19.95

03R02 RTTY Today by Dave Ingram Modern guide to amateur radioteletype. \$8.50

05E03 First Book of Modern Electronics Unique projects that are money saving. \$12.95

09D22 The World Ham Net Directory by Mike Witkowski New—2nd edition. Introduces the special interest ham radio networks and shows you when and where you can tune them in. \$9.50

WGP87158 1994 North American Callbook The 1994 North American Callbook lists the calls, names, and address information for 500,000+ licensed radio amateurs in all countries of North America. \$29.95

05H24 Radio Handbook, 23rd Ed. by William I. Orr W6SAI 840 pages of everything you wanted to know about radio communication. \$39.95

WGP1234 1994 International Callbook The new 1994 International Callbook lists 500,000+ licensed radio amateurs in the countries outside North America. It covers South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions). \$29.95

02B10 Heath Nostalgia by Terry Perdue K8TP 124 page illustrated history of the Heath Company. Includes many fond memories contributed by long-time Heathkit employees. \$9.50

12E76 Basic Electronics Prepared by the Bureau of Naval Personnel Covers the important aspects of applied electronics and electronics communications. \$10.95

12E41 Second Level Basic Electronics Prepared by the Bureau of Naval Personnel Sequel to Basic Electronics, thorough treatment of the more advanced levels of applied electronics. \$9.95



01D45 The Illustrated Dictionary of Electronics, 5th Ed by Rufus P. Turner and Stan Gibilisco An exhaustive list of abbreviations, and appendices packed with schematic symbols and conversion tables. \$26.95

20N091 Most-Often-Needed Radio Diagrams and Servicing Information, 1926-1938, Volume One compiled by M.N. Beitman An invaluable reference for anyone involved in Vintage Radio restoration. \$11.95

20N096 How To Read Schematics (4th Ed.) by Donald E. Herrington Written for the beginner in electronics, but it also contains information valuable to the hobbyist and engineering technician. \$14.95

WLSW0CP Radio Operator's World Atlas by Walt Stinson, W0CP This is a compact (5x7), detailed, and comprehensive world atlas designed to be a constant desk top companion for radio operators. \$17.95

20N020 Secrets of RF Circuit Design by Joseph J. Carr Written in clear non-technical language, covers everything from antennas to transistors. \$19.50

DP918 73 Magazine Index 1960-1990 A complete index to every article published in 73 Magazine through 1990. Book \$15.00
DP919 IBM software (specify type) \$20.00

DP919 Product Reviews Since 1945 Contains an index to 3,400 product reviews that have appeared in QST, CQ, HR, 73 and Radcom. Book \$12.95 IBM Software 5.25 \$10.00

BB10036 1994 World Radio TV Handbook 600p. Country-by-country listings of long, medium and shortwave broadcasting stations by frequency, time, and language. Includes world satellite broadcasts, world broadcasts in English, broadcaster addresses, transmitter site maps, and a ton of other valuable listening information. All that for only \$20. Amazing! \$20.00

TB17294 Troubleshooting & Repairing Compact Disc Players by Davidson. 488 p. Everything and a half you'll need to know to service these confounded things. There's a mint to be made fixing CD players, hi-fi systems and VCRs. \$25.00

WAYNE'S PICKS

SS8756 Warning! The Electricity Around You May Be Hazardous To Your Health by Ellen Sugarman An invaluable guide to the risks of electromagnetic fields, and steps you can take to protect yourself and your family. \$11.00

IB8657 Dumbing Us Down: The Hidden Curriculum Of Compulsory Schooling. by John Gatto If you enjoyed "Declare War", you'll enjoy this also. A Wayne Green recommended reading. \$9.95.

WG2 The Million Dollar Video Uncle Wayne has made a video which explains how just about any company can increase sales by over a million dollars just through the sneaky (aka intelligent) use of promotion. As a magazine editor and publisher he explains in detail how you can manipulate these people to give you tons of free advertising. After all, when one new product release in a magazine can bring in sales equivalent to a full page paid ad, you need to know how to take advantage of this gold mine. \$39.95 for a video of Uncle Wayne showing you how to beat the system. Order \$1 million Video.

SHORTWAVE

NBPAW94P 1994 Passport to World Band Radio by International Broadcasting Services. Lid You'll get the latest station and time grids. \$17.95

03S11 Shortwave Receivers Past and Present edited by Fred J. Osterman Guide to 200+ shortwave receivers manufactured in the last 20 years. The Blue Book of shortwave radio value. \$8.95

07R25 The RTTY Listener by Fred Osterman New and expanded. This specialized book compiles issues 1 through 25 of the RTTY Listener Newsletter. Contains up-to-date, hard-to-find information on advanced RTTY and FAX monitoring techniques and frequencies. \$19.95

UE221 US Military Communications (Part 1) US Military communication channels on shortwave. Covers frequencies, background on point-to-point frequencies for the Philippines, Japan and Korea, Indian and Pacific Oceans, and more. \$12.95

UE222 US Military Communications (Part 2) Covers US Coast Guard, NASA, CAP, FAA, Dept. of Energy, Federal Emergency Management Agency, Disaster Communications, FCC, Dept. of Justice. From 14 KC to 9073 KC. \$12.95

UE223 US Military Communications (Part 3) Completes the vast overall frequency list of US Military services, from 8993 KC to 27,944 KC. \$12.95

09S42 The Scanner Listener's Handbook by Edward Soomre N2BFF Get the most out of your scanner radio. \$14.95

CRBTIO Tune in on Telephone Calls by Tom Kneitel K2AES Formatted as a frequency list

with detailed description of each service and its location in RF spectrum. \$12.95

UE205 Guide to Radioteletype (RTTY) Stations by J. Klingenfuss Updated book covers all RTTY stations from 3MHz-30MHz. Press, Military, Commercial, Meteo, PTTs, embassies, and more. \$12.95

CRBASG Air Scan Guide to Aeronautical Communications (5th Ed.) by Tom Kneitel K2AES Most comprehensive guide to monitoring US aeronautical communications. Covers all Canadian land airports and seaplane bases, plus listings for Central America, the Caribbean, North Atlantic, and the Pacific Territories. \$14.95

07A66 Aeronautical Communications Handbook by Robert E. Evans Exhaustive, scholarly treatment of shortwave aeronautical listening. \$19.95

CRBTSR The "Top Secret" Registry of US Government Radio Frequencies (7th Ed.) by Tom Kneitel K2AES This scanner directory has become the standard reference source for frequency and other important information relating to the communications of federal agencies. \$19.95

CRBFCF Ferrell's Confidential Frequency List, New Revised Edition compiled by A.G. Halligey All frequencies from 4 MHz-28MHz covering ship, embassy, aero, Volmet, Interpol, numbers, Air Force One/Two, more. \$22.95

15A002 Scanner and Shortwave Answer Book by Bob Grove Most frequently asked questions by hobbyists. \$13.95

CRBNDS National Directory of Survival Radio Frequencies by Tom Kneitel K2AES Handy and concise reference guide to high interest communications frequencies required by survivalists. \$8.95

CRBSM1 Scanner Modification Handbook, Vol. 1 by Bill Creek provides straightforward step-by-step instructions for expanding the operating capabilities of VHF scanners. \$17.95

CRBSM2 Scanner Modification Handbook Vol. 2 by Bill Creek Here it is—a companion to Vol. 1. In fact, Vol. 2 has a section that provides improved approaches and updated techniques for the mods in Vol. 1. There's 18 new exciting modifications for popular scanners. \$17.95

11EE06 Guide to Embassy Espionage Communications by Tom Kneitel K2AES Candid and probing examination of worldwide embassy and (alleged) espionage communications systems and networks. \$10.95

20N094 A Flick of the Switch, 1930-1950 by Morgan E. McMahon Discover the fast-growing hobby of radio collecting. \$8.95

07R26 World Wide Aeronautical Communications by Robert E. Evans Aircraft/Air Traffic Control, Aircraft/Company Operations, Aviation Weather Broadcasts, Aeronautical Flight Tests, Worldwide Military Air Forces, Aero Search & Rescue, Aero Law Enforcement, NASA Flight Support, Aero Terms & Abbreviations and Aero Tactical Identifiers. \$6.95

UE201 World Press Services Frequencies (RTTY) New 5th Ed A comprehensive manual covering radioteletype news monitoring—contains all information—antenna, receiving, terminal units, plus three extensive frequency lists. \$8.95

SOFTWARE

04M54 GGTE Morse Tutor From beginner to Extra class in easy self-paced lessons. Code speeds from 1 to over 100 words per minute. Standard or Farnsworth mode. Adjustable tone frequency. Create your own drills, practice or actual exams. Exams conform to FCC requirements. 5 1/4" floppy for IBM PC, XT, AT, PS/2 or compatibles. GG3 1/2+, GG525 \$19.50

GGADV35+, GGADV5 Advanced Edition \$29.95

20N021 No Code Ham Radio Education Package Computer software package. Includes computer aided instruction software (IBM compatible), 200 page Ham Radio Handbook. \$29.95

20N022 Ham Operator Education Package Computer software contains five IBM compatible discs with all questions for all license classes, plus "Morse Academy" code teaching software that takes you from 0-20 wpm. \$28.95

Lanze Code Programs—(Available on 5 1/4" * disk.) Inexpensive complete study guide code programs for both the C64/128 Commodores and the IBM compatibles. Programs include updated FCC questions, multiple choice answers, formulas, schematic symbols, diagrams, and simulated (VE) sample test.

	IBM Part#	Commodore Part#	Price
Novice	LZIBM01	LZCOM01	\$14.95
Tech	LZIBM02	LZCOM02	\$14.95
General	LZIBM03	LZCOM03	\$14.95
Advance	LZIBM04	LZCOM04	\$19.95
Extra (New Pool)	LZIBM05	LZCOM05	\$19.95

* Add \$2.00 for 3 1/2" Disk

LZIBM06, LZCOM06 IBM/Commodore Tech No Code—Lanze Code Program Contains all the authorized FCC questions and answers used in testing formulas, schematic symbols, diagrams, and sample test for passing the new Technician No Code license. \$24.95

IBM97 Amateur Radio Part 97 Rules New Edition, complete FCC rules. \$9.00

VIS Study Cards Compact, up-to-date Flash Cards with Key Words, Underlined, Quiz on back. Formulas worked out. Schematics at your fingertips. Used SUCCESSFULLY by ages 6 to 81!

NOVICE	VIS01	\$11.95
TECH	VIS02	10.95
GENERAL	VIS03	9.95
ADVANCED	VIS04	15.95
EXTRA	VIS05	14.45



\$545*
for 2-Day Delivery
*Up to 12 lbs. in Continental USA
Call for Catalog
Ask for Ext. 22

Holiday

Savers

1-800-426-2891
Phone Hours
M-F 8am-8pm
Sat. 10am-5pm
CST



ALINCO
ALINCO ELECTRONICS INC.

KENWOOD

YAESU



DJ-G1T

So much for so little. This 2 meter HT offers dual band receive and a spectrum scope display. Full features include air band receive, CTCSS encode, DTMF, DSQ, 80 memories, scan, auto dialer, auto off and more.

SAVE \$40 MORE



NEW COUPON'S!

DR-M06



NEW
Now 6 Meter
New propagation modes and new contacts are yours on the 6 meter band with this new mobile from Alinco. It offers FM performance with 100 memories, handles unique splits, tone encode, time out timer and more.

\$369⁹⁵

Alinco Coupons Expire 1/15/94



99¢ CASE

TH-79A

This slim line dual bander sports a dot-matrix LCD (for a perfect Alpha numeric display), 82 memories, non-volatile memory with ID, DTSS, DTMF & CTCSS V/V & U/U receive & "FET" power make this a winner.

* With Purchase of radio

\$479⁹⁵

Get a Case for 99¢ w/purchase 9/20/94-12/30/94
Direct Cash Back from Factory 9/20/94-11/30/94

\$30 CASH BACK REBATE

TM-241A



This 2 meter FM mobile provides the user-friendly operation the amateur radio operator expects from Kenwood. It comes complete with extra-large display, DTMF microphone, wide band receive and illuminated switches. For the experienced operator, an additional feature is available which allows you to connect to as many as 4 mobile transceivers by remote control.

\$329⁹⁵

*Supplies Limited to SOH

SAVE \$150

FT-890/AT

A fine blend of high performance features borrowed from the FT-1000 and the FT-990 are combined in this affordable transceiver. Pass band tuning, variable notch filter, variable noise blanker and VOX, dress out this 100W rig. This model includes a built-in antenna tuner to expand your mobile fun. Great for base operation also.

* FT-890 - \$169.95 - Limited to SOH



~~\$1279⁹⁵~~
~~\$150⁰⁰~~
\$1129⁹⁵
with coupon

SAVE \$30

FT-2500M

This new 2 meter mobile borrows its ruggedness from the FT-2400H while adding great new features such as advance track tuning, time out timer, A.P.O., 9600 bps option, 31 memories, the new "omni-glow" LCD display and more!

~~\$356⁵⁰~~
~~\$30⁰⁰~~
\$326⁵⁰
with coupon

*Supplies Limited to SOH

FREE VOX

IC-820H

This new satellite Dual band all mode base is designed to provide critical performance with Icom technology. Competitively priced. Features include Data port, 50 memories, TXCO, Noise Blanker, DDS, Compact size and much much more.

* EX1514 \$120⁰⁰ Value Yours FREE when you purchase: IC-275, IC-475, IC-575, IC-820H, IC-2330A, IC-728, IC-735, or IC-707.



\$1629⁹⁵

IC-281H

This 50 watt 2 meter mobile is equipped with a data port, 440 MHz receive, 60 memories, auto dialer, auto off, direct frequency entry, and cross band duplex operation. Easy one touch operation. There's more to discover with Icom.



\$389⁹⁵

ICOM

IC-736A



Here's the H.F. rig you've been holding out for! It features a full 100 watts output from 160 meters through 6 meters with a built in antenna tuner and power supply, VOX, PBT, RF Gain, 101 memories and more provides you with the latest features and fun.

\$1919⁹⁵

NEW

IC-738

Icom does it again with a new radio worth the word "Great" utilizing DDS technology, 1 Hz of tuning resolution is displayed with VOX, RF gain, 100 watt 100% duty cycle, 101 memories, quick split auto antenna tuning with step function, dual CW ports and more stack up to a feature packed HF rig.



\$1549⁹⁵

NEW LOW PRICE

IC-W21AT

This newest Icom dual band handheld transceiver offers unsurpassed performance and the kind of innovative features amateurs have come to expect from Icom. From the unique new whisper function, auto-output power selection to many other trendsetting features, so impressive you'll want to experience it for yourself. This radio sports 70 memories, pager, CTCSS, and many other features.



\$429⁹⁵

Authorized Factory Warranty Center

We offer factory authorized warranty service for Icom, Kenwood and Yaesu. We service all makes and models. Our customers may send any product requiring service to us, and we will handle it for them. This is a one-stop service that keeps our customers having more fun than hassle in this hobby. If you need a custom cable for packet and don't have time to make it, let us do it for you. C.A.P. & M.A.R.S. mods are also available at reasonable rates to authorized hams only.

2663 County Road I, Mounds View, MN 55112
Metro: (621) 786-4475 • Nat'l Watts: 1-800-426-2891 • FAX (612) 786-6513

Store Hours: M-F, 10:00 am - 8:00 pm, Sat., 10:00 am - 5:00 pm
Phone Hours: M-F, 8:00 am - 8:00 pm, Sat., 10:00 am - 5:00 pm

CIRCLE 153 ON READER SERVICE CARD

Call for Catalog
Ask for
Ext. 22

Not Responsible For Typographical Errors.

Expires
December 31
1994



Prices Subject To Change Without Notice.

NEW HF

Compact HF Transceiver FT-900AT

Introducing an HF that's going places.

"With the small snap-off remote front panel design, it's an HF mobile."



"It's a great base, too. Direct keypad entry, built-in antenna tuner, CW keyer with adjustable speed, 100 Watts, Omni-Glow display... Wow!"

"Yaesu did it again!"

speech processor, twin stacking VFOs, and IF Shift and Notch. No competitor offers this! Bonuses, such as signal



The FT-900AT controls mount almost anywhere in your car, truck or camper. 100 Watt RF deck can mount in trunk, or under seat.

strength, power output, SWR and ALC digital meters, add value to the FT-900AT, and the proven duct-flow cooling system provides excellent long-term transmit power output reliability and frequency stability. For ease of use, Yaesu's exclusive Omni-Glow display enhances viewing in any light condition. And, since the high speed antenna tuner is built-in, it means less clutter in your shack.

For sheer high-performance, anywhere, the incomparable FT-900AT ranks with the FT-1000 to further establish Yaesu as the choice of the world's top DX'ers.

Trust Yaesu to know what you want. True HF you can take with you or leave at home! Available now at your Yaesu dealer.

Uncompromising HF quality that will change your lifestyle. It's the first transceiver with true HF technology to go mobile in any vehicle or stay at home as a compact base station.

With its revolutionary, small, snap-off remote panel, the controls of the FT-900AT can install almost anyplace in your car, truck or camper. Since the 100 Watt RF deck can be installed under a seat or in your car trunk, it's away from critical automotive electronic wizardry. And, for ultimate convenience, the built-in antenna tuner simplifies in-car operation.

As a base station, the compact full function FT-900AT includes direct keypad entry for pinpoint accuracy during quick band/frequency changes. Other features you'll like include CW keyer with front panel speed adjustment,



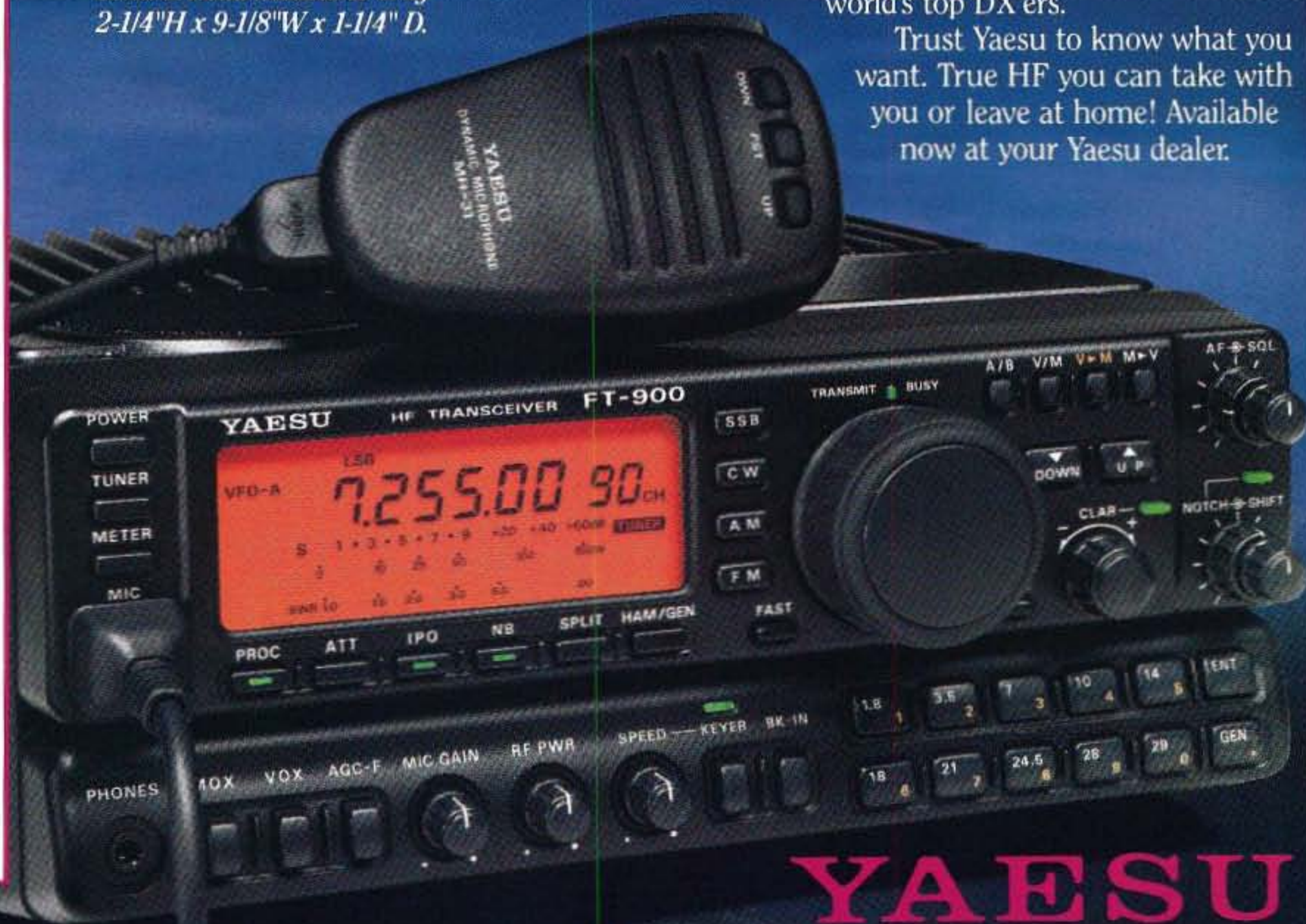
Remote front panel control head measures only 2-1/4"H x 9-1/8"W x 1-1/4" D.

Specifications

- Remote Front Panel Design
- Built-In Auto Antenna Tuner
- Direct Keypad Entry when used as a Base Station
- Large, Bright Omni-Glow™ LCD Display
- 100W on SSB, CW, FM modes; 25W on AM
- IF Shift and 30db Notch Filter
- Digital S/R, SWR & ALC Meters
- Programmable CTCSS Encode w/Repeater Offset
- Direct Digital Synthesis (DDS)
- 100 Memory Channels
- Frequency Range
RX: 100 kHz-30 MHz
TX: 160-10 meters
- CW Full Break-in Keying w/ Adjustable Speed
- Fast/Slow AGC Circuit
- Intercept Point Optimization
- Duct Flow Cooling System
- Twin Band Stacking VFOs
- Built-in Noise Blanker
- Built-in Adjustable Speech Processor

ACCESSORIES:

- YSK-900 Remote Mount Kit
- MMB-62 Controller Bracket
- MMB-20 Mobile Mtg. Bracket
- SP-7 Mobile External Spkr.
- SP-6 Base Station External Spkr.
- DVS-2 Digital Voice Recorder
- FP-800 20A HD Power Supply
- YH-77ST Headphone



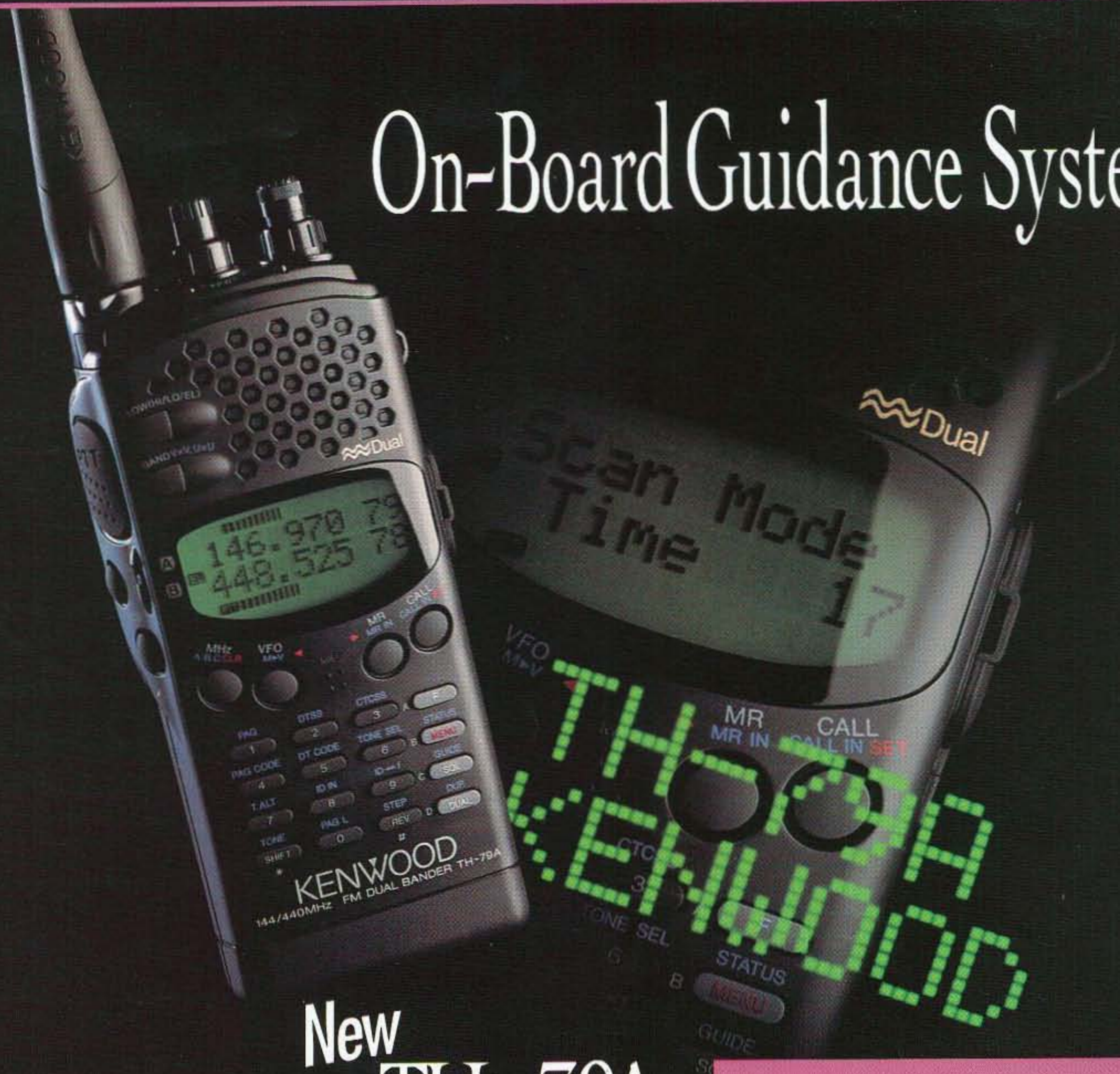
YAESU

Choice of the World's top DX'ers

© 1994 Yaesu USA, 17210 Edwards Road, Cerritos, CA 90703 (310) 404-2700

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

On-Board Guidance System



New TH-79A FM DUAL BANDER

Information at your fingertips. Everything you need to know about operating the new TH-79A FM dual-bander (144MHz/440MHz) can be viewed in its unique dot-matrix LCD with alphanumeric display. No need for the manual. In addition to this innovative guide function, the TH-79A sports a user-friendly menu system, providing easy access to the many powerful features of this slim-line handheld transceiver. Such as 82 non-volatile memory channels with ID, DTSS and page functions, and a DTMF memory function for auto-dial operation. Full-crossband duplex operation is available, as is the ability to receive two frequencies on the same band (VHF+VHF or UHF+UHF) simultaneously. And thanks to the FET power module, long hours of operation are possible on one charge. With the TH-79A, transceiver technology enters the 21st century.

Features

- 2.7W approx. output (144MHz), 2W approx. output (440MHz) from MOS FET power module and supplied 6V battery; 5W approx. output using optional PB-34
- Dot-matrix LCD with menu/guide system
- 82 non-volatile memory channels with ID
- DTMF keypad with memory function
- DTSS (Dual-Tone Squelch System) with page
- Built-in CTCSS tone encoder/decoder
- Automatic band change ■ Power-on call sign display
- Auto repeater offset (VHF) ■ Input overvoltage warning
- 3-position output power control
- Auto power-off and battery save function ■ Time-out timer
- Multiple scan modes ■ Cross-band repeater function
- Page answer-back function ■ Channel display function
- Wideband receiver coverage, including AM receive on the aircraft band*
- Modifiable for MARS/CAP use**

*Specifications guaranteed for Amateur bands only.

**Permits required. Specifications guaranteed for Amateur bands only.

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745
•Customer Support/Brochures (310) 639-5300
•Repair Locations/Parts (800) KENWOOD •Bulletin Board Service (BBS) (310) 761-8284
KENWOOD ELECTRONICS CANADA INC.
6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

KENWOOD