JUNE 1987
Issue #321

73® Amateur Radio

USA $2.95
CAN. $3.95
A WGE Publication

Novice Enhancement **BUYER'S GUIDE** p. 34

1987 SSB Championships: Top Claimed Scores p. 42

Gold Mine At 1.2 GHz p. 24

Head-To-Head IC-38A vs. TM-3530A p. 18

Easy 220 Receiver Conversion p. 32

Table of Contents

A Guided Tour of 1.2 GHz
The 23-cm band is Novice Enhancement's least-understood allocation—come on up and see what you've been missing. KT2B 24

The Digital Novice
Jim Grubbs leads you through the basics of a ham's digital world—from Sam Morse through packet. K9EI 28

Tune In 220
Convert the GE MASTR-PRO receiver to 220 MHz—it's as easy as winding a few coils. W3DTN 32

Novice Enhancement Buyer's Guide
Everything and anything that the "enhanced" Novice might want or need for the new bands and modes. ..... Staff 34

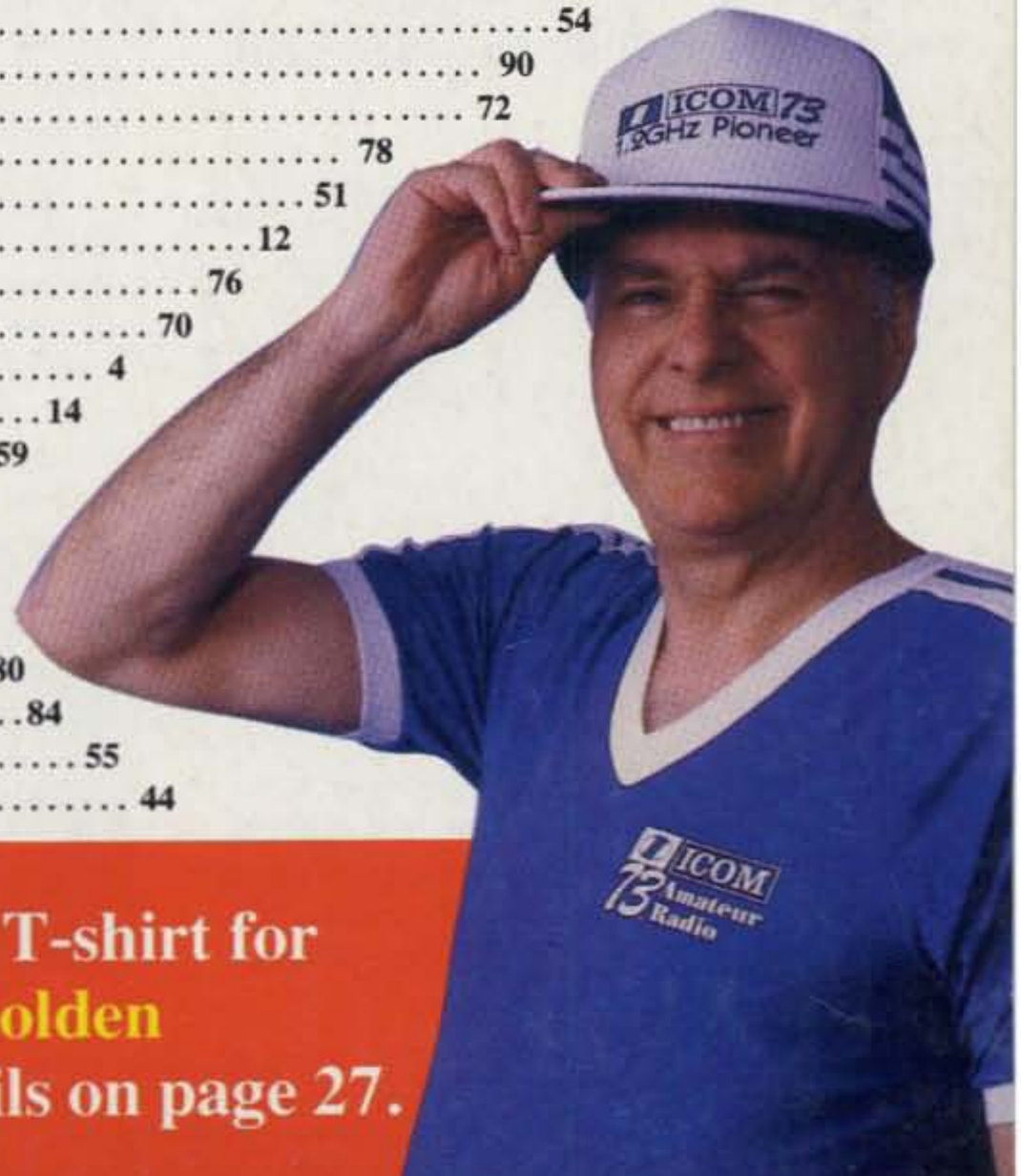
Reviews

220 Toss-up: ICOM's IC-38A and Kenwood's TM-3530A 220-MHz Mobile Transceivers KT2B 18

Homely on HF: Com-Rad's Hi-Rizer Antenna N1BLH 20

Departments

Above and Beyond 57
ATV 62
Barter 'N' Buy 54
Dealer Directory 90
DX 72
Fun! 78
HAMSATS 51
Letters 12
List of Advertisers 76
Looking West 70
Never Say Die 4
New Products 14
NK6K > Packet 59
Propagation 90
QRP 66
QRX 7
QSL of the Month 4
RTTY Loop 80
73 International 84
Special Events 55
WEATHERSAT 44



Receive a FREE hat and T-shirt for entering the 73/ICOM Golden Gigahertz Contest. Details on page 27.

THE IC-735 HF TRANSCEIVER

BUY YOUR HF FOR PERFORMANCE, NOT BY THE POUND

- **All HF Band Transceiver/**
- **General Coverage Receiver**
- **HM-12 Scanning Mic Included**
- **12 Memories/Frequency and Mode**
- **105dB Dynamic Range**
- **All Modes Built-In USB, LSB, AM, FM, CW**

The IC-735 is a heavyweight when you compare features and performance. Other transceivers may weigh more than the advanced IC-735 compact HF transceiver, but inch-for-inch and pound-for-pound, the IC-735 outweighs them all.

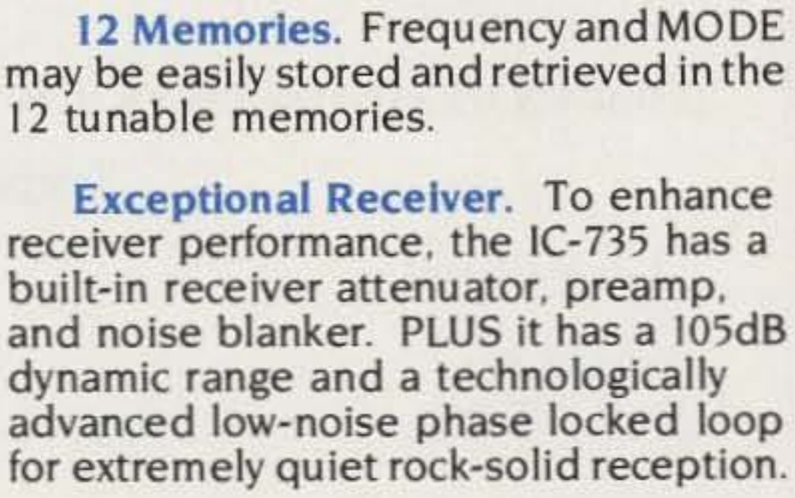
Ultra Compact. Measures only 3.7 inches high by 9.5 inches wide by 9 inches deep and weighs only 11.1 pounds. Without question, the IC-735 is the best HF transceiver for mobile, marine or base station amateur operation.

All Amateur Band Coverage. It's a high performer on all the ham bands, plus it includes general coverage reception from 100kHz to 30MHz. May be easily modified for MARS operation.

12 Memories. Frequency and MODE may be easily stored and retrieved in the 12 tunable memories.

Exceptional Receiver. To enhance receiver performance, the IC-735 has a built-in receiver attenuator, preamp, and noise blanker. PLUS it has a 105dB dynamic range and a technologically advanced low-noise phase locked loop for extremely quiet rock-solid reception.

Simplified Front Panel. Controls which require infrequent adjustment are placed behind a unique hatch cover on the front panel of the radio. The hatch cover is designed to protect seldom used controls from being accidentally knocked off line, but also provides easy access. The large LCD readout and conveniently located controls enable easy operation, especially important for the mobile environment.



More Features. FM built-in, HM-12 scanning mic, program scan, mode scan and memory scan. Switchable AGC, automatic SSB selection by band and RF speech processor. Continuously adjustable output power up to 100 watts, 12V operation, 100% duty cycle and deep tunable notch filter.

Options. A new line of accessories are available, including the AH-2 mobile antenna system, AT-150 whisper quiet automatic bandswitching antenna tuner for base station operation and the PS-55 power supply. The IC-735 is also compatible with most of ICOM's existing line of HF accessories.

See the IC-735 performance heavyweight at your local authorized ICOM dealer.

ICOM
First in Communications

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3150 Premier Drive, Suite 126, Irving, TX 75063
ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada

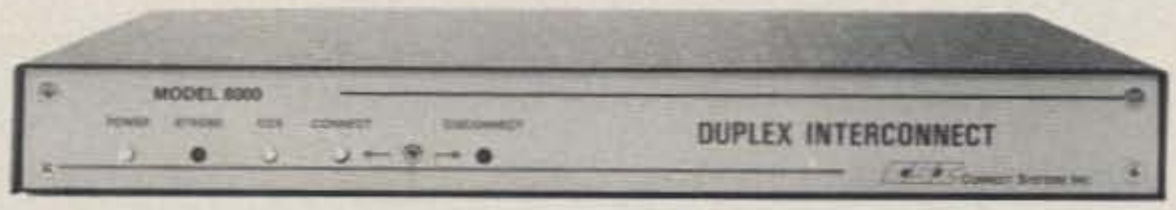
MODEL 8000 DUPLEX

- Desk top or rack mounted versions
- Pulse or fully regenerated tone dialing
- Full and half duplex operation
- Half duplex privacy mode
- Internally squelched audio
- Powerful toll call protection
- Secret toll override code
- ✱ up # down or multi-digit access
- Ringout
- End to end signalling (DTMF standard)
- Auto answer on 1st, 2nd, 4th or 8th incoming ring
- Mobile to mobile signalling
- Telephone initiated control mode
- Dip switch selectable hybrid compensation capacitance.
- Programmable timout and mobile activity timers with unique beeps
- Disconnect beep
- Separate repeat level control
- Lightning protection
- Connectors for options
- 10-16VDC powered

28 dip switches make all features user programmable and selectable.

OPTIONS

8001 ANI code validator (up to 1024 access codes)
8002 1000 call two tone signalling
8003 32 call CTCSS signalling
8004 FCC registered coupler
8005 Centralized computer billing system



NOW ANYONE CAN ENJOY FULL DUPLEX!

Merely connect a CSI Model 8000 to any duplex base (such as the Yaesu FT-2700RH) and presto. . . you have an instant full duplex mobile telephone system!

Or, the 8000 can be connected to any repeater for shared use. A landline caller can selectively call any mobile on the system with (end to end) regenerated DTMF (standard), CTCSS (optional) or two tone sequential (optional). Mobiles can even selectively call **each other**!

Knowing the correct code, a caller can **take control** of the 8000 from any touch phone and **voice communicate** with mobiles that are not equipped with touch dialers.

No other duplex patch offers so much for so little.

FIRST CLASS FEATURES and PERFORMANCE . . . COACH FARE!

MAKE YOUR MOBILE TELEPHONE SYSTEM FLY WITH A PATCH FROM CSI

PRIVATE PATCH III

A high performance VOX based patch for simplex systems and for operation through remotely located repeaters.

Thousands of Private Patch III's are in both amateur and commercial use worldwide. Private Patch III enjoys a reputation that is second to none.

CW ID and other powerful features make Private Patch III the best deal going in Vox Simplex phone patches!

MODEL CS-9500

For exemplary simplex performance, the CS-9500 control station interconnect incorporates a full ½ second of landline to mobile electronic voice delay. Voice delay assures compatibility with the slowest CTCSS or trunked repeater systems.

Attractively styled to complement any decor.

STANDARD FEATURES (Both models)

- Three simple connections to base radio
- Simplex operation (VOX, of course)
- Digital "fast VOX"
- Toll restrict
- Secret toll disable code
- Selectable tone or pulse dialing
- Automatic busy signal disconnect
- Control interrupt timer (maintains positive control in simplex mode)
- Three digit access code (eg. ✱ 73)
- Ringout (reverse patch)
- Ringout inhibit if channel is in use
- Lightning protectors
- Spare relay position
- 110VAC supply
- And much more

OPTIONS: 12 VDC or 230 VAC power
FCC registered coupler

CONNECT SYSTEMS INC.
23731 Madison St.
Torrance CA 90505
Phone: (213) 373-6803

CIRCLE 12 ON READER SERVICE CARD

DEALERS

AMATEUR ELECTRONIC SUPPLY
Milwaukee WI, Wickliffe OH, Orlando FL, Clearawater FL, Las Vegas NV

BARRY ELECTRONICS CORP.
New York, NY

EGE, INC.
Woodbridge, VA

ERICKSON COMMUNICATIONS
Chicago IL

HAM RADIO OUTLET
Anaheim CA, Burlingame CA, Oakland CA, Phoenix AZ, San Diego CA, Van Nuys CA

HENRY RADIO
Los Angeles CA

INTERNATIONAL RADIO SYSTEMS
Miami, FL

JUNS ELECTRONICS
Culver City CA

MADISON ELECTRONICS SUPPLY
Houston, TX

MIAMI RADIO CENTER CORP.
Miami FL

MIKES ELECTRONICS
Ft. Lauderdale, Miami FL

OMNI ELECTRONICS
Laredo, TX

N&G DISTRIBUTING CORP.
Miami FL

PACE ENGINEERING
Tucson AZ

THE HAM STATION
Evansville IN

WESTCOM
San Marcos, CA

CANADA:
CARTEL ELECTRONIC DISTRIBUTORS
Surrey B.C.

SKYWAVE RADIO SYSTEMS, LTD.
Burnaby, B.C.

COM-WEST RADIO SYSTEMS LTD.
Vancouver, BC

MFJ TUNERS

This may be the world's most popular 3 KW roller inductor tuner because it's small, compact, reliable, matches virtually everything and gives you SWR/Wattmeter, antenna switch, dummy load and balun — all at a great price!

Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs-only 10¾"Wx4½"Hx14 7/8"D.

Matches coax, balanced lines, random wires—1.8 to 30 MHz. 3 KW PEP—the power rating you won't outgrow (250pf-6KV caps).

Roller inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.

MFJ989B **$349.95**

Lighted Cross-needle Meter reads SWR, forward and reflected power all in one glance. Has 300 and 3,000 watt ranges. Meter light requires 12 VDC.

6 position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt bail.

MFJ's Fastest Selling TUNER

MFJ-941D **$99.95**

MFJ's fastest selling tuner packs in plenty of new features. New styling! Brushed aluminum front. All metal cabinet. **New SWR/Wattmeter**! More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.

New antenna switch! Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load.

New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 RF power output.

Matches everything from 1.8 to 30 MHz! dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:1 balun for balanced lines. 1000 V capacitor spacing. Black. 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

MFJ's 1.5 KW VERSA TUNER III

MFJ-962B **$229.95**

Run up to 1.5 kw PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

Lighted Cross-needle Meter reads SWR, forward and reflected power in one glance. Has 300 and 3,000 watt ranges. 6 position antenna switch handles 2 coax lines, wire and balanced lines. 4:1 balun. 250 pf, 6 kv variable capacitors. 12 position ceramic inductor switch. New smaller size matches new rigs: 10¾ × 4½ × 14⅞ inches. Flip stand for easy viewing. Requires 12V for light.

MFJ's Best VERSA TUNER

MFJ-949C **$149.95**

MFJ's best 300 watt tuner is now even better! The MFJ-949C all-in-one Deluxe Versa Tuner II gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a new compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale on easy-to-read 2 color lighted meter (needs 12 V).

A handsome new black brushed aluminum cabinet matches all the new rigs. Its compact size (10 x 3 x 7 inches) takes only a little room.

You can run full transceiver power output—up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Use it to tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

A 300 watt 50 ohm dummy load gives you quick tune ups and a versatile six position antenna switch lets you select 2 coax lines (direct or thru tuner), random wire or balanced line and dummy load.

A large efficient airwound inductor—3 inches in diameter—gives you plenty of matching range and less losses for more watts out. 100 volt tuning capacitors and heavy duty switches gives you safe arc-free operation. A 4:1 balun is built-in to match balanced lines.

Order your convenience package now and enjoy.

2 KW COAX SWITCHES

MFJ-1702 **$19.95**

MFJ-1702. $19.95. 2 positions. 60 dB isolation at 450 MHz. Less than .2 dB loss. SWR below 1:1.2.

$29.95 MFJ-1701

MFJ-1701, $29.95. 6 positions. White markable surface for antenna positions.

MFJ's Smallest VERSA TUNER

MFJ-901B **$59.95**

MFJ's smallest 200 watt Versa Tuner matches coax, random wires and balanced lines continuously from 1.8 thru 30 MHz. Works with all solid state and tube rigs. Very popular for use between transceiver and final amplifier for proper matching. Efficient airwound inductor gives more watts out. 4:1 balun for balanced lines. 5 x 2 x 6 inches. Rugged black all aluminum cabinet.

MFJ's Random Wire TUNER

MFJ-16010 **$39.95**

MFJ's ultra compact 200 watt random wire tuner lets you operate all bands anywhere with any transceiver using a random wire. Great for apartment, motel, camping operation. Tunes 1.8-30 MHz. 2 x 3 x 4 inches.

MFJ's Mobile TUNER

MFJ-945C **$79.95**

Designed for mobile operation! Small, compact. Takes just a tiny bit of room in your car. SWR/dual range wattmeter makes tuning fast and easy. Careful placement of controls and meter makes antenna tuning safer while in motion.

Extends your antenna bandwidth so you can operate anywhere in a band with low SWR. **No need to go outside and readjust your mobile whip.** Low SWR also gives you maximum power out of your solid state rig—runs cooler for longer life.

Handles up to 300 watts PEP RF output. Has efficient airwound inductor, 1000 volt capacitor spacing and rugged aluminum cabinet. 8x2x6 inches. Mobile mounting bracket available for $5.00.

ORDER ANY PRODUCT FROM MFJ AND TRY IT-NO OBLIGATION. IF NOT SATISFIED, RETURN WITHIN 30 DAYS FOR PROMPT REFUND (less shipping).
• One year **unconditional** guarantee • Made in USA
• Add $5.00 each shipping/handling • Call or write for free catalog, over 100 products.

MFJ

MFJ ENTERPRISES, INC.
Box 494, Mississippi State, MS 39762

TO ORDER OR FOR YOUR NEAREST DEALER, CALL TOLL-FREE

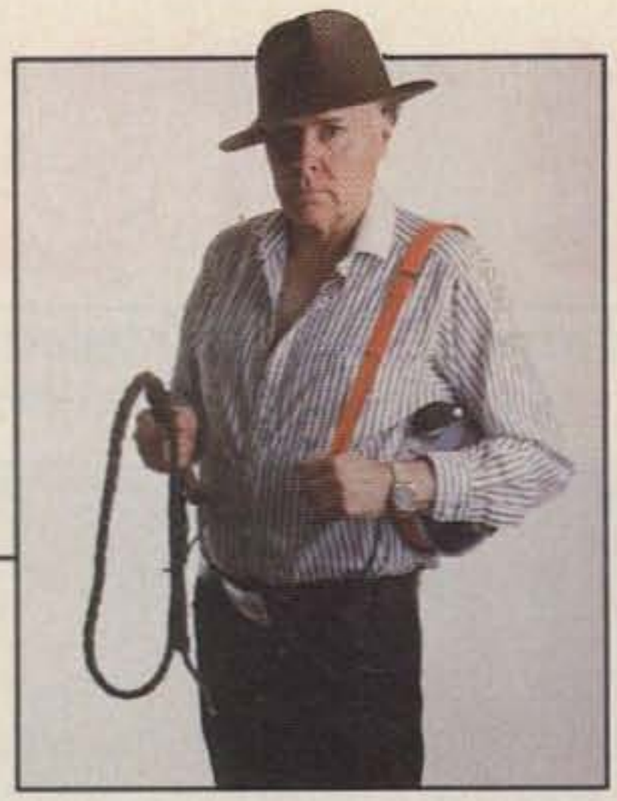
800-647-1800

Call 601-323-5869 in Miss. and outside continental USA Telex 53-4590 MFJ STKV

VISA® MasterCard

CIRCLE 24 ON READER SERVICE CARD

NEVER SAY DIE



ENGLISH—THE INTERNATIONAL LANGUAGE

Most ham contacts are in English, no matter where you are in the world. . . except perhaps in South or Central America, where Spanish is often the rule. Is this a good thing for the hobby?

There are two movements afoot in America today—one to make our country bilingual—the other to make English the national language by law. The enormous influx of Spanish-speaking people from Cuba, Mexico, and other Latin countries has created this problem. Spanish radio, television, newspapers, and magazines have made it unnecessary for these immigrants, legal or illegal, to bother to learn English.

In past immigrations, we often found the first generation resisting English, living in ghettos (barrios) to avoid having to learn the new language—which admittedly is difficult for adults. The children learned English in school and then spoke it at home when they were married, getting away from their parents' language. Often the grandchildren never bothered to learn the old language at all.

It's difficult enough to get along when everyone speaks one common language—which I think is one of the greatest strengths of America—but when people are unable to communicate, it almost always leads to suspicion and paranoia.

What can we do about this mess? Should we all learn enough Spanish to make contacts in that language? It doesn't take much of a command of a language to give a name, city, report, and request for QSL—which, sadly, is about all most of us demand of our ham contacts.

Perhaps, if we recognize and admit that English has become the world's foremost language, we can put this into perspective. Most countries of the world are teaching English as a second language. Thus one of the better uses of amateur radio might be as a way to help DX hams improve their English—a language they often need for business.

"It doesn't take much of a command of a language to give a name, city, report, and request for QSL—which, sadly, is about all most of us demand of our ham contacts."

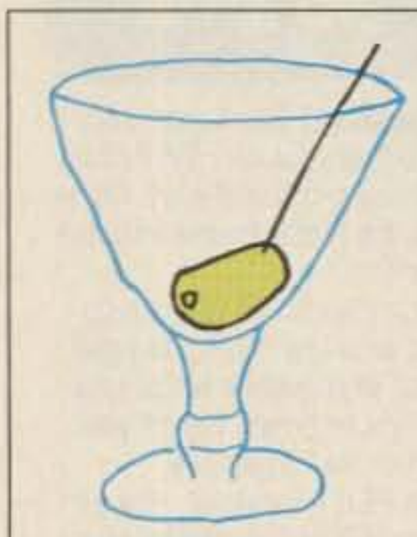
I've heard English-speaking ham ops on 20m fire up on frequencies occupied by Spanish-speaking amateurs—just as if they weren't there. If you can't understand them, they don't exist. And I've heard Spanish-speaking amateurs do the same thing—as if the English-speaking contacts weren't real.

Look at the problems Canada has had as a result of bilingualism! It's been one of the most divisive forces they've had to deal with. It's made it possible for rabble-rousers to get serious consideration for dividing the country in two—English-speaking and French-speaking. Could America face a similar separatist problem some day?

There is a tendency to put down Americans because so few of us are able to speak more than one language—and that one not very well. I remember all too well the suffering I went through in high school trying to learn French. That was mind-numbingly awful.

There are some signs of a movement to get American edu-

Continued on page 10



WB8JDV

George J. Martini
3027 Inn Road
Columbus, Ohio 43232
Franklin County

Date	Time	Station	RST	Frequency	Mode

QSL OF THE MONTH

To enter your QSL, mail it in an envelope to *73*, WGE Center, 70 Rte. 202 N., Peterborough NH 03458, Attn: QSL of the Month. Winners receive a one-year subscription (or extension) to *73*. Entries not in envelopes cannot be accepted.

QRM

Editorial Offices
WGE Center
Peterborough NH 03458-1194
phone: 603-525-4201

Advertising Offices
WGE Center
Peterborough NH 03458-1194
phone: 800-225-5083

Circulation Offices
WGE Center
Peterborough NH 03458-1194
phone : 603-525-4201

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 acceptance. 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.

Subscription Information
Rates: in the United States and Possessions: One Year (12 issues) $24.97; Two Years (24 issues) $45.47. Elsewhere: Canada and Mexico—$39.00/1 year only, US funds. Foreign surface mail—$45.00/1 year only, US funds drawn on US bank. Foreign air mail—please inquire. To subscribe, renew or change an address: Write to Subscription Department, PO Box 931, Farmingdale NY 11737. Return postage guaranteed. For renewals and changes of address, include the address label from your most recent issue of *73*. For gift subscriptions, include your name and address as well as those of gift recipients. For questions concerning your subscription, call toll free 1-800-227-5782. To place subscription orders, please call us toll free at 1-800-722-7790 between 9 am and 4:30 pm Eastern time or write to *73*, Subscription Department, PO Box 931, Farmingdale NY 11737. ***73 Amateur Radio*** (ISSN 0745-080X) is published monthly by WGE Publishing, WGE Center, Peterborough NH 03458-1194. Second class postage paid at Peterborough NH 03458 and at additional mailing offices. Canadian second class mail registration number 9566.

Microfilm Edition—University Microfilm, Ann Arbor MI 48106. **Postmaster:** Send address changes to *73 Amateur Radio*, Subscription Services, PO Box 931, Farmingdale NY 11737. Nationally distributed by International Circulation Distributors.

KENWOOD

NOW! 70 cm

All Mode Mobility!

TR-751A/851A
Compact all mode transceivers

It's the "New Sound" on the 2 meter band—Kenwood's TR-751A! Automatic mode selection, versatile scanning functions, illuminated multi-function LCD and status lights all contribute to the rig's ease-of-operation. All this and more in a compact package for VHF stations on-the-go!

- Automatic mode selection, plus LSB

144.0 144.1 144.5 145.8 146.0 148.0 MHz

CW	USB	FM	USB	FM

- Optional front panel-selectable 38-tone CTCSS encoder
- Frequency range 142-149 MHz (modifiable to cover 141-151 MHz)
- High performance receiver with GaAs FET front end
- VS-1 voice synthesizer option
- 25 watts high/5 watts adjustable low
- Programmable scanning—memory, band, or mode scan with "COM" channel and priority alert
- 10 memory channels for frequency, mode, CTCSS tone, offset. Two channels for odd splits.
- All mode squelch, noise blanker, and RIT
- Easy-to-read analog S & RF meter

- Dual digital VFOs
- Semi break-in CW with side tone
- MC-48 16-key DTMF hand microphone and microphone hook included
- Frequency lock, offset, reverse switches
- Digital Channel Link (DCL) option

Optional accessories:

- **CD-10** call sign display
- **PS-430, PS-30** DC power supplies
- **SW-100A/B** SWR/power meter
- **SW-200A/B** SWR/power meter
- **SWT-1** 2 m antenna tuner
- **SWT-2** 70 cm antenna tuner
- **TU-7** 38-tone CTCSS encoder
- **MU-1** modem unit for DCL system
- **VS-1** voice synthesizer
- **MB-10** extra mobile mount
- **SP-40, SP-50B** mobile speakers
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MC-60A, MC-80, MC-85** deluxe base station mics.
- **MC-43S** UP/DOWN mic.
- **MC-55** (8-pin) mobile mic.
- **MA-4000** dual band antenna with duplexer

Actual size front panel

TR-851A
70 cm SSB/CW/FM transceiver

The same winning features are yours on 70 cm with the TR-851A!

- Covers 430-439.999 MHz
- 25 W high power/5 W adjustable low
- MC-43S UP/DWN mic. and mic. hook included

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.
Specifications guaranteed for the 144-148 MHz Amateur band only.

KENWOOD

KENWOOD U.S.A. CORPORATION
Communications & Test Equipment Group
2201E. Dominguez St., Long Beach, CA 90810

KENWOOD

HF Superiority!

TS-930S All band transceiver with general coverage receiver

Throughout the contest and DX world, the TS-930S is recognized as THE HF rig to own—with the most outstanding performance per dollar ratio!

- Easily modified for HF MARS and CAP operation
- IF notch filter
- Excellent receiver dynamic range
- All solid state, 28 volt final amplifier for lowest inter-modulation distortion
- Power input rated at 250 watts on SSB, CW, FSK, and 80 watts on AM
- Full break-in or semi-break-in CW
- SSB slope tuning—Another Kenwood First!
- CW VBT and pitch controls
- Tunable audio filter built in
- Dual mode noise blanker ("pulse" or "woodpecker") with threshold control
- Eight memory channels
- RF speech processor
- High stability, dual digital VFOs
- AC power supply built in
- Fluorescent tube digital display
- One year limited warranty on parts and labor
- A complete line of accessories is available

TS-430S Compact all band transceiver with general coverage receiver

Kenwood engineering brings you "Digital DXterity"—QSY from band to band, mode-to-mode, and frequency-to-frequency with ease!

- Easily modified for MARS operation
- Superb interference reduction
- Programmable scanning
- 8 memories store mode, frequency, band. Each channel may be used as a separate VFO
- Superior solid state design
- VOX, semi break-in CW with sidetone
- Dual digital VFOs
- A complete line of accessories is available

10 Hz display shown (see operating manual)

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.

KENWOOD

KENWOOD U.S.A. CORPORATION
Communications & Test Equipment Group
2201 E. Dominguez St., Long Beach, CA 90810

QRX . . .

Novice Numbers

NOVICE APPLICATIONS have quadrupled since Novice Enhancement went through. **Larry Weikert**, Chief of the General Radio Branch in Gettysburg, is quoted in the *W5YI Report* as saying, "We will probably process in excess of 6,000 Novice applications this month . . . as opposed to a normal of 1,500." It's obviously too early to make a judgement about any long-term effects of Novice Enhancement, but it's possible that the desirability of voice and digital privileges to prospective hams may be strong enough to offset the negative aspect of having to learn code. *73* has long maintained that the major breakthrough ham radio is searching for can *only* be found in a no-code license. We wouldn't mind being wrong on this one.

Ham/West R.I.P.

JOHN (W7IA) AND JAN (N7YL) WEAVER have decided to cancel plans for the 1987 Ham/West hamfest. In the two years that Ham/West existed, attendance never grew to a level that would support the show. Despite good reviews from both the industry and the public, in the end the only review that mattered came from the ticket sales.

10m Novice Nets

IT'S GREAT to see that Novices are being welcomed with open arms onto their new frequencies. KB1XD wrote to say that the **Ten Meter Rag Chew Net** has been formed with Novices/Technicians in mind. The TMRCN meets every Sunday night at 0000 UTC on 28.400 MHz USB. NØHBS wrote to tell us about the **Rochester (Minnesota) 601 Novice Net** that meets every Friday night at 0100 UTC on 28.306 MHz. The "601" in the name refers to the first meeting of the net, which was at 6:01 p.m. CST (0001 UTC) on March 21. Both nets encourage hams of all classes to check in.

New in L.A.

BILL SMITH N6MQS has decided to put his money where W2NSD's mouth is. Impressed by Wayne's renewed enthusiasm for the hobby, Bill has opened up a ham radio store called **A-TECH** in Burbank, California. Until now there had been only three ham stores in the greater Los Angeles area—which has one of the largest concentrations of hams in the country. If you're in the L.A. area, drop in to A-TECH at 1033 Hollywood Way in Burbank, and tell 'em Wayne sent you.

Summer is the season to hit the road with ham radio. This 15-Watt 80m mobile setup produced contacts of up to 600 km and illustrates the fact that a DXpedition need go no further than around the block. From left to right: Liisa OH2BYL/OH7LP, Anssi OH2QV, Aleksi, Katri, and Inkeri. (Photo by OH2BOX.)

Contest Update

WE'VE BEEN TRYING to get our contesting program up to date in recent months, and progress is being made. If you want to know where you stand in the **1987 World SSB Championships**, the top claimed scores for the January Classics are on page 42. *73* and ICOM have combined forces to sponsor a 1.2 GHz contest on July 13–14. This new **Golden Gigahertz Contest** awards a free hat and T-shirt to each entrant. Complete details and rules can be found on page 27. We've also got something big cooking for the beginning of September. **The National Championships** will occur on September 5 (CW) and 6 (SSB), and for the first time ever the little gun has a chance to become a champion. These events have been designed to single out the best contest operators, not the stations with the biggest hardware investment. The contests are open only to single-operator stations in the U.S. For starters, external amplifiers are prohibited, and a mandatory band-switching rule and antenna multiplier put a premium on the operator's skill. The complete rules will be published next month—if you can't wait, send an SASE to The National Championships, 2665 Busby Road, Oak Harbor WA 98277.

Lucky Number 6

DENNIS MARTIN NØGPD is throwing a party—and everyone's invited. Since Dennis was born on the sixth day of the sixth month, he's holding a six-meter birthday party for himself. He'll be on a hilltop in grid square EN20 on 50.150 MHz SSB from 2300 UTC June 5 through 2100 UTC June 7. No doubt he'll have a few six-packs up there with him. Work a rare grid square and wish Dennis a happy birthday. QSL via Dennis Martin NØGPD, 1211 N. 26th Street, Council Bluffs IA 51501.

New Digs

KENWOOD is consolidating its consumer electronics division (Kenwood Electronics) and its communications division (Trio-Kenwood Communications) in a single new building. The move was necessitated by Kenwood's growth in recent years. The new office is located at 2201 East Dominguez Street, Carson CA 90801.

Hey, Ralph

A DAY DOESN'T GO BY that someone doesn't call the *73* editorial offices looking for ***The New Weather Satellite Handbook*** by *73* columnist **Dr. Ralph Taggart WB8DQT**. For those of you still searching, it is available **from the author** at 602 S. Jefferson, Mason MI 48854 ($13.50 ppd.; $14.50 outside the U.S.).

Real No-Code

ON THE BACK OF PLACEMATS used by Pizza Hut is a section for kids on learning the Morse code in order to decipher a "hidden" message. Unfortunately, this must have been thought up by somebody else named Morse—many of the letters are wrong.

YHOTY Nominations

THE WESTLINK REPORT is soliciting nominations for the **1987 Young Ham of the Year Award**. Any licensed amateur 18 years old or younger is eligible for the award, which was created to honor the ham-related achievements of younger members of the fraternity. Letters of nomination should detail the reason why an individual should be considered for the

award, and letters written by minors must be countersigned by a parent or legal guardian. All letters must include verifiable background material to prove any claims made. Send nominations by September 10 to Westlink Young Ham of the Year, 28197 Robin Avenue, Saugus CA 91350. The award will be presented at the ARRL Southwest Division Convention in Scottsdale, Arizona, on October 10.

Dayton Winners

THE 1987 DAYTON AMATEUR RADIO ASSOCIATION (DARA) Ham of the Year is **Carol Perry WB2MGP**, a school teacher from Staten Island, New York. She created and documented unique ham radio teaching methods and has been active in attempting to get her teaching curriculum accepted as part of secondary school training. Perry chairs the Educational Task Force of the ARRL's Hudson Division, and nationally she participates with the League's Ad Hoc Committee for the Advancement of Amateur Radio. The Specific Achievement Award winner is **Arthur M. Gentry W6MEP** of Northridge, California. In the 1950s Gentry developed the technology and operating practices that evolved into the standard for amateur repeaters as we know them today. He and his wife Millie K6JJN have maintained their own open two-meter repeater for more than 30 years. An in-depth two-part interview with W6MEP was published in *73*'s April and May Looking West columns. The Technical Excellence Award winner is **Henry Oredson WØRLI** of Santa Cruz, California. He is being recognized for his work in packet software development. WØRLI software ties individual packet operators to bulletin board systems locally, and bulletin boards to each other in a regional and national network. He is considered to be the father of packet networking worldwide.

"News"

SCANNING the *Los Angeles Times* of April 2, 1987, W2NSD came across this tidbit about the code requirement: **"It's like having to pass a horseback riding test to get a driver's license."** For more horsesense on the subject, check the Letters column on page 12.

The End

THIS MONTH'S QRX has been compiled with the help of WB6TPG, KE7C, KB6HYK, KT2B, KB1XD, NØHBS, OH2QV, *The Westlink Report*, the *W5YI Report*, and The Great Volu. Send your news and photos to *73* Magazine, WGE Center, Peterborough NH 03458, Attn: QRX.

KENWOOD

...pacesetter in Amateur radio

YES! 220 MHz

220: Kenwood Style!

TM-3530A

The first comprehensive 220 MHz FM transceiver

TM-3530A—25 watts of 220 MHz FM—Kenwood style! Features include built-in 7-digit telephone number memory, auto dialer, direct frequency entry and big LCD. All this makes the TM-3530A the most sophisticated rig on 220 MHz!

- **First** mobile transceiver with telephone number memory and auto-dialer (up to 15 seven-digit telephone numbers)
- Frequency range 220-225 MHz
- Automatic repeater offset selection—**a Kenwood exclusive!**
- Direct keyboard entry of frequency
- 23-channel memory for offset, frequency and sub-tone
- Big multi-color LCD and back-lit controls for excellent visibility
- Optional front panel programmable 38-tone CTCSS encoder **includes 97.4 Hz**
- Frequency lock switch
- Digital Channel Link (DCL) option
- High performance GaAs FET front end receiver

- 16-key DTMF pad, with audible monitor
- Center-stop tuning—**another Kenwood exclusive!**
- **New** 5-way adjustable mounting system
- **Unique** offset microphone connector—relieves stress on microphone cord
- HI/LOW power switch (adjustable LOW power)

TH-31BT/31A

Kenwood's advanced technology brings you a new standard in pocket/handheld transceivers!

- 1 watt high, 150 mW low
- Super compact and lightweight (about 8 oz. with PB-21!)
- Frequency range 220-224.995 MHz in 5-kHz steps
- BT Series has built-in tone
- Repeater offset:—1.6 MHz, reverse, simplex
- **Supplied accessories:** rubber flex antenna, earphone, wall charger, 180 mAH NiCd battery and wrist strap
- Quick change, locking battery case

TH-31BT/31A optional accessories:

- **HMC-1** headset with VOX
- **SMC-30** speaker microphone
- **PB-21** NiCd 180 mAH battery
- **PB-21H** NiCd 500 mAH battery
- **DC-21** DC-DC converter for mobile use
- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8/8T** soft cases with belt hook
- **TU-6** programmable sub-tone unit
- **AJ-3** thread-loc to BNC female adapter
- **BC-6** 2-pack quick charger
- **BC-2** wall charger for PB-21H
- **RA-9A** StubbyDuk antenna
- **BH-3** belt hook

TH-31BT with DTMF pad shown. Optional RA-9A attached.

TM-3530A optional accessories:

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48B** extra DTMF mic. with UP/DOWN switch
- **MC-43S** UP/DOWN mic.
- **MC-55** (8 pin) mobile mic. with time-out timer
- **SP-40** compact mobile speaker
- **SP-50B** mobile speaker
- **SW-200B** SWR/power meter
- **SW-100B** compact SWR/power meter

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.

KENWOOD

KENWOOD U.S.A. CORPORATION
Communications & Test Equipment Group
2201E. Dominguez St., Long Beach, CA 90810

NEVER SAY DIE

from page 4

cation away from the eighteenth century system of memorization and tests. The main problem with memorization as a learning technique is that unless what has been memorized is used, and used frequently, it's soon forgotten and all the work spent memorizing it is wasted.

If you're not sure I'm right about that, dig out one of your old college books and see how much you remember of the stuff you had to memorize a few years ago. I still remember the shock I got when I returned to college after spending almost four years in the Navy during World War II. I'd one remaining calculus course to go, but it required my remembering the previous two years of calculus. I found I had zero recollection of it, so I had to spend a whole summer memorizing the same stupid stuff all over again.

Ask anyone from a foreign country how long it takes to start forgetting his vocabulary, even when he was brought up from birth with it. You either use something or you lose it.

In most parts of America we have so little opportunity to use foreign languages that even if we go to the trouble to learn them in high school we lose them quickly. If we're going to be serious about foreign languages, then we've got to change our whole system. To make us multilingual, we'll have to teach languages before the kids are seven years old and then make sure they have plenty of opportunity to keep their languages well used.

The problem with this is that there are so few benefits—certainly not enough to make up for the amount of work involved. Sure, we could teach all our kids French, Spanish, and perhaps German, right from the start. And we could help them keep up by having plenty of TV programs in these languages. But what's the benefit?

For that matter, if we're going to start getting serious about foreign languages, perhaps we'd better give some deep thought to Japanese.

No, the present system is working pretty well. Instead of our having us learning dozens of languages, we're gradually getting the world to turn to English. Our ham bands are one place where we can be a big help to DX hams. For foreign businessmen, the better their command of English, the more opportunities they have—even in their own countries. The airline pilots of the world speak English so they can communicate over the radio no matter where they are.

My suggestion is this—let's encourage foreign amateurs to speak English—let's help them with it. In cases where some of us have taken the trouble to learn a foreign language, we can use amateur radio to help us keep up with and improve our use of that language, but let's encourage American amateurs of foreign extraction to use English, even when talking with their old homeland.

America is still the foremost land of opportunity in the world, but a key element in success here is the ability to speak English. And, as a general rule, the better you speak English, the better your chances of being successful. We don't give the same opportunities to people who speak poorly—Spanish and Black dialects are particularly a barrier to sales, marketing, and executive jobs. Indeed, one of the best keys to joining the middle class lies in one's use of English.

I suggest we be polite about this, but keep in mind that amateur radio is an English-speaking hobby. It isn't something we're going to accomplish in a year, but if we keep our goal in mind, we'll get there.

I have no doubt I'll get a bunch of hate mail over this. It goes with the territory. But if someone has any unemotional data to offer, pro or con, my mailbox is open. S. I. Hayakawa, the former senator from California, is pushing for a constitutional amendment making English our national language. His reasoning makes good reading, the next time you see an article or book on the subject.

"The recent legislation making cellular phone calls illegal to listen in on has provided a bonanza for both organized and disorganized crime."

CONGRESS GOOFS

The recent legislation making cellular phone calls illegal to listen in on has provided a bonanza for both organized and disorganized crime. It's difficult not to laugh over the situation the cellular industry has gotten itself into in its blind pursuit of the fast buck.

What's happened is a mass move into cellular by criminals. They buy a cellular system, have an unscrupulous dealer alter the electronic serial number (ESN) on the built-in programmable IC, which makes calls both untraceable and free—a great combo. They tool around town, making calls to Pakistan, Colombia, and their Caribbean drug warehouses at will.

Cellular has turned out to be great for coordinating every kind of criminal activity. It's just what the criminals have been needing for years—a dependable, free, untraceable, and safe communications system. With a combination of pagers and cellular phones, crooks are making a shambles of the cellular system—all protected by Congress.

If you wanted to deal in drugs, how better to get orders from your customers than by giving them your cellular phone number? There's no way to tap a telephone that can be anywhere in a big city, operating through different cells as it moves around. And with an altered ESN it's all free!

If it weren't against the law to listen to cellular channels, I'd suggest we hams help the law by listening for suspicious cellular calls and recording them. Say, how'd you like to get the goods on some serious crooks and find (a) the evidence is inadmissible because it was illegally attained and (b) yourself on trial for making the recordings. So join me in a big laugh, okay?■

KENWOOD

Accessories

TL-922A 160-15 m 2 KW PEP/1 KW DC Input Linear Amplifier. Pair of EIMAC 3-500Z tubes and excellent IMD characteristics. Perfect safety protection with blower turn-off delay circuit.

PC-1A Phone Patch (FCC Part 68 registered).

MA-5 80/40/20/15/10 meter mobile antenna. All resonators supplied. 200 W PEP max., VSWR 1.5:1 or less. Easily adjustable for center frequencies.

VP-1 Bumper mount for above.

VB-2530 25 W RF Power Amplifier (for TR-2600A). BNC-BNC cable, and mounting bracket supplied.

MC-85 (8-pin) Multi-function desk-top microphone (8-pin) 700 Ω unidirectional electret condenser mic. Built-in audio level compensation with output and tone control, meter, and UP/DOWN switch. Selector switch for up to three transceivers. (Additional 4, 6, or 8-pin cables optional.)

MC-60A (8-pin) Deluxe desk-top microphone. Pre-amp built-in, PTT, LOCK and UP/DOWN switches. Hi/Lo Z selector switch.

SP-40 Compact mobile speaker.

SP-50B Mobile speaker.

SM-220 Station monitor/10 MHz oscilloscope Pan display capability with optional BS-8 (for TS-940S, TS-830S). Monitor transmitted waveforms and/or received signal waveforms. Built-in 2-tone generator.

HS-5 Deluxe headphones.

HS-6 Lightweight headphones.

LF-30A Low pass filter. 1 kW, 50 Ω. Insertion loss: less than 0.5dB at 30 MHz.

MA-4000 2 m/70 cm dual band mobile gain antenna. Duplexer supplied. Ideal for use with the TW-4000A "Dual Bander" and TM-211A/TM-411A. (Mount not supplied.)

MJ-Series
Microphone adapters

Not Shown:

MC-50 Desk-top microphone. Hi/Lo Z. 4-pin connector.

MC-80 Desk-top microphone. 700 Ω unidirectional electret element with flexible boom. Built-in mic. pre-amp and UP/DOWN switch, with lock. (8-pin).

MC-48B Hand microphone with 16-key DTMF pad and UP/DOWN switches. (8-pin).

MC-46 As above, but with 6-pin connector.

MC-43S Hand microphone with UP/DOWN switches. (8-pin).

MC-35S Noise cancelling hand microphone, 50 k Ω (4-pin).

MC-30S As above, but 500 Ω.

PG-4A Microphone cable for MC-60A. Converts MC-60A to 4-pin connector.

PG-4B As above, but 6-pin.

PG-4C As above, but 8-pin, as supplied with MC-60A.

PG-4D Extra 4-pin cable for MC-85.

PG-4E As above, but 6-pin.

PG-4F As above, but 8-pin.

HS-7 Micro-headphones.

KPS-7A 13.8 V DC, 7.5 A intermittent DC power supply.

RA-3 2 m, 3/8 λ telescoping antenna with BNC connector.

RA-5 2 m 1/4 λ /70 cm 5/8 λ telescoping antenna with BNC connector.

RA-8B 2 m StubbyDuk® with BNC connector.

RA-9B As above, for 220 MHz.

RA-10B As above, for 440 MHz.

RD-20 Dummy load, 50 Ω DC-500 MHz 20 W continuous, 50 W intermittent.

PG-3B DC line filter for mobile use.

Service manuals are available for all Kenwood transceivers and most accessories.

Specifications and prices subject to change without notice or obligation.

KENWOOD

KENWOOD U.S.A. CORPORATION
Communications & Test Equipment Group
2201 E. Dominguez St., Long Beach, CA 90810

LETTERS

OL' CLEM

We have a neighbor, Clem, who is a senior citizen. Everyone loves Ol' Clem and we all try to look out for him and take care of him, but he is a rather independent old codger. Among other things, he insists on saddling up his old mule to ride the 13 miles to the post office each day to pick up his mail (we live in a very rural area of the southwest). He says it is nostalgic and he enjoys it.

We usually stop by and offer him a ride in our pickup, but he says he would rather ride the old mule. It takes him a lot longer to make the trip and it is somewhat uncomfortable, but he seems to enjoy it. Also, he says his mule takes up less space on the road than our truck. Of course, he occupies his portion of the road a lot longer to make the same trip, but that doesn't seem to matter to Ol' Clem.

He also says that at times when the weather is really bad, he can make the trip on the old mule when we can't get through in our pickup—but I don't remember many such times.

The only thing about Ol' Clem that really bothers us is that he is one of those who insist on keeping a rather archaic provision in our local driver's license exam requiring that all prospective motor vehicle drivers must demonstrate a clear capability to catch and saddle a mule and ride it for 13 miles without falling off.

My 15-year-old son just doesn't understand what that has to do with his ability to drive our 1987 model pickup truck. I truly love Ol' Clem and admire his ability and patience with that old mule of his, but I do agree with my son that mule technology doesn't relate well as the measure of one's ability to handle a modern pickup at 55 mph on the interstate.

The result is that a lot of our young folks are moving to other parts of the country because while they all want to drive cars and pickup trucks; they think it is pretty stupid for them to have to learn how to handle that old mule—to have to put up with its slow plodding pace and to take forever to ride those 13 miles to the post office.

I hate to see our young ones move off to other areas, but I really don't blame them under the circumstances. I'm starting today to get enough people together to out-vote Ol' Clem at the next election.

R. C. "Dick" Chabot N5JHW
Organ NM

TOWER TROUBLE

The article "Glen Martin M185A Tower" by N1EJF (*73 Amateur Radio*, April, 1987) reads like an episode from Laurel and Hardy Theater. No qualified engineer would ever permit a tower foundation to be installed as described in this article!

Where are the moment and uplift calculations? Apparently EJF used the mass theory (make it massive and it won't blow over). Where is the reinforcing steel? Concrete has little or no strength. How does EJF expect the foundation to hold together?

Probably the most unforgivable sin is the wood form. Leave the wood in the ground and backfill? Certainly not! What do you suppose will happen to the foundation when the wood rots? If the block of concrete doesn't crack first, it is going to wobble in its own space, that's what. Where is the compacted backfill? Does EJF think that by pushing loose dirt back into the hole it will reach its original compressive strength? Maybe in about 40 years.

The ground rod in the bottom of the hole is absolutely the wrong approach. The ground rod is going to corrode. This will leave a void in the concrete, and the void will collect moisture, which will eventually reach the tower base, which will also begin to corrode. The slug of moisture will freeze and the concrete will crack. No maybe about it. If EJF were concerned about grounding the tower, he would have used the foundation as a UFER ground or installed a counterpoise.

Fellow hams, DO NOT, I repeat, DO NOT use this article as an example of how to install a tower foundation. If the tower manufacturer condoned the method used to design and install the foundation, one may well question the integrity of the tower and Hazer unit. As for me, I will continue to consult a qualified engineer before I install a tower foundation. I suggest you readers do the same.

By the way, I hope N1EJF has a good home owner's insurance policy and an understanding insurance adjuster. I'm afraid he is going to need both.

Jim Sanford N0AIH
Omaha NE

Foundation dimensions were supplied by Glen Martin Engineering. One must make the presumption that they have the necessary data regarding moment and uplift to support their recommendations.

The compression strength of the concrete used is 3,000 pounds. This strength concrete is consistent with that used for building foundations in this area. An important consideration with any foundation of this type is that it sit on undisturbed earth BELOW the frost line. The steel base structure provides adequate reinforcement for the foundation; if desired, additional steel could be added, but this is considered unnecessary.

While there is certainly no requirement to leave any part of the form on the foundation, the untreated wood will rot quickly and not present the foundation any opportunity to move. The base is on undisturbed earth, and the lateral space will be compensated by surrounding fill. In any event, the lateral space (if any) will be microscopic in size when compared to the surface of the foundation. The foundation has gone through one complete season so far and no settling of the backfill has been noted. Mr. Sanford is correct when he states that fill should be compressed, and it was in this installation.

Grounding the tower in the manner that I described is not *intended to provide lightning protection, but to satisfy the National Electrical Code article 810. Per that code, the grounding material is noncorrosive and is run in a straight line to the point of nearest attachment on the tower. Even if the grounding material went away, any water that collected would not freeze as this area is located below the frost line.—N1EJF*

73 Amateur Radio (ISSN 0745-080X) is published monthly by WGE Publishing, Inc., a division of Wayne Green Enterprises, Inc., WGE Center, Peterborough NH 03458-1194.

rf enterprises

• We Specialize In Antennas & Towers. • We Ship Worldwide.

ANTENNAS

hy-gain

TH7DXS / TH5Mk2S Triband Beams
Explorer-14 / TH3JrS Triband Beams
204BAS / 205BAS 20 Mtr. Monobanders
155BAS / 105BAS 15 & 10 Monobanders
Discoverer 7-1 Discoverer 7-2 & 7-3 Kit
14AVQ / WBS / 18AVT / WBS
18HTS Hy-Tower / LC-160 Coil
2BDQ / 5BDQ "Full power" trap dipoles
V2S / V3S / V4S Verticals
215S (70 cm) / 216S (2 Mtr) **NEW!!**
218S Complete OSCAR System
BN-86 balun **COMPLETE Telex/Hy-gain inventory!**

CALL FOR PRICE

cushcraft

A3 & A4 Beams	$215.00 / 289.95
A743 & A744 30/40 Mtr Add-ons	74.50 / 74.50
A3SK & A4SK Stainless Kits	34.95 / 41.95
R3, 10, 15, 20 Mtr. Vert	265.00
AV4 & AV5 Verts	94.00 / 100.00
40-2CD 2-el. 40 Mtr. Beam	295.00
Monobanders for 10, 15, & 20 in stock!	**CALL!**
617-6B 6 Mtr. BOOMER	198.95
A50-5, A50-6	81.95 / 104.95
A147-11, A147-2OT	47.50 / 59.95
215WB & 230WB 15 & 30 el. 2 Mtr	81.95 / 219.95
3219 3.2 wavelength, 144-146 MHz	94.00
4218X 4.2 wavelength, 144-146 MHz	101.00
220B & 424B Boomers	94.00 / 81.95

Large inventory of other antennas & accessories!

KLM

KT34A / KT34XA	$395.00 / 585.00
Monobanders for 10 to 80 Mtrs!	CALL
2M-13LBA / 2M-16LBX	86.95 / 165.00
220-14X / 220-22LBX	97.00 / 119.95
432-20LBX / 432-30LBX	124.00 / 142.95
2M-14C / 2M-22C	125.00 / 175.00

BUTTERNUT

HF6V 80-10 Vertical	$115.00
HF2V 80 & 40 Vertical	112.00
HF4B Compact 10-20 "Butterfly" Beam	189.00

VHF / UHF Verticals and Scanner Ants. in stock.

ACCESSORIES

RMK II Mtg Kit/STR II Radial Kit	42.95/29.95
TBR-160S Coil/SC-3000 Scanner Ant	47.95/54.95

All other accessories in stock.

Mosley

TA-33 / CL-33	$235.00 / 265.00
TA-33Jr / TA-40KR	179.00 / 89.95
Pro 57 / Pro 67	465.00 / 579.00

ALPHA DELTA

DX-A / DX-D Slopers	$46.95 / 57.00
DX-D / DX-DD Dipoles	79.95 / 69.95
Delta-4 / Delta-4N Coax Switches	65.00 / 75.00

Transi-traps in stock.

HUSTLER

6BTV / 5BTV Verticals	$127.95 / 106.00
G6-144B / G7-144B 2 Mtr Verts	86.95 / 114.95

HF Mobile Masts, Resonators, & Mounts
CALL!

Larsen Antennas

VHF & UHF Mobile Systems

TEN-TEC

Model 585 PARAGON

NEW! 200W Full featured HF Transceiver. Microprocessor controlled. General coverage.

OTHER TEN-TEC PRODUCTS:

Model 561 Corsair II
Model 425 Titan Linear Amplifier
Model 579 Century/22 - 50W CW Transceiver
Model 229A 2KW Antenna Tuner
Model RX-325 General Coverage Receiver
Model 2510 Satellite Station
Model TT-920 VHF Aviation Transceiver

MIRAGE

VHF & UHF AMPLIFIERS

Full line of VHF & UHF Amplifiers

B1016	$247.95
B3016	$216.95

NEW! ASTRON CORPORATION

DC supplies from 4 to 50 amps. In stock!

RS-12A / -20A	$67.95 / 84.95
RS-35A / -50A	129.95 / 186.95
RS-20M / -35M	102.95 / 146.95
RS-50M / VS-50M	206.95 / 224.95

Tuners, meters, keyers, switches, PACKET!!

AMERITRON

HF linears amplifiers and remote coaxial switches.

KDK FM-240

SANTEC ST-20T

ROTORS

TELEX		KENPRO	
HDR-300	CALL	KR-400 / -400RC	$149.00 / 174.95
T2X	CALL	KR-600 / -600RC	234.95 / 249.95
HAM IV	CALL	KR-500 / -500B	189.00 / 259.95
CD 45 II	CALL	KR-2000 / -2000RC	449.95 / 479.95
AR-40	CALL	KR-5400A / -5600A	315.00 / 399.00

ALLIANCE HD-73 ..... $109.00

TOWERS

HY-GAIN

Crank-up towers. Self-supporting, steel, galvanized, with base & rotor plate. Rated at 9 & 16 sq. ft. All accessories available.

HG-37SS / HG-52SS (9 sq. ft.)	$Call
HG-54HD / HG-70HD (16 sq. ft.)	$Call

Free shipping on Hy-gain towers and all Hy-gain antennas and rotors ordered with tower.

ROHN

FREE STANDING: Rated at 10 & 18 sq. ft.

HBX40 / HDBX40	$215.00 / 272.00
HBX48 / HDBX48	289.00 / 355.00
HBX56 / BX64	369.00 / 409.00

Galvanized, self-supporting towers with base and rotor plate. Today's best tower buy.
Freight additional.

GUYED TOWERS:

25G / 45G	$51.00 / 115.00
TB3 Thrust Bearing	51.95

All accessories in stock. Freight additional.

FOLD-OVER TOWERS:

FK2548 / FK2558	$995.00 / 1059.00
FK2568 / FK4544	1105.00 / 1315.00
FK4554 / FK4564	1405.00 / 1495.00

Fold-overs shipped FREIGHT PREPAID in U.S.
Prices 10% higher in western states.

ROOF TOWERS ..... Call

TOWER HARDWARE

Guywire: 3/16 EHS / 1/4 EHS, per ft	$0.15 / 0.18
CCM Cable Clamps: 3/16 / 1/4	0.39 / 0.49
Turnbuckles: 3/8" E & E / E & J	6.95 / 7.95
1/2" E & E / E & J	12.95 / 13.95
Thimbles: 1/4" (3/16 & 1/4" cable)	0.39
Earth Anchor: 4 ft. Screw-in	13.95
Preformed "Big Grips": 3/16 & 1/4	2.49 / 2.99
Guy Insulators: 500 D / 502	1.69 / 2.99

PHILLYSTRAN GUY SYSTEMS

HPTG-2100 /-4000 /-6700 Cable	0.24 / .40 / .67
Cable Ends: 9901LD / 9902LD	7.95 / 9.50
Socketfast Potting Cmpd	14.50

WIRE & CABLE

BELDEN COAX

9913 low loss	$0.42/ft.	RG-8X (9258)	0.19
RG-213/U (8267)	0.40	RG-11A/U (8261)	0.37
RG-8/U (8237)	0.32	RG-58A/U (8259)	0.13
RG-8/U (8214)	0.35	RG-59/U (8241)	0.14

450 Ohm Ladder Line 0.10

COPPERWELD ANTENNA WIRE

Solid: 12 ga. / 14 ga.	0.10 / 0.08
Stranded: 14 ga.	0.08

ROTOR CABLE

Standard (6-22, 2-18)	0.19
Hvy Dty (6-18, 2-16)	0.35

Others in stock!

AMPHENOL CONNECTORS

PL-259: std / silver / teflon	0.89 / 1.25 / 1.45
UG-21B (8261) Type N Male	2.95

T's, angles, adaptors, jacks, & BNC in stock!

COAX AVAILABLE IN PRECUT LENGTHS WITH CONNECTORS ATTACHED.

ANDREW HELIAX

LDF4-50A 1/2" Cable	1.75
LDF5-50A 7/8" Cable	4.00

Connectors in stock.

TONNA
ANTENNAS

MICROWAVE MODULES
TRANSVERTERS, CONVERTERS, PREAMPS

BENCHER • B & W • WELZ • VGE
SHURE 444D MICS • ARRL BOOKS

VISA/MASTERCARD

Prices subject to change without notice.
Minnesota residents add 6% tax.
Shipping additional except as noted.

TO ORDER:
1-800-233-2482
INFORMATION, TECHNICAL, MINNESOTA & DX:
218-765-3254

rf enterprises
HCR Box 43
Merrifield, MN 56465
(Located at Junction of 3 & 19)

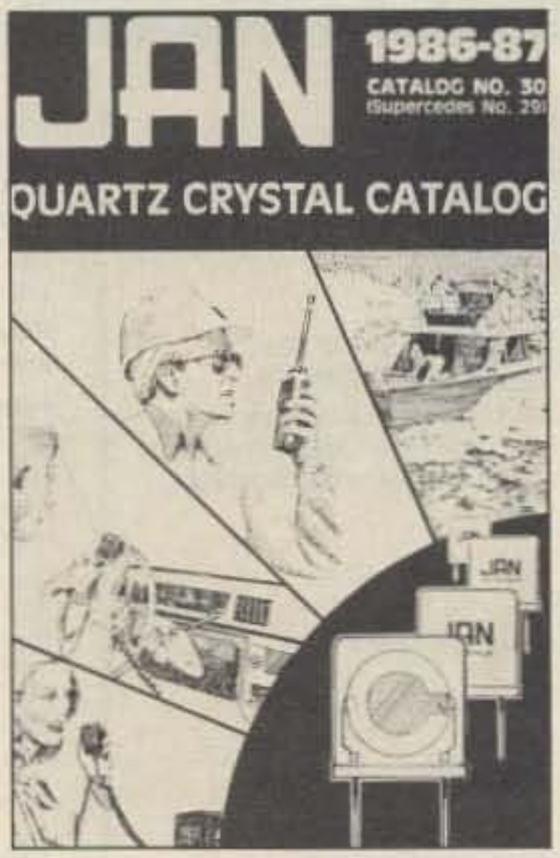
CIRCLE 142 ON READER SERVICE CARD

NEW PRODUCTS

JAN CRYSTALS BOOKLET

A free booklet with general information on frequency control quartz crystals and listings of various kinds is now available from Jan Crystals. Among its topics, the booklet contains crystal data and current prices for the Novice through General bands, as well as for scanners, CBs, and business radios.

For your free copy, circle number 202 on your Reader Service card.



Free quartz crystal catalog from Jan Crystals.

ICOM TRANSCEIVERS

ICOM America, Inc., has introduced three new transceivers: the IC-761, the IC-375A, and the IC-1200.

IC-761

The IC-761 is an HF base-station transceiver rated at 100 Watts output on CW, SSB, FSK, and SSTV. It covers all bands from 160 through 10 meters, plus MARS and CAP operation. The IC-761 also features passband tuning, i-f shift, i-f notch, a dual-width adjustable level noise blanker, 32 memory channels, semi-duplex or split-band vfo operation, a built-in CW keyer, and a steep-skirted narrow CW filter. The 761 has a 28-volt power amplifier, an internal cooling fan, a large heat sink, a built-in switching-type ac power supply, and a built-in automatic antenna tuner.

IC-375A

The IC-375A is a 25-Watt 220-MHz base-station transceiver that covers 216–230 MHz. The 375A has 99 tunable full-function memories, passband tuning, a notch filter, a noise blanker, a built-in swr bridge, semi or full CW break-in, and a multi-function meter. Four scanning systems are available: band, programmable, mode, and memory scan with selectable lockout. All subaudible tones and standard repeater splits are built-in; odd splits are programmable.

Rotating Tower Systems drive mechanism for rotating Rohn 45 and 55 towers.

IC-1200

The IC-1200 is a compact 1.2-GHz transceiver for mobile or base operation. It covers 1240–1300 MHz. The 1200 has a large LCD readout, 21 memory channels, 10 Watts of output power, built-in subaudible tones, frequency scan, and memory scan. Its frequency control function automatically adjusts the receive frequency to that of the transmitting station. Two new options are the UT-28 digital code squelch unit (for digital coding and decoding) and the UT-29 tone squelch unit (to encode/decode subaudible tones).

Prices for all three transceivers are to be announced. For more information, contact your local ICOM dealer.

ROTATING TOWER HARDWARE

Rotating Tower Systems, Inc., now offers complete hardware systems to rotate Rohn 45 or 55 towers. Each system is tailored for separate mechanical and strength requirements of the selected tower. The hardware is easily assembled, all bearings and drive components are easily replaced without tower disassembly, and the rotating base can be mounted at any tower height. The hardware uses 2:1 chain drive with an HDR 300 rotor for increased turning torque and decreased rotational kinetic energy.

To receive further information on this hardware, circle number 205 on your Reader Service card.

REGENCY R-1090 SCANNER

The latest offering from Regency Electronics, Inc., is the R-1090, a 45-channel scanner. Its features include bank scanning, weather scan, and a priority control. The scanner covers more than 15,000 UHF/VHF frequencies on 30–50, 144–174, and 440–512 MHz. Forty-five preprogrammed frequencies enable the unit to be op-

The IC-1200 1.2-GHz FM mobile/portable transceiver.

ICOM's new Big Gun HF transceiver, the IC-761.

The Regency R-1090 scanner.

erated right out of the box. Frequencies can be grouped into any of four channel banks for bank scanning, which can be scanned individually or all at once. It also includes channel lockout, fast and slow scan speeds, and a memory backup system.

The Regency R-1090 sells for $239.95

For more details about Regency scanners, circle number 206 on your Reader Service card.

KANTRONICS PERSONAL PACKET MAILBOX

The Personal Packet Mailbox from Kantronics, Inc., is a replacement plug-in 256K EPROM that lets you and others leave and collect messages in your Kantronics Packet Communicator, without disrupting the other functions of your packet unit. The mailbox is operated from your keyboard. The Personal Packet Mailbox option is currently available for the KAM, KPC-1, KPC-2, and KPC-2400. The unit retails for $39.95 plus $2.50 shipping; it includes a replacement plug-in EPROM and an installation/operations manual.

For more information, circle number 207 on your Reader Service card.

E.L. JONES QUICK SILVER

Quick Silver from E.L. Jones Co. is a silver-bearing bonding paste that flows at 430° F using a match, butane lighter, or soldering gun. It has a tensile strength of 18,000 to 22,000 psi.

Quick Silver bonding paste.

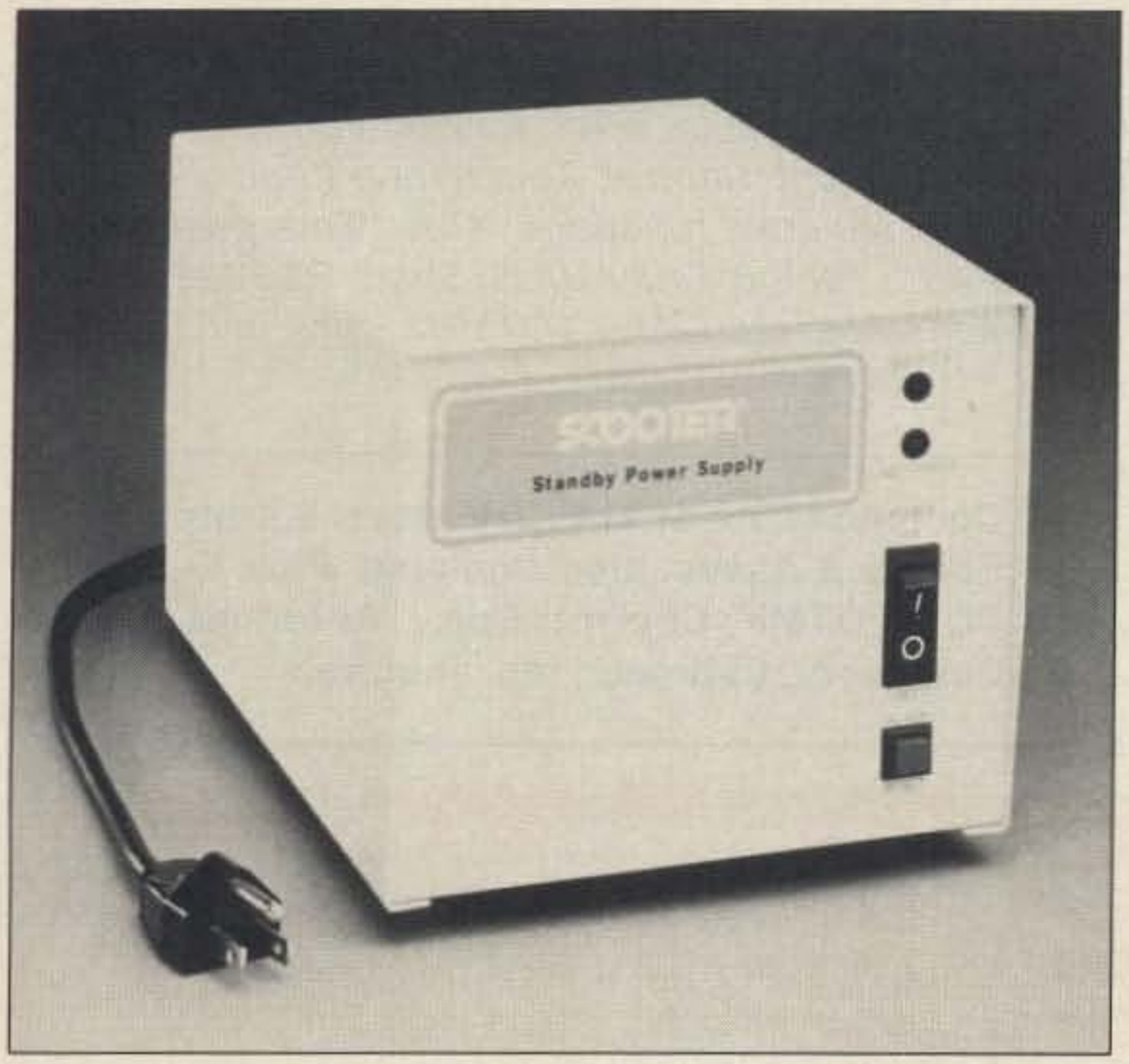
It comes in a syringe-type applicator that lets you apply the paste and then apply the heat. Quick Silver is available for $9.95, plus $2 p/h.

For more information about Quick Silver, circle number 209 on your Reader Service card.

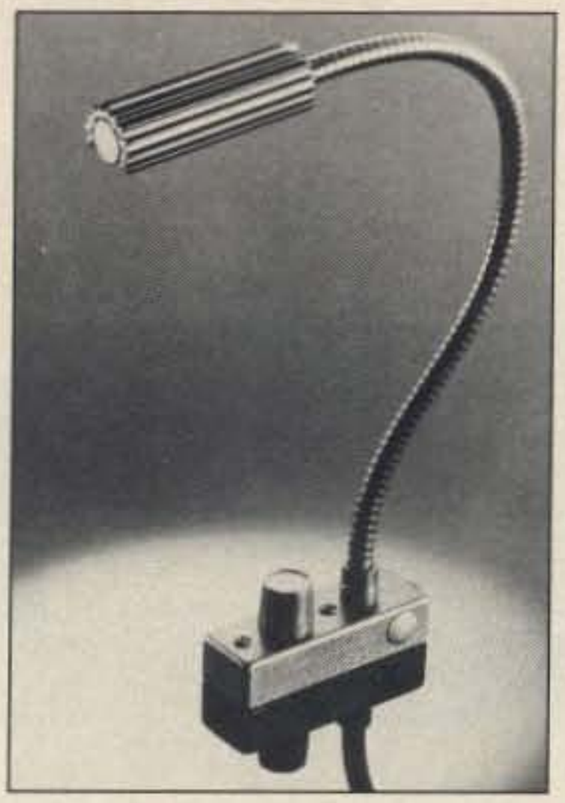
SCOOTER STANDBY POWER SUPPLY/ VOLTAGE REGULATOR

Ohm Electronics, Inc., has released the Scooter® model SPS450VR standby power supply/voltage regulator, which is rated at 450 Watts continuous duty.

When primary power fails or drops below 15% of nominal, inverter power is automatically provided at a regulated 120 V ±5%. When primary power returns to within 7% of nominal, the system automatically switches back to normal line operation and begins to recharge the battery to full charge.



The Scooter SPS450VR standby power supply/voltage regulator.



The Littlite from CAE.

The circuitry monitors the line voltage for electrical spikes and surges, providing complete protection. Other features include an internal audible alarm system (primary power loss and low battery), regulated automatic recharging, automatic shutdown to protect battery after discharge, alarm silencing button, status indicator LEDs, and master on/off switch.

The SPS450VR retails for $895.

For more information, circle number 210 on your Reader Service card.

NEVADA COIL

The Nevada RC 26 "Roller Coaster" coil, designed and manufactured by G4JEV, is being distributed by Telecomms of Portsmouth, England. It is intended for use in high-power ATUs and transmitter output stages. The unit has a unique roller suspension system, which both minimizes "contact bounce" and ensures the best possible contact between roller and coil during adjustment. The Nevada Roller Coaster has a power-handling capability of up to 1 kW and an inductance of 30 uH maximum. The unit sells for around $33.

For further details, circle number 211 on your Reader Service card.

CAE LITTLITE

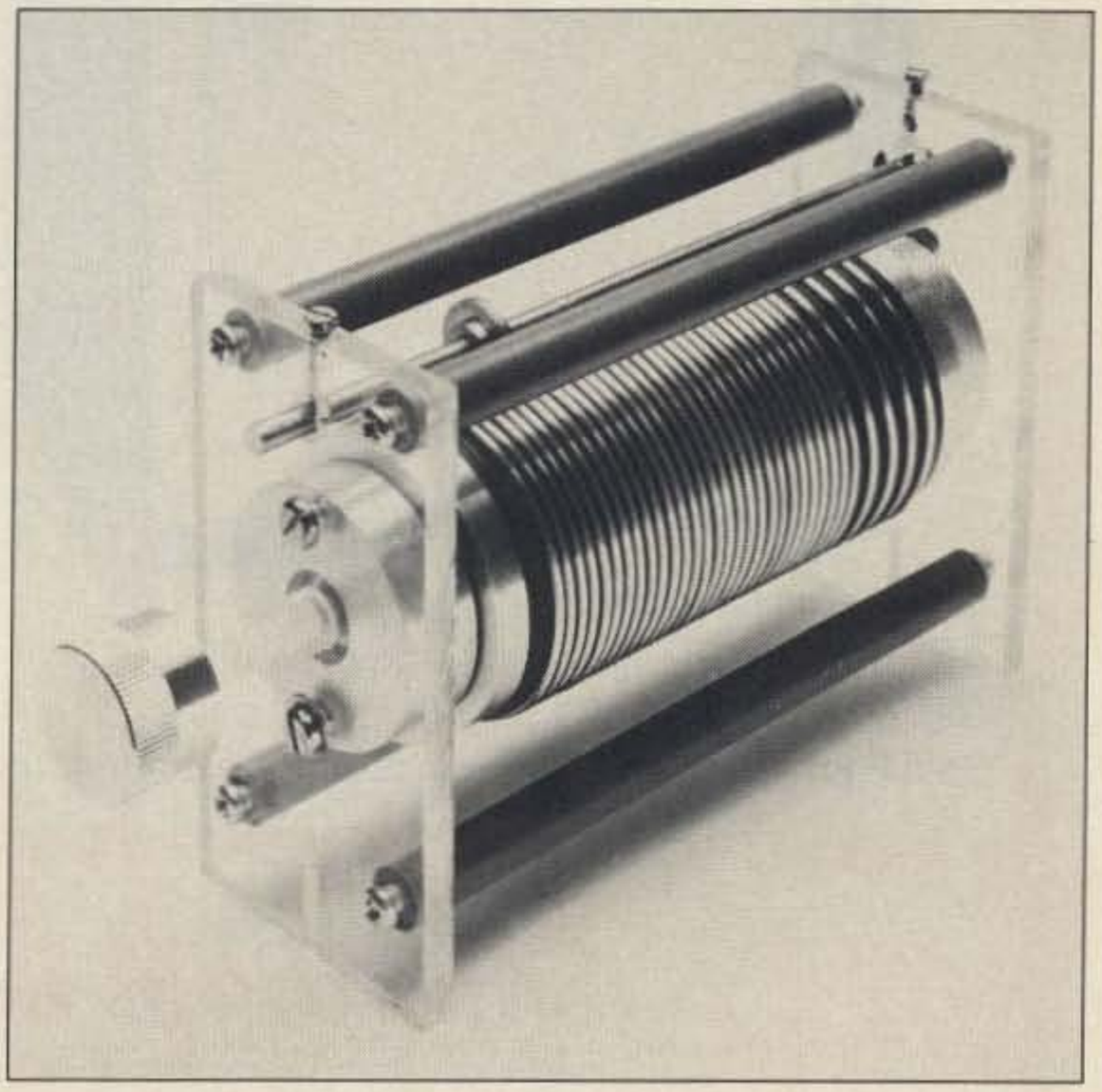
The Littlite from CAE, Inc., is an excellent way to illuminate your radio bench. A *73* staff member used the Littlite during a recent contest and found that it made operating at night much more comfortable. Its intensity can be varied from dim to bright white, and the area of illumination can be confined to the front of the radio and log book.

For more information on the Littlite, circle number 212 on your Reader Service card.

UNIVERSAL ELECTRONICS PUBLICATIONS

The latest catalog of electronics books and publications by Universal Electronics, Inc., has been released. Topics include RTTY, shortwave, facsimile, weather, radioteletype, and satellite TV.

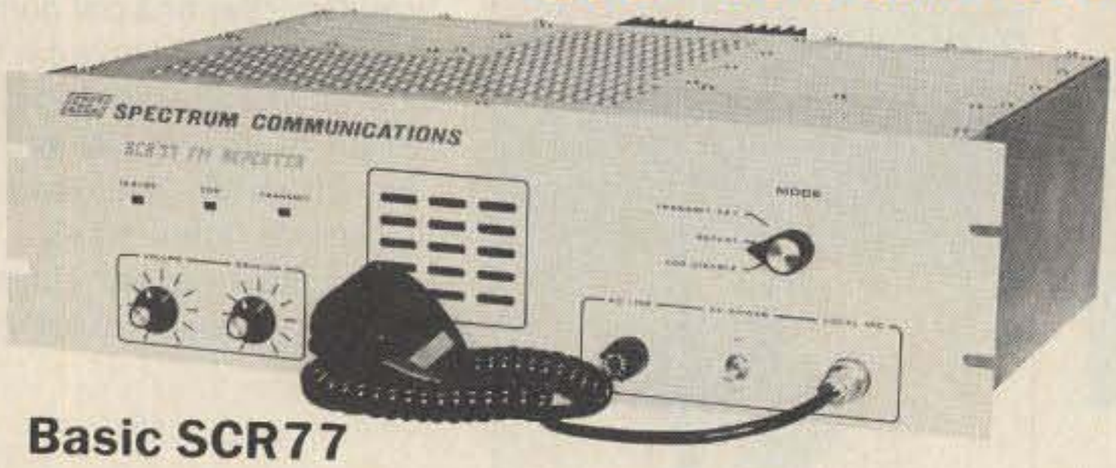
For a complete list of publications from Universal Electronics, circle number 201 on your Reader Service card.



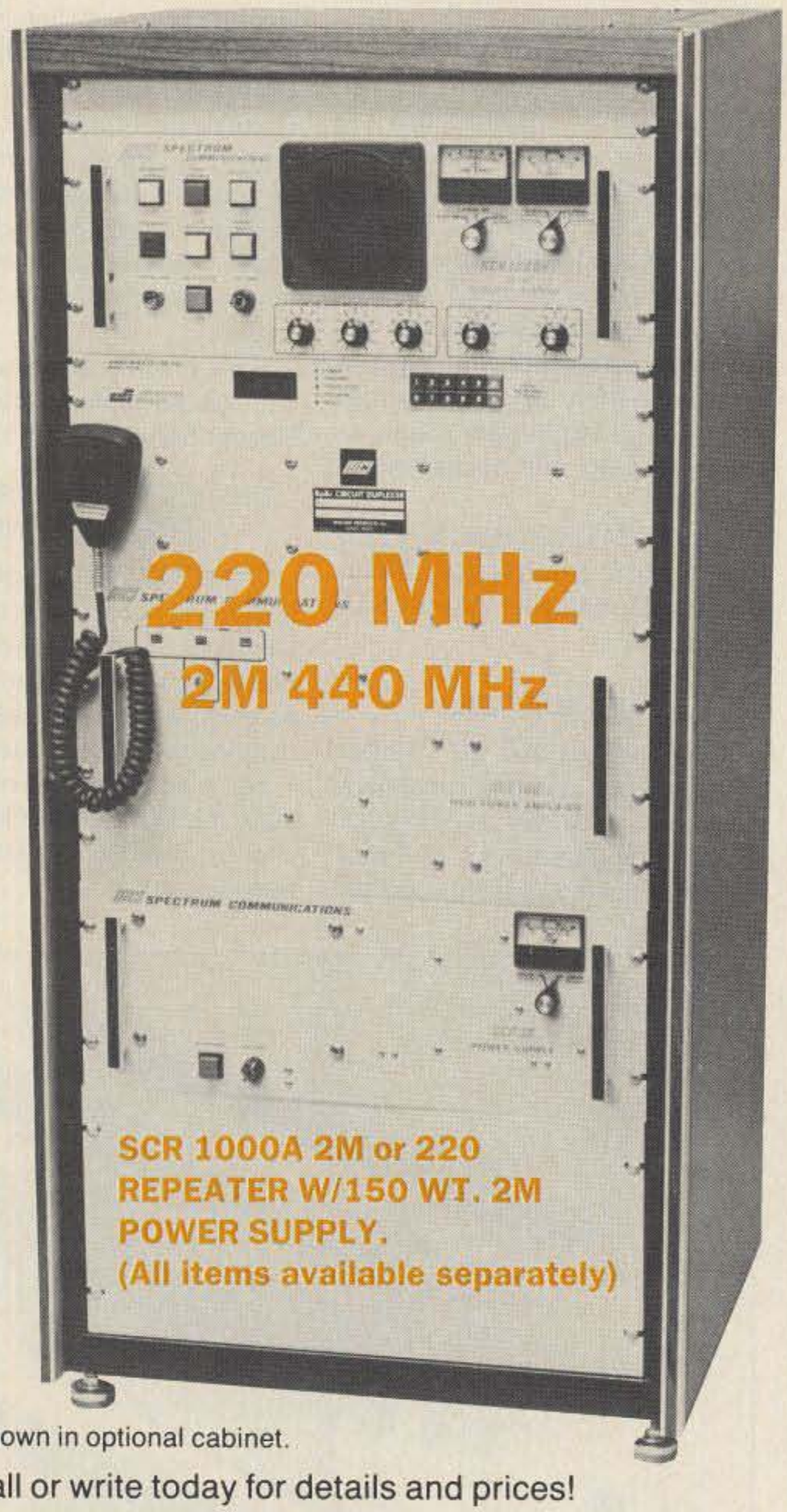
The Nevada RC 26 Roller Coaster variable inductor.

For the Finest in 220 MHz Repeaters, Go with the Leader—

SPECTRUM



Basic SCR77



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.

We've got the greatest design/performance "Know-how"—12+ years in the business—with constant improvements in our Repeaters & Link Units!

For that new 220 MHz Machine—Spectrum now makes 3 lines of VHF Repeaters—the world famous Deluxe SCR1000A, the Low Cost line of SCR77s, and the State of the Art Microprocessor Controlled SCR2000X Line of Repeaters!

The SCR77 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 SCR77 is a real "workhorse" basic machine designed for those who want excellent, super-reliable performance year after year—*but no frills!*

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 SCR1000A or the SCR2000X.

All three available with: Autopatch/Reverse Patch/Landline Control; TouchTone Control of various repeater functions; 'PL'; "Emergency Pwr./ID"; Tone & Timer Units; Sharp RX Filters; Power Amps; etc. (2M & 440 MHz Rptrs. and RF Link Units also available.)

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

SPECTRUM COMMUNICATIONS CORP.

1055 W. Germantown Pk, S6 • Norristown, PA 19403 • (215) 631-1710 • TELEX: 846-211

CIRCLE 51 ON READER SERVICE CARD

73 Review

ICOM IC-38A and Kenwood TM-3530A 220-MHz Transceivers

ICOM America, Inc.
2380-116th Avenue NE
Bellevue WA 98004
Price class: $400

by Peter H. Putman KT2B

Trio-Kenwood Communications
1111 West Walnut Street
Compton CA 90220
Price class: $450

The IC-38A and TM-3530A are part of the first wave of what can only be a flood of 220-MHz mobile equipment, now that Novices have gained access to the band. Both radios offer full coverage of the present 220-MHz segment (220–225 MHz), 20–25 Watts output, and selectable subaudible tone programming. Both radios can be used in base-station operation as well, and both have easy-to-read green LCD displays.

These radios represent two very different approaches in "top-of-the-line" 220 FM transceivers, however! There are more differences between the two units than just the $50 in list price. Table 1 summarizes the basic features of both radios. Which is the right one for you?

Features

Let's start with the Kenwood TM-3530A, which sizes up at 2-1/2″ high, 7″ wide, and 7-1/2″ deep and weighs four pounds. Finished in black, it makes for a slick-looking transceiver, both on the operating bench and under the dashboard. The front panel is dominated by the large (2″ x 1″) green LCD display, which shows received signal strength/power output, offsets, scan modes, frequency, memory channel, center tuning, priority channel, tone function, and repeater reverse. The signal strength/power output display is sort of a three-colored curved display, with marks at the 1-, 3-, 5-, 7-, 9-, and +20-dB points. Other selected functions appear over different colored bands when enabled, which is very handy when you're operating in the car and taking quick glances at the radio.

You'll notice right away the absence of a tuning knob! All frequency selection is performed by punching in the last four digits of the desired frequency (i.e., "4060" for 224.060 MHz) on the front-panel keypad, or by using the UP/DOWN scanning control on the supplied microphone. The large knob on the front panel selects any of the 23 memory channels or the standard CTCSS tone frequencies. Two of the memory channels can be paired up for oddball offsets if need be. Other controls below the keypad are for volume, squelch, and power on. Above the memory tuning knob are switches to lock the displayed frequency and enable the memory channel pairings for offsets.

"Both the TM-3530A and IC-38A represent good values in 220-MHz FM equipment."

To the left of the display are controls for priority channel, repeater reverse, lamp control, low power, scanning, and alert (checks the priority channel every six seconds). Below the display, Kenwood's DCS (digital coded squelch) system can be enabled and programmed. On the far right, buttons are provided for an optional voice synthesizer VS-1, tone activation, and the built-in telephone autodialer, which holds up to 15 numbers. This latter function is very useful if you make a fair amount of autopatch calls. It could also be used for DTMF control of a repeater or link. The keypad rounds out the list with frequency selection, offsets, memories, and scanning modes.

The rear panel couldn't be simpler: antenna connector, dc power, and external speaker jack. The supplied speaker is mounted on top of the chassis, a Kenwood tradition that started with the TR-7400A and has continued intermittently since. This would make certain mobile installations a bit difficult unless you employ an external speaker. The supplied scanning microphone is of the dynamic type with up/down controls and no DTMF pad—obviously one is not needed!

On to the ICOM IC-38A. It is considerably smaller, sizing up at 1-7/8″ high by 5-1/2″ wide by 6″ deep and tipping the scales at three pounds. The finish is black with a bold white logo on the top case. The 3/4″ x 1-7/8″ green LCD display also dominates the front panel, showing frequency selected, duplex mode, tone, power output, received signal strength, memory functions/memory channel, and offset write function.

All frequency selection is performed via the front tuning knob or the supplied up/down microphone. ICOM has chosen to make the tuning rate selectable via the SET control, offering 5-, 10-, 15-, 20-, or 25-kHz steps per dial click. This is handy if you want to scoot around the band in a hurry! The tuning knob also selects memory channels, and there are 21 of those to choose from. Below the LCD display are the power on, volume, and squelch controls, as well as the HI/LO power switch.

The rest of the controls are: to the left of the

display, a duplex/simplex switch, transmit/receive indicator (green LED), tone activation for CTCSS, memory write button, vfo/memory select, and frequency stepping in 1-MHz steps up or down. On the right of the display, you'll find two switches, one of which is the previously mentioned SET (selects offsets, tone frequencies, and tuning steps) and T/D SQL, which enables either the UT-28 digital code squelch option or UT-29 tone squelch option.

The rear panel consists of a large heat sink (proportional area equivalent to the TM-3530A) with connections for dc power, antenna, and external speaker. The antenna connector is on a cable extension, following the design of the IC-27A/37A/47A series radios. This saves much knuckle-busting as you try to fit a PL-259 into a tight compartment around a heat sink! Unfortunately, the external speaker jack is very hard to access. The built-in speaker is mounted on the bottom of the chassis, making for a simple mobile installation but posing a bit of a problem in the base station unless an external speaker is used.

Feature	Kenwood TM-3530A	ICOM IC-38A
Coverage	220–225-MHz T/R	220–225-MHz T 215–230-MHz R
Display	Green LCD, Multifunction	Green LCD, Multifunction
Memory Channels	23	21
Offsets	+1.6 MHz, −1.6 MHz Programmable	+1.6 MHz, −1.6 MHz Programmable
Power Output (claimed)	25 Watts HI, 5 LO	25 Watts HI, 5 LO
DTMF Ready?	Yes	No
Autodialer	Yes	No
CTCSS Tone Equipped?	Yes	Yes
Selectable Frequency Steps?	No	Yes
Digital Squelch Option?	Yes	Yes
Priority/Alert Channels?	Yes	No

Table 1. Basic features of the TM-3530A and the IC-38A.

Specification	IC-38A Measured	Claimed
Power Output		
HI	22 Watts	25 Watts
LO	4 Watts	5 Watts
Current Drain		
HI	5 A	6.5 A max.
LO	2.4 A	3.0 A approx.
With receiver squelched	300 mA	450 mA
Receiver Sensitivity	.2 uV for 10-dB S/N	.18 uV for 12-dB Sinad
	.6 uV for 20-dB S/N	N/A
	2 uV for S9	N/A
Selectivity	−6 dB ± 10 kHz	−6 dB > 12.5 kHz
	−30 dB ± 15 kHz	N/A
	−50 dB ± 20 kHz	−60 dB 25.0 kHz
Squelch Law	.15 uV	N/A

Table 2. Performance data—ICOM IC-38A.

Specification	TM-3530A Measured	Claimed
Power Output		
HI	25 Watts	25 Watts
LO	5 Watts	5 Watts
Current Drain		
HI	4.5 A	6.5 A approx.
LO	2.1 A	2.5 A approx.
With receiver squelched	310 mA	600 mA
Receiver Sensitivity	.25 uV for 10-dB S/N	.25 uV for 12-dB Sinad
	.6 uV for 20-dB S/N	N/A
	2.5 uV for S9	N/A
Selectivity	−6 dB ± 10 kHz	−6 dB > 12 kHz
	−20 dB ± 15 kHz	N/A
	−40 dB ± 20 kHz	−60 dB 24 kHz
Squelch Law	.16 uV	.125 uV

Table 3. Performance data—Kenwood TM-3530A.

Observations

Now for the fun part. Both radios are enjoyable to use in mobile and base applications. My acid test for any radio is to open the box and see how many functions I can figure out before opening the manual, and in this case the ICOM won hands down—but the reason for this is that the 38A has far fewer controls and options to deal with.

The Kenwood system of direct frequency selection from the keypad (as opposed to a tuning dial) took some getting used to, and I personally prefer the more conventional approach. I also liked the rapid frequency stepping available with the 1-MHz and STEP switches on the IC-38A.

Both radios have more than enough output to operate in the noisiest of environments, with the ICOM a bit higher at 2.4 Watts and the Kenwood at 1.5 Watts. The supplied speakers work very well, although the TM-3530A sounded a bit tinny. Received audio reports were about equal as well, both in repeater and simplex use.

As far as the control layout goes, the LCD display on the IC-38A is considerably brighter than that of the TM-3530A. I'd rate character readability about equal on both. The IC-38A is by far the easier of the two to set up and operate while you're mobile, due to its simple design, but then I've always preferred simple transceivers for the car.

One nice feature on the TM-3530A is the automatic offset selection when a frequency is punched in. This applies only above 223.940 MHz, as all frequencies selected below here come up with a simplex display, and you have to select the correct offset. Of course, this is easily solved by putting those frequencies and offsets in memory.

Another nice touch is the built-in DTMF encoder, so you are touchtone™ ready—right from the box! Contrast this with the IC-38A, which will not allow touchtone operation unless the optional IC-HM14 DTMF microphone is purchased as well.

The TM-3530A's telephone autodialer is slick. You can store up to 15 seven-digit telephone numbers for recall in any order, making dialing while you're driving much safer. It would be nice to have a larger storage capacity per channel, say on the order of 10 or even 15 digits per channel to combine access codes and telephone numbers with the appropriate pauses built in. The autodialer has a side benefit: Simplex 220-MHz linking and remote control functions can easily be supervised from the TM-3530A autodialer.

The ALERT and PRIORITY channel functions on the TM-3530A received no usage here, but you may find them useful for local monitoring of repeaters or simplex net frequencies. The IC-38A makes no provision for these functions.

As far as the scanning functions go, the IC-38A provides one scan mode for the vfo frequency range and one for the memories. If

you're into scanning, the 38A's vfo scanning mode will drive you crazy. Why? Because (for some strange reason) the IC-38A receive coverage is from 215–230 MHz. This really makes no sense! I can't imagine any current operations on those channels I'd care to listen to at all, and it just makes the scan rate longer when you have to cover an extra 10 MHz out of the band.

The TM-3530A also provides two basic-scanning modes: keyboard programmable scan and memory scan. The latter is obvious, and the former involves setting the upper and lower limits of the band in which you wish to scan. Those band limits are 220–225 MHz, unlike the IC-38A. You can also skip certain memory channels with the Skip Scan function—also available on the IC-38A.

I should also briefly mention a problem I had with the TM-3530A out of the box: No matter how fast I keyed the PTT switch on the microphone, the transmitter stayed on for a minimum of one second. A call to Kenwood revealed this to be a microprocessor problem, and I was instructed to perform the reset function outlined in the owner's manual, which cured the problem nicely.

I should add that both transceivers appear to have adequate transmit/receive switchover time to function in packet radio operations, which is perhaps the fastest-growing mode on 220 MHz today.

Now for some test data (see Tables 2 and 3). The equipment consisted of a Hewlett Packard signal generator, Bird 43 wattmeter with 5C and 50C slugs, a 25-Watt coaxial resistor, and Astron RS 7 power supply. All measurements were made at 13.8 volts dc.

Conclusions

There were only a few drawbacks on each radio. On the IC-38A, inserting and/or removing an external speaker plug takes smaller fingers than I or anyone I know posesses! Also, not having DTMF functions included on the microphone is kind of silly for the price of the radio. Finally, the receiver coverage (and scan coverage) is too wide.

On the TM-3530A, I miss the conventional tuning dial knob. The audio sounded tinnier than it should have, given the speaker size, and I found the front-panel control layout unnecessarily busy for mobile operation.

From my observation of the two radios, the Kenwood makes the better base-station radio, what with the built-in feet, overall control layout, and top-mounted speaker. And indeed, it would appear that in this area many operators are using it for that purpose. The ICOM is better suited to mobile performance. The display is easy to read, the controls easy to grasp, and the size just right for today's compact cars.

Want everything in a 220 rig? The TM-3530A has everything but the kitchen sink installed, which should keep you happy for a while! Want to set it and forget it? The IC-38A offers simple, no-frills communications. Both the TM-3530A and IC-38A represent good values in 220-MHz FM equipment, and each is versatile enough to be used in a variety of applications.■

Com-Rad Hi-Rizer

by Marc Stern N1BLH

Com-Rad Industries
PO Box 554
Grand Island NY 14072
Price class: $117, plus $5 s&h

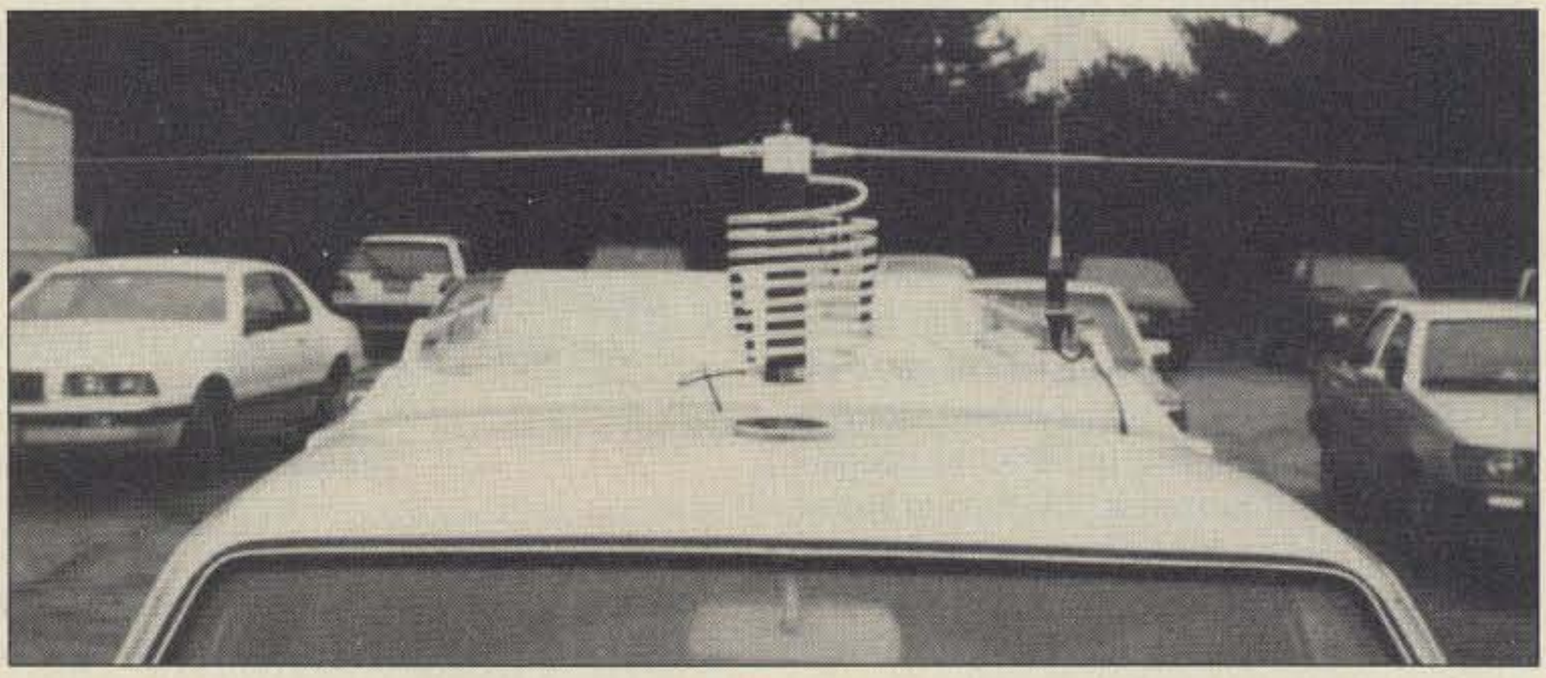


Photo A. The Hi-Rizer configured for mobile operation.

Although it looks a little like R2D2 and sometimes a piece of wire will hear better, there's no denying that the Hi-Rizer by Com-Rad Industries works. In fact, it's surprising just how well it does work. Just ask the ZL who was contacted on the low end of 20 one morning . . . or the UA. Each gave a 599 report rather recently.

And this is quite surprising for an antenna that is a compromise and that looks like an inductor gone wild or a strange-looking car radio antenna. It's also surprising to find such good performance from an antenna that's about 18 inches high and that sports a humongous, nine-turn aluminum tubing inductor. Essentially what Com-Rad has presented the world is a short, tuned inductor that gives you, in turn, a short, inductively loaded antenna.

Looking at the antenna, you'll see it's little more than a balun with its inductor and radiators attached. There's a shorting clip at the top and an SO-239 at the base. That's all there is to it. The radiators seem to be standard auto radio antenna replacements. They are placed on studs at the top and tightened with set screws.

As you can see, it's not a very complicated antenna. It's made for operators who have antenna space restrictions, such as those in apartments or condos. To facilitate this use, Com-Rad provides about 30 feet of RG-58 coax and a quarter-inch mesh screen that serves as an indoor ground plane. The coax, evidently, is supposed to serve as the counterpoise. Com-Rad delivers the antenna cable unterminated, so you'll have to spend some time with a hot soldering iron before you can use the cable.

"The Hi-Rizer is made for operators who have antenna space restrictions, such as those in apartments or condos."

Interestingly, I tried several lengths of coax and found the antenna loaded up fairly well without regard to length. There is a special knack to using the coax, though. Com-Rad goes to great lengths to explain that the antenna cable can't be run in parallel—it must be laid out in a pattern that avoids paralleling. In fact, the instructions provide several diagrams detailing suggested cable routings. In this way, you prevent cable coupling into the antenna, and the cabling can also serve its purpose as part of the ground plane.

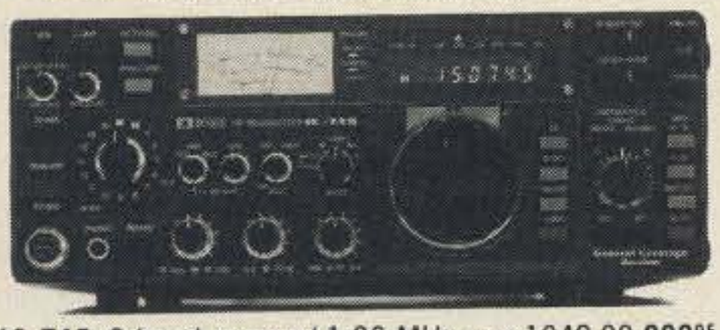
Overall, the antenna is quite straightforward to set up and use. All you do is unpack it and attach it to the particular mount you are planning on using, fixed or magnetic. For example, Com-Rad delivered the evaluation unit with a five-inch diameter mag mount on the base. It used the standard 3/8-by-24 connector base. There was another 3/8-by-24 base on the grounding mesh that was secured with four healthy bolts. To use the mesh, simply unscrew the mag mount base and insert the Hi-Rizer into the ground mesh.

As you can see, getting to this point is a piece of cake, and that ease of use continues into tuneup and use of the Hi-Rizer.

Tuning the Antenna

To tune the Hi-Rizer, you simply set the radiating elements to roughly 25 inches and leave them there. Then refer to a chart supplied by Com-Rad which shows you the number of turns to tap according to the band you are using. For example, 40 meters requires that you simply insert the shorting clip without attaching it to the coil. Apparently it acts ca-

HF Equipment	Regular	SALE
IC-735 HF transceiver/SW rcvr/mic †	999.00	**799.95**
PS-55 External power supply	199.00	**179.95**
AT-150 Automatic antenna tuner	445.00	**349.95**
FL-32 500 Hz CW filter	66.50	
EX-243 Electronic keyer unit	56.00	
UT-30 Tone encoder	17.50	



IC-745 9-band xcvr w/.1-30 MHz rcvr	1049.00	**899.95**
PS-35 Internal power supply	199.00	**179.95**
EX-241 Marker unit	22.50	
EX-242 FM unit	44.00	
EX-243 Electronic keyer unit	56.00	
FL-45 500 Hz CW filter (1st IF)	66.50	
FL-54 270 Hz CW filter (1st IF)	53.00	
FL-52A 500 Hz CW filter (2nd IF)	108.00	**99.95**
FL-53A 250 Hz CW filter (2nd IF)	108.00	**99.95**
FL-44A SSB filter (2nd IF)	178.00	**159.95**

IC-751A 9-band xcvr/.1-30 MHz rcvr	1649.00	**1399**
PS-35 Internal power supply	199.00	**179.95**
FL-32 500 Hz CW filter (1st IF)	66.50	
FL-63 250 Hz CW filter (1st IF)	54.50	
FL-52A 500 Hz CW filter (2nd IF)	108.00	**99.95**
FL-53A 250 Hz CW filter (2nd IF)	108.00	**99.95**
FL-33 AM filter	35.25	
FL-70 2.8 kHz wide SSB filter	52.00	
RC-10 External frequency controller	39.25	

Other Accessories:	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	**1699**
PS-15 20A external power supply	169.00	**154.95**
PS-30 Systems p/s w/cord, 6-pin plug	299.00	**269.95**
OPC Opt. cord, specify 2, 4 or 6-pin	10.00	
MB Mobile mount, 735/745/751A	24.50	
SP-3 External speaker	61.00	
SP-7 Small external speaker	49.00	
CR-64 High stab. ref. xtal (745/751)	63.00	
PP-1 Speaker/patch	159.25	**149.95**
SM-6 Desk microphone	44.95	
SM-8 Desk mic - two cables, Scan	78.50	
SM-10 Compressor/graph EQ, 8 pin mic	136.25	**124.95**
AT-100 100W 8-band auto. antenna tuner	445.00	**389.95**
AT-500 500W 9-band auto. antenna tuner	559.00	**489.95**
AH-2 8-band tuner w/mount & whip	625.00	**549.95**
AH-2A Antenna tuner system, only	495.00	**429.95**

ICOM

Other Accessories - continued:	Regular	SALE
GC-5 World clock	91.95	**89.95**

6-meter VHF Portable	Regular	SALE
IC-505 3/10W 6m SSB/CW portable	549.00	**489.95**
EX-248 FM unit	55.50	
LC-10 Leather case	39.50	

VHF/UHF base multi-modes	Regular	SALE
IC-551D 80W 6-meter SSB/CW	799.00	**719.95**
EX-106 FM option	140.00	**126.95**
BC-10A Memory back-up	9.50	
IC-271A* 25W 2 meters ... **CLOSEOUT**	859.00	**699.95**
AG-20* Internal preamplifier	64.00	
IC-271H 100W 2m FM/SSB/CW	1099.00	**969.95**
AG-25 Mast mounted preamplifier	95.00	
IC-275A 25W 2m FM/SSB/CW w/ps	1199.00	**1049**
IC-471A* 25W 430-450.... **CLOSEOUT**	979.00	**769.95**
AG-1* Mast mounted preamplifier	99.50	
IC-471H* 75W 430-450 ... **CLOSEOUT**	1399.00	**999.95**
AG-35* Mast mounted preamplifier	95.00	

***Preamp $9.95 with 271A/471A/471H Purchase**

Accessories common to 271A/H and 471A/H		
PS-25 Internal power supply for (A)	115.00	**104.95**
PS-35 Internal power supply for (H)	199.00	**179.95**
SM-6 Desk microphone	44.95	
EX-310 Voice synthesizer	46.00	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	14.00	
UT-15S UT-15S w/TS-32 installed	92.00	

VHF/UHF mobile multi-modes	Regular	SALE
IC-290H 25W 2m SSB/FM, TTP mic	639.00	**569.95**
IC-490A 10W 430-440..... **CLOSEOUT**	699.00	**499.95**

VHF/UHF/1.2 GHz FM	Regular	SALE
IC-27A Compact 25W 2m FM w/TTP mic	429.00	**369.95**
IC-27H Compact 45W 2m FM w/TTP mic	459.00	**399.95**
IC-37A Compact 25W 220 FM, TTP mic	499.00	**439.95**
IC-47A Compact 25W 440 FM, TTP mic	549.00	**479.95**
PS-45 Compact 8A power supply	139.00	**129.95**
UT-16/EX-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	
IC-28A 25W 2m FM, TTP mic	459.00	**399.95**
IC-28H 45W 2m FM, TTP mic	489.00	**429.95**
IC-38A 25W 220 FM, TTP mic	489.00	**429.95**
IC-48A 25W 440-450 FM, TTP mic	489.00	**429.95**
HM-14 TTP microphone	55.50	
UT-28 Digital code squelch	37.50	
UT-29 Tone squelch decoder	43.00	
HM-16 Speaker/microphone	34.00	
IC-3200A 25W 2m/440 FM w/TTP	599.00	**529.95**
UT-23 Voice synthesizer	34.99	
AH-32 2m/440 Dual Band antenna	37.00	
AHB-32 Trunk-lip mount	34.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	20.18	
Larsen PO-MM Magnetic mount	19.63	
RP-3010 440 MHz, 10W FM, xtal cont.	1229.00	**1089**
IC-120 1W 1.2 GHz FM Mobile	579.00	**499.95**
ML-12 1.2 GHz 10W amplifier	379.00	**339.95**
IC-1271A 10W 1.2 GHz SSB/CW Base	1229.00	**1069**
AG-1200 Mast mounted preamplifier	105.00	
PS-25 Internal power supply	115.00	**104.95**
EX-310 Voice synthesizer	46.00	
TV-1200 ATV interface unit	129.00	**119.95**
UT-15S CTCSS encoder/decoder	92.00	
RP-1210 1.2 GHz, 10W FM, 99 ch. synth	1479.00	**1289**

MasterCard VISA

Hand-helds	Regular	SALE
IC-2A 2-meters	279.00	**249.95**
IC-2AT with TTP	299.00	**259.95**
IC-3AT 220 MHz, TTP	339.00	**299.95**
IC-4AT 440 MHz, TTP	339.00	**299.95**
IC-02AT 2-meters	365.00	**299.95**
IC-02AT/High Power	399.00	**329.95**
IC-03AT for 220 MHz	449.00	**399.95**
IC-04AT for 440 MHz	449.00	**389.95**
IC-u2A 2-meters	299.00	**269.95**
IC-u2AT with TTP	329.00	**289.95**
Accessories for IC-u2A/T (CALL)		
IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	459.00	**399.95**
A-2 5W PEP synth. aircraft HT	599.00	**499.95**

Accessories for IC series	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	74.25
BP-8 800mah/8.4V Nicad Pak - use BC-35	74.25
BC-35 Drop in desk charger for all batteries	74.50
BC-16U Wall charger for BP7/BP8	20.25
LC-11 Vinyl case for DIx using BP-3	20.50
LC-14 Vinyl case for DIx using BP-7/8	20.50
LC-02AT Leather case for DIx models w/BP-7/8	54.50

Accessories for IC and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	47.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	37.50
BP-4 Alkaline battery case	15.25
BP-5 425mah/10.8V Nicad Pak - use BC35	58.50
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	11.50
CP-1 Cig. lighter plug/cord for BP3 or DIx	13.00
CP-10 Battery separation cable w/clip	22.50
DC-1 DC operation pak for standard models	23.25
MB-16D Mobile mtg. bkt for all HTs	24.50
LC-2AT Leather case for standard models	54.50
RB-1 Vinyl waterproof radio bag	34.95
HH-SS Handheld shoulder strap	16.95
HM-9 Speaker microphone	47.00
HS-10 Boom microphone/headset	23.25
HS-10SA Vox unit for HS-10 & Deluxe only	23.25
HS-10SB PTT unit for HS-10	23.25
ML-1 2m 2.3w in/10w out amplifier ... **SALE**	**99.95**
SS-32M Commspec 32-tone encoder	29.95

Receivers	Regular	SALE
R-71A 100 kHz-30 MHz, 117V AC	$949.00	**799.95**
RC-11 Infrared remote controller	67.25	
FL-32 500 Hz CW filter	66.50	
FL-63 250 Hz CW filter (1st IF)	54.50	
FL-44A SSB filter (2nd IF)	178.00	**159.95**
EX-257 FM unit	42.50	
EX-310 Voice synthesizer	46.00	
CR-64 High stability oscillator xtal	63.00	
SP-3 External speaker	61.00	
CK-70 (EX-299) 12V DC option	12.25	
MB-12 Mobile mount	24.50	
R-7000 25 MHz-2 GHz scanning rcvr	1099.00	**969.95**
RC-12 Infrared remote controller	67.25	
EX-310 Voice synthesizer	46.00	
TV-R7000 ATV unit	131.95	**119.95**
AH-7000 Radiating antenna	89.95	

HOURS • Mon. thru Fri. 9-5:30; Sat. 9-3

Milwaukee **WATS** line: **1-800-558-0411** answered evenings until 8:00 pm Monday thru Thursday.
WATS lines are for Quotes & Ordering only, use Regular line for other Info & Service dept.

All Prices in this list are subject to change without notice.

Order Toll Free: 1-800-558-0411 *In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195*

AMATEUR ELECTRONIC SUPPLY® Inc.

4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 • Phone (414) 442-4200

AES® BRANCH STORES — Associate Store

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio WATS 1-800-362-0290
Outside Ohio 1-800-321-3594

ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. WATS 1-800-432-9424
Outside Florida 1-800-327-1917

CLEARWATER, Fla. 33575
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS
Outside Nevada 1-800-634-6227

CHICAGO, Illinois 60630
ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181
Outside Illinois 1-800-621-5802

pacitively at that frequency. However, when you move up to 20 meters, you short out about a turn and a half. It's just that easy to use. There's a short instruction sheet with the antenna—really more of an ad than anything else—which indicates how many turns of the coil to tap.

Interestingly, Com-Rad urges you to load the antenna up through a tuner, which I did. In this way, it's easy to get a flat match, and, as a benefit, you also attenuate some harmonic radiation which keeps TVI out of the picture. You would also normally think the tuner is needed because of the way the antenna is being used—no real ground and, possibly, several stories above earth ground, which almost guarantees poor matching characteristics. But, much to my surprise, I found that straight through the tuner, the Hi-Rizer matched at about 1.5:1, which isn't bad when you consider the nature of the antenna. (A brief testimonial letter indicates this wasn't a fluke with me. Other operators report the same things.)

Using the Antenna

After you've tuned the Hi-Rizer, the next step is to use it and that's the simple part. If you've done everything correctly, you simply have to tune up your rig (if yours isn't solid-state) and you're off to the races.

Realize, though, that this antenna isn't a beam and there's no way you can compete with the Big Guns. If you're using the Com-Rad, you'll have to sharpen your DX techniques to work any rare one.

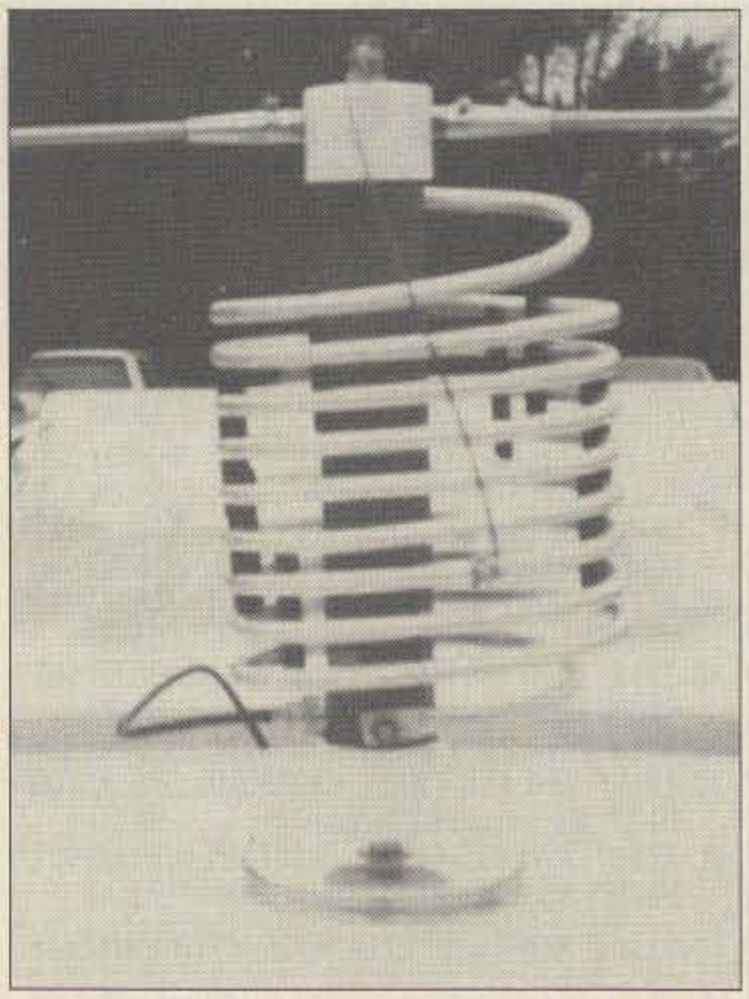


Photo B. Close-up of the Hi-Rizer coil.

Com-Rad says that you can place the Hi-Rizer just about anywhere and, in truth, you can. However, I would advise placing it in an area where people aren't likely to go. The reason is that if you're on the air and someone brushes by the antenna, not only will he upset the pattern, but he also runs the risk of getting rf burns. An unused room or deck is a good bet.

I would also suggest you pay close attention to the ground mesh. Com-Rad terminates it with a couple of pieces of plastic to keep hot rf away from roving youngsters. Still, if they put their fingers into the mesh grid while you're on the air, they're likely to get rf burns. Again, the unused room makes a great deal of sense.

Finally, Com-Rad suggests you can use this mobile, and with a five-inch magnetic mount, I certainly agree. But, remember that you have about 50 inches of radiator extending across the roof of the rear deck of your car, so keep passersby clear and keep the vehicle clear of obstructions. Also, with the size of the coil, I suggest that you keep your speed down.

Conclusions

Overall, the Com-Rad Hi-Rizer is a decent, small antenna for operators with antenna restrictions or problems. If you think about it, you must seriously realize from the start that it is a compromise antenna, which isn't a beam. Further, if you're operating from inside a building, you must also expect the performance, in some cases, to be marginal, even compared to a short length of wire out a window. In this case, the wire will probably hear better.

However, if you're willing to accept these facts, then you'll find the Hi-Rizer is a fun antenna to use. Ultimately, though, what counts is that you stay on the air. That's the point of an antenna like this, isn't it?■

THE MOST AFFORDABLE REPEATER

ALSO HAS THE MOST IMPRESSIVE PERFORMANCE FEATURES

(AND GIVES THEM TO YOU AS STANDARD EQUIPMENT!)

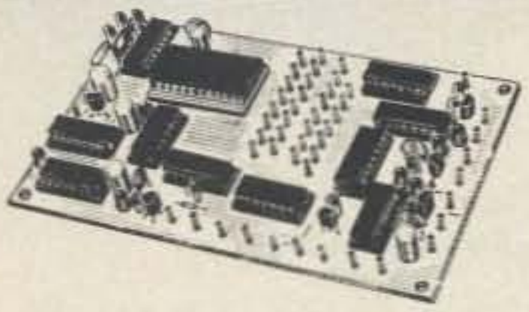
BAND	WIRED	KIT
6M,2M, 220	$880	$630
UHF	$980	$730

(Also available for commercial bands!)

FEATURES:

- **SENSITIVITY SECOND TO NONE!** 0.15uV Typ.
- **SELECTIVITY THAT CAN'T BE BEAT!** Both 8 pole xtal filter & ceramic filter for >100dB at ±12kHz. Helical resonator front end to combat desense & intermod.
- **Flutter-proof squelch,** Automatic frequency control, separate spkr amplifier.
- **CLEAN, EASY-TUNE TRANSMITTER,** up to 20W output. 50W with additional PA.

ACCESSORIES



- **TD-2 DTMF DECODER/CONTROLLER** kit **only $78. Full 16 digits, 5 functions, toll call restrictor, programmable. Much more. Great for selective calling too!**
- **AP-1 AUTOPATCH** kit only **$78. Reverse patch & phone line remote control std.**
- **AP-2 Simplex Autopatch.** Use with above.

- **CWID kit,** new low price $48. Field programmable, timers, the works!
- **COR-2 kit,** $38. Audio mixer, local spkr amplifier, tail & time-out timers.
- **COR-3 kit,** $48, with courtesy beep.

- **MO-202 FSK DATA MODULATOR kit** $38. Run up to 1200 baud digital or packet radio signals through any FM transmitter.
- **DE-202 FSK DATA DEMODULATOR kit** $38.

GaAs FET PREAMPS at a fraction of the cost of comparable units!

LNG -(*) GaAs FET PREAMP

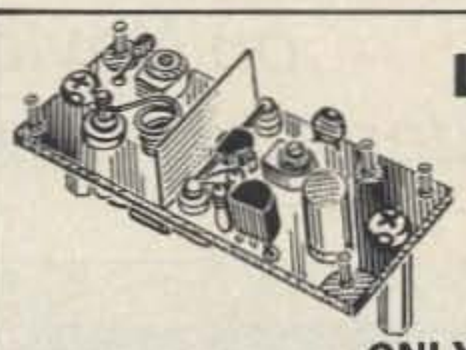
ONLY $49! WIRED/TESTED

FEATURES:

- **Very Low Noise:** 0.7dB VHF, 0.8dB UHF
- **High Gain:** 13-20dB, depending on freq
- **Wide Dynamic Range:** to resist overload
- **Stable:** new-type dual-gate GaAs FET

* Specify tuning range desired: 26-30, 46-56, 137-150, 150-172, 210-230, 400-470, or 800-960 MHz.

LNW -(*) MINIATURE GaAs FET PREAMP



Unbelievably Low Price - - -

ONLY $19/kit, $34 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 desired: 25-35, 35-55, 55-90, 90-120, 120-150, 150-200, 200-270, or 400-500 MHz.

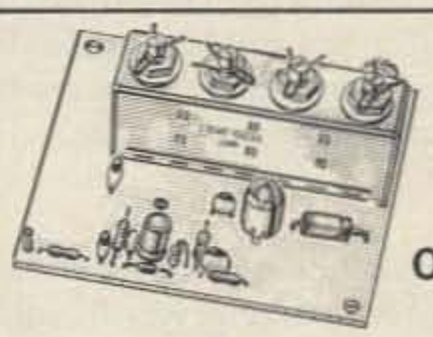
LNS-(*) IN-LINE PREAMP

ONLY $59/kit, $79 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 mtg. hardware supplied.**

* Specify tuning range desired: 120-175, 200-240, or 400-500 MHz.

HRA -(*) HELICAL RESONATOR PREAMP

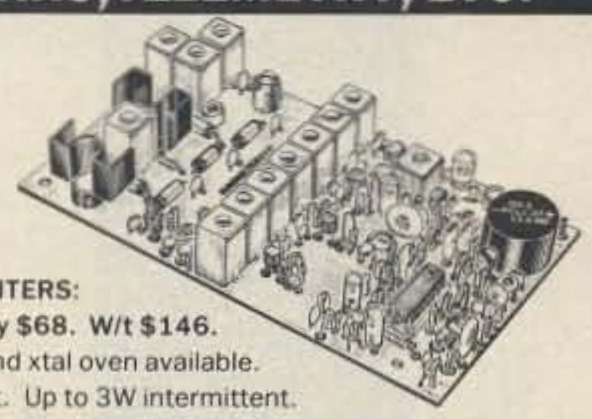


ONLY **$49** VHF or **$64** UHF

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

* Specify tuning range desired: 143-150, 150-158, 158-162, 162-174, 213-233, 420-450, 450-465, or 465-475 MHz.

HIGH QUALITY XMTR & RCVR MODULES FOR REPEATERS, LINKS, TELEMETRY, ETC.



- **FM EXCITERS:** **Kits only $68. W/t $146.** TCXO and xtal oven available. 2W cont. Up to 3W intermittent.
- **TA51 for 10M, 6M, 2M, 150-174, 220 MHz.**
- **TA451 for uhf.** FCC TYPE ACCEPTED FOR COMMERCIAL BANDS.
- **VHF & UHF LINEAR AMPLIFIERS.** For FM or SSB. Power levels from 10 to 45 Watts. Several models, kits starting at $78.

- **R144/R220 FM RCVRS** for 2M, 150-174, or 220 MHz. 0.15uV sens, 8-pole xtal & 10 pole ceramic i-f filters, helical resonator front end for exceptional selectivity, >100dB at ±12kHz (best available anywhere!) Flutter-proof squelch. AFC tracks drifting xmtrs. Xtal oven avail. Kit $138, w/t $198.
- **R451 FM RCVR.** Same as above but UHF. Tuned line front end. 0.2uV sensitivity. Kit only $138, w/t $198.
- **R76 VHF FM RCVR** for 10M, 6M, 2M, 220. As above, but w/o AFC or hel.res. Kits only $98 to $118.
- **R110 VHF AM RCVR** for VHF aircraft or ham bands or UHF. Kit only $98.

NOW—FCC TYPE ACCEPTED TRANSMITTERS, RECEIVERS, AND REPEATERS AVAILABLE FOR HIGH-BAND AND UHF. CALL FOR DETAILS.

RECEIVING CONVERTERS

		Antenna Input Range	Receiver Output
VHF MODELS		28-32	144-148
		50-52	28-30
		50-54	144-148
		144-146	28-30
		145-147	28-30
		144-144.4	27-27.4
		146-148	28-30
		220-222	28-30
		220-224	50-54
		222-224	28-30
Kit with Case	**$49**		
Kit less Case	**$39**		
Wired w/case	**$69**		
UHF MODELS		432-434	28-30
		435-437	28-30
		432-436	144-148
		432-436	50-54
		439.25	61.25
		902-928	422-448
		902-922	430-450
Kit with Case	**$59**		
Kit less Case	**$49**		
Wired w/case	**$75**		

TRANSMIT CONVERTERS

For SSB, CW, ATV, FM, etc. Can be linked with receive conv for tranceive. 1 to 2 W out. Linear PA's available up to 50W.

	Exciter Input Range	Antenna Output
For VHF, Model XV2 Kit $79 Wired $149 (specify band)	28-30	144-146
	28-29	145-146
	28-30	50-52
	27-27.4	144-144.4
	28-30	220-222
	50-54	220-224
	144-146	50-52
	144-146	28-30
For UHF, Model XV4 Kit $79 Wired $139	28-30	432-434
	28-30	435-437
	61.25	439.25
	144-148	432-436

HAMTRONICS, INC.
65-E Moul Rd.; Hilton NY 14468-9535

☐ **High quality equipment at reasonable prices surely appeals to me; but I want more details before I buy! Rush my copy of the 40-page Hamtronics catalog by return first class mail. I enclose $1 ($2 for overseas air mail).**

Name _____

Address _____

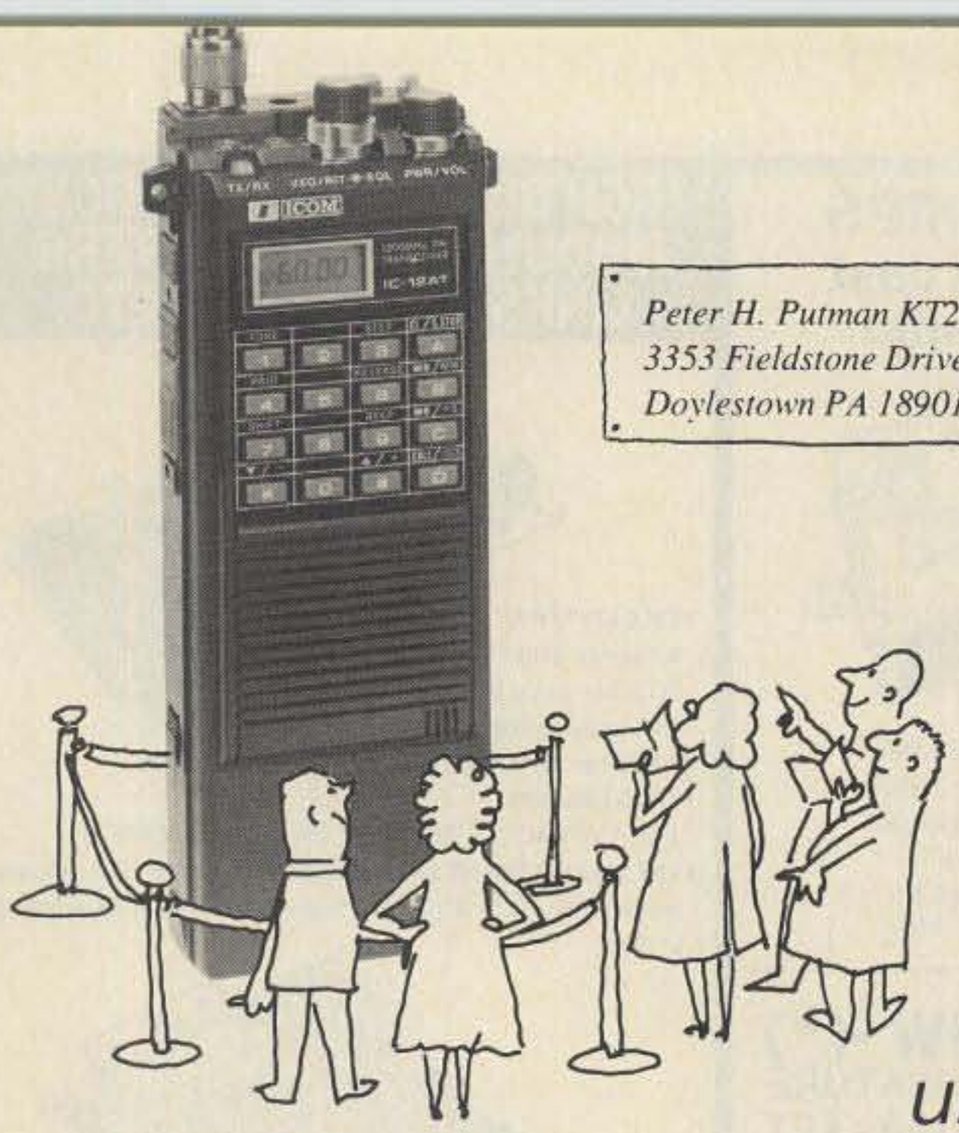
City _____ State/ZIP _____

- **Order by phone or mail • Add $3 S&H per order (Electronic answering service evenings & weekends)**
- **Use VISA, MASTERCARD, Check, or UPS COD.**

hamtronics, inc.

65-D MOUL ROAD•HILTON NY 14468-9535

Phone: 716-392-9430 *Hamtronics® is a registered trademark*



Peter H. Putman KT2B
3353 Fieldstone Drive
Doylestown PA 18901

A Guided Tour of 1.2 GHz

KT2B covers the basics of operation on Novice Enhancement's least-understood allocation, the 23-cm band.

With the adoption and implementation this year of the FCC Novice Enhancement Docket (PR Docket 86-161), Novices have substantially increased their privileges on three bands encompassing vastly different parts of the amateur spectrum—10 meters, 1.25 meters, and 23 centimeters. Ten-meter activity around my area has surely multiplied in the past few months and 220 seems to be coming along nicely, but I have a feeling that 1270–1295 MHz remains a puzzle to much of the Novice population despite an adequate supply of equipment for the band. Well, you can stop scratching your head! I'll try to give some pointers about 23 cm that will help make you invest your money and time better.

Band Characteristics

First off, let's consider the position of 23 cm. It's the next allocation above 33 cm (902 MHz) and is harmonically related to 144 and 432 MHz (1296 MHz/3 = 432; 1296/9 = 144). Its position in the amateur spectrum and its propagation characteristics truly qualify it as a microwave frequency!

Typical installations here involve high-gain directional antennas, high path loss, and low-noise GaAsFET preamplifiers and receiver front ends. At this frequency, the limiting factor regarding receiver noise figure is the noise generated by the receiver itself.

Average signal propagation can be as little as one mile, using 1-Watt hand-helds on FM simplex. This assumes a clear shot between the stations, since objects such as buildings, trees, billboards, and hills will greatly attenuate (if not block) the signals. In many cases, some of these obstructions will act to reflect the signal (and even refract it, to a lesser degree), resulting in the raspiness common to received multipath signals. (Some operators reflect signals off of airplanes passing overhead for brief long-haul DX contacts.) With high-gain antenna arrays and the best receiving equipment, the average range can be extended considerably to more than 50–60 miles—even 100 miles under ideal conditions.

At 23 cm, precipitation can play havoc with your signals. It's not unusual to have virtually all of your 1296 efforts dissipated by a dense, moisture-laden cloud not far away. Mountaintop operators know this phenomenon well, especially when caught in rainstorms (or even snowstorms)!

Photo A. ICOM's IC-1200 1.2-GHz mobile transceiver.

Photo B. Kenwood's TR-50 1.2-GHz portable transceiver.

Additionally, layers of snow, ice, and even raindrops on 23-cm yagi antennas will detune the elements, resulting in all kinds of wild swr readings. These effects are virtually unheard of on 50 and 144 MHz. On the other hand, the same conditions that spawned those rain clouds will often produce some of the more exciting propagation seen on the band, and it goes by the nickname "tropo."

Tropo

Vastly extended 23-cm propagation can occur via tropospheric ducting, which is present when a layer of cooler air is trapped between two layers of warmer air in the troposphere (that's the "sphere" that produces all of our weather). This is called an inversion, wherein the air temperature actually rises with an increase in altitude, and is very common in the mid to late summer and fall.

When ducting occurs, signals entering the duct can be carried for many miles beyond their normal range. To give you an example, such a duct often forms between Hawaii and higher elevations along the California coast, and has resulted in two-way contacts on 144, 220, 432, and even 1296 MHz.

Several years ago, a strong duct was formed by a severe storm off the Carolina coast during the 1984 ARRL September VHF QSO Party. Stations were working from Connecticut into Florida on 432, and from western Massachusetts into Georgia on 1296 MHz.

Indeed, this past November we were treated to a tremendous opening from the Midwest to the East Coast, and stations in Nebraska, Kansas, and Oklahoma worked stations in Ohio, New Jersey, and New York—all the way up to 23 cm. Some contacts on 23 cm were made with as little as 2 Watts of output!

Equipment Considerations

Okay, I've convinced you. There is something going on up there! What's the best way to get on? There are a few options, so let's start by discussing equipment first. At the present time, there are four major companies (to my knowledge) offering ready-to-go transceivers or transverters for 23 cm. I suspect that more will come on line as Novice activity picks up. (Remember that your Novice privileges at 23 cm restrict you to 5 Watts output!)

ICOM of America offers perhaps the broadest line of radios, with a hand-held, a mobile transceiver, and a base-station multimode. The IC-12AT operates FM only with 1 Watt of output, while the IC-1200A delivers 10 Watts from a mobile package. And, of course, ICOM makes the 10-Watt IC-1271A, a multimode radio offering FM, SSB, CW, and ATV (reviewed in the September, 1986, issue of *73*).

The ICOM line is nice in that it covers all possible angles of 23-cm operation. It would seem that FM takes the priority over other modes, and I'm sure this is a reflection of

Photo C. Two transverters for 23 cm, Microwave Modules' MMT 1296/144 (top) and SSB Electronics' LT23S (bottom).

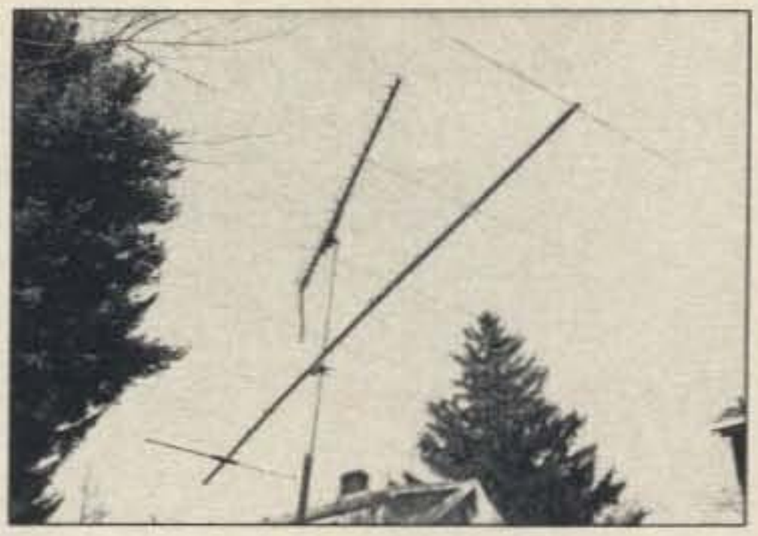


Photo D. Comparison of a 23-element 1296-MHz yagi beam (top) with a 9-element 144-MHz yagi beam (bottom).

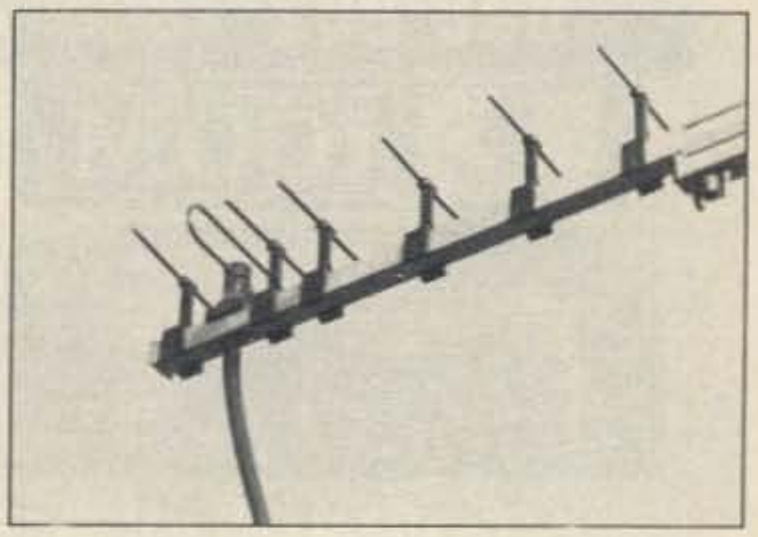


Photo E. Close-up of the dipole driven element on the 1296-MHz yagi beam. Note the small size and the method of element support.

23-cm FM activity in Japan. But if you're into fast-scan amateur television, SSB, CW weak-signal work, or even satellite operation, then the 1271A will fit the bill.

Kenwood at the present time markets only a 1-Watt FM portable for 23 cm, the TR-50. This unit is battery-powered and offers coverage of the Novice segment in a shoulder-carried configuration. However, folks at Kenwood assure me that a hand-held, mobile rig, and multimode will be available for 23 cm in the near future.

For those of you better equipped with HF gear and 2-meter multimodes, a quick and easy way to get on 23 cm is to use the transverter route. Microwave Modules of Liverpool, England, has offered a nice 2-Watt transverter for 1296 MHz for some time. The front end is a GaAsFET, and all transceive switching is on-board. Microwave Modules also offers a companion 15-Watt power amplifier for a little "kick." The i-f is on 2 meters, so you'll need a source of energy at 144–148 MHz to make it work.

As the MMT 1296/144 comes from the factory, the conversion is from 144 to 1296 MHz. However, simply changing the local oscillator crystal would result in a different conversion frequency. For example: Changing the stock 96-MHz LO crystal to 94 MHz would allow coverage of the 1272–1276-MHz range, with an i-f of 144–148 MHz. Using 95 MHz would permit coverage of the 1284–1288-MHz range.

Another manufacturer of high-quality 23-cm products is SSB Electronics of West Germany, who make the famous LT23S linear transverter. This unit is a staple of microwave operation in the U.S., and in addition to its 10-Watt output, it features a dual-crystal switch for the LO. This gives you two choices of frequency coverage at the flip of a switch. The LT23S also features a GaAsFET front end, but you will have to come up with your own antenna-switching scheme as separate connections are made for 1296-MHz rf OUT and rf. Incidentally, 28-MHz i-f schemes are also available for use with the "Transverter" connection on your HF radio—an easy way to go!

Antenna Considerations

Now that I've reviewed the products, let's look at feedlines and antennas. Most conventional transmission lines are useless at this frequency, with the standard RG-8/U showing about 10-dB loss per 100-foot run. This means that if you are feeding 10 Watts up your 100-foot tower, about 1 Watt will be available to the antennas. Fortunately, Belden introduced the now-famous type 9913 semi-rigid coaxial cable, which checks in a bit better at about 6-dB loss per 100 feet. Now you have 2.5 Watts to work with instead of 1! (Any victory, however small. . . .)

Of course, you can select rigid transmission lines such as Prodelin Spir-O-Line or Andrew Heliax cable in diameters of up to 1-5/8". The more common sizes are 1/2" and 7/8", but be prepared to spend a few dollars for it. Using 100 feet of 7/8" Heliax, for example, would cut your losses to about 3 dB per 100 feet, giving you 5 of the original 10 Watts to work with. You'll pay a steep price for it, though—about $3 a foot! My advice? Stay with 9913. It's easy to use, readily available, and inexpensive (from 40–50¢/foot), and connectors for it are also inexpensive, easy to use, and readily available.

Using type N fittings here is a must. Specially made N connectors are available from different sources including Amphenol. The RF Connection in Maryland makes a particularly nice center pin for Kings type N connectors to use with this cable. If you employ the standard PL-259 connectors—even with Teflon™ dielectric—be prepared to see 1.5-dB loss in the connector. A PL-259 looks nothing like 50 Ohms at this frequency, so stay away from 'em.

Another good choice for low-power applications is the time-tested BNC connector. It's also cheap, easy to use, and plentiful. Best of all, it looks like 50 Ohms way beyond 23 cm!

Antennas, antennas. Here you have a few choices. Larsen Antennas (of Kul-Rod fame)

MANUFACTURERS OF 23-CM RADIO EQUIPMENT AND ANTENNAS

ICOM America, Inc.
2380-116th Ave. N.E.
Bellevue WA 98004
1, 2, 3, 6

Microwave Modules, Ltd.
North American Distributor:
The PX Shack
52 Stonewyck Drive
Belle Mead NJ 08502
3, 4, 5, 6

Mirage/KLM Communications
PO Box 1000
Morgan Hill CA 95037
7

Down East Microwave
Box 1655A RFD #1
Burnham ME 04922
3, 4, 9

Larsen Electronics, Inc.
11611 N.E. 50th Avenue
PO Box 1799
Vancouver WA 98668
10

F9FT Antennes Tonna
The PX Shack
52 Stonewyck Drive
Belle Mead NJ 08502
7, 8

SSB Electronik
North American Distributor:
Transverters Unlimited
PO Box 6286 Station A
Toronto, Ontario M5W 1P3
3, 4, 5, 6

Trio-Kenwood Communications
1111 West Walnut Street
Compton CA 90220
1

Jaybeam, Ltd.
Spectrum International
PO Box 1084
Concord MA 01742
9

Key to 23-cm Equipment

1 FM transceivers
2 SSB/CW transceivers
3 Linear transverters
4 Rf power amplifiers
5 Receiving converters
6 Preamplifiers
7 Yagi antennas
8 Stacking frames
9 Loop yagis
10 Mobile and base vertical antennas

Segment	Use
1240–1246	ATV
1246–1248	NBFM, digital, duplex links
1248–1252	Digital
1252–1258	ATV
1258–1260	NBFM, digital, duplex links
1260–1270	Wideband experimental, satellite uplinks
1270–1276	Repeater inputs every 25 kHz
1276–1282	ATV
1282–1288	Repeater outputs every 25 kHz
1288–1294	Wideband experimental, ATV
1294–1295	Narrowband FM simplex, 25-kHz channels
1294.5	National FM simplex calling frequency
1295–1297	Weak-signal SSB, CW
1297–1300	Digital communications

Table 1. The current 1240–1300-MHz ARRL band plan adopted in 1985 (Novice subband indicated in italics).

makes an excellent collinear antenna for 1200–1300 MHz, employing either magnetic or fixed mounts. These NMO series antennas employ a special Belden type 9311 cable about the size of RG-58, with a loss rating of 16 dB/100 ft. The supplied coaxial cable is about 17 feet in length, so you are talking perhaps 3-dB total losses in a mobile installation. Gain is comparable to a collinear on lower frequencies, typically in the range of 4–5 dB due to the low angle of radiation.

For extended-range communications, consider a yagi (or several of them!). Many manufacturers offer high-performance beams for 23 cm, among them KLM, Tonna, Jaybeam, and Down East Microwave.

The KLM and Tonna designs are of a more conventional straight-element type, with KLM producing an 18-dB, 44-element yagi, and Tonna producing 23- and 55-element versions. The yagis from Down East are of the loop type and are available in 45-element configurations. The reason for the loop design is to eliminate the effects of water droplets or ice particles hanging from the elements (which degrades performance). Jaybeams are also of the loop variety and come in two versions.

Remember, of course, that most FM communications will employ vertical polarization, and most weak-signal work will use horizontal polarization. (At 23 cm, polarization losses can be in the 50–60-dB range!) All things considered, I suggest the single yagi approach for starters. One antenna, one feedline, and (hopefully) one radio to keep it simple. After you acquire some experience on 23 cm, you can decide how best to upgrade your station and antennas.

Remember also that you are working with microwave energy, so be careful! The FCC specified the 5-Watt power level for safety reasons, so use common sense. Don't make it a practice to stand in front of yagi antennas while transmitting. These antennas quite often have 20 dB or more gain at 23 cm, so your 5 Watts at the feedpoint become more like 500 Watts erp (effective radiated power)! As far as FM operation goes, I don't see a real problem with hand-helds running 1 Watt or less.

Operating Considerations

Now for the $64,000 question: Just who can I work on 23 cm, anyway? Admittedly a legitimate question, what with 25 MHz of spectrum space available and very little activity at present. Most operation on 23 cm occurs during contests and most of that is SSB/CW on or near the national weak-signal calling frequency of 1296.100 MHz. The current 1240–1300-MHz ARRL band plan, adopted in 1985, is shown in Table 1.

By viewing the table, you can see that there's plenty of spectrum space for a variety of interests, from exotic wideband modes to amateur television (ATV), digital modes such as packet, satellite modes such as OSCAR mode L (uplink at 1268 MHz), and, of course, narrowband FM and weak-signal work. As mentioned earlier, the predominant modes are SSB and CW around 1296.100, but this has been largely due to availability of equipment, with most of those operators using transverters or home-brew transmit and receive converters.

I would hope that a subband adjacent to the national calling frequency at 1296.100 would be redesignated for Novice weak-signal work. The reasons are quite obvious: Any radio equipment tuned to peak performance at 1296 will yield satisfactory results at 1295 or 1294 MHz. The same would apply to antennas as we are talking a variation of less than .25% in frequency. Also, higher-class licensees currently active on 1296 could, with minimal effort, switch downward to 1294 MHz by installing a different crystal in transverters. Of course, stations with multimodes such as the IC-1271A would be able to make the excursion easily.

In summary, the 23-cm band presents numerous opportunities for both newly licensed Novices and seasoned higher-class amateurs. There hasn't been a better time to get state-of-the-art equipment and antennas, either. If you still aren't sure, try and find a local ham who's already active on 23 cm. He'll probably be glad to share his knowledge with you. (I don't know anyone on 23 cm who wouldn't like to see a little more activity on the band, especially during contests!) See you on 23! ■

Atlanta ARRL National Convention

JULY 10 -11-12, 1987 ■ ATLANTA, GA
GEORGIA WORLD CONGRESS CENTER

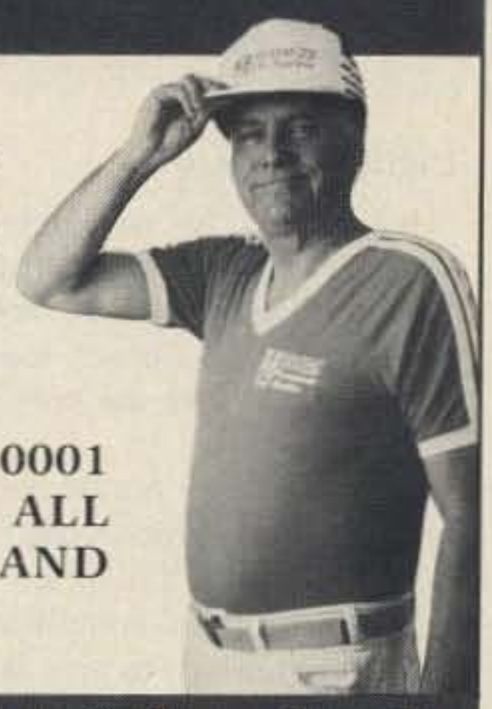
■ Club & Association Meetings - July 10 ■ New Product & Indoor Flea Market Sales - July 11-12 ■ License Exams -Both days ■ Banquet featuring Stu Gilliam (K16M) and Roy Neal (K6DUE) JULY 11 ■ Questions? Call ARC Computer Bulletin Board (404)393-3083 ■ Or write the ATLANTA RADIO CLUB, P.O. Box 77171, Atlanta, GA 30357

BIGGER! BETTER! BE THERE!

73 and ICOM present the

Golden Gigahertz Contest

JULY 13–14



Official Rules:

Operating Categories: Single operator; multi-operator, single transmitter.

Frequencies: Contest frequencies are 1260–1300 MHz. However, because of the large size of the band and the nature of microwave communication we suggest that you check **1294.500 MHz** (the national FM simplex calling frequency) and **1296.100 MHz** (the national SSB/CW weak-signal calling frequency).

Modes: If it's legal on 1.2 GHz, it's valid for the GGC.

Exchange: Grid square and signal report. (Grid locators are available from ARRL HQ.)

Scoring: Multipliers are grid squares. Repeater contacts count to increase QSO total but do not count as multipliers. Total Score = (Total QSOs x 5 x Multipliers) + Repeater Contacts + Repeater Grid Squares. (See the entry form for more information.)

Forms: Please fill out the attached coupon to receive your official Golden Gigahertz entry form/log sheets. **PLEASE BE SURE TO INDICATE YOUR T-SHIRT SIZE AND LICENCE CLASS ON THIS COUPON.** Mail the coupon to Golden Gigahertz Contest, ICOM America, Inc., 2380-116th Ave. NE, Bellevue, WA 98004.

Entries: Mail your completed log sheets to **Golden Gigahertz Contest, *73 Magazine*, WGE Center, Peterborough, NH 03458.** Entries must be postmarked by August 31, 1987. Results will be printed in *73 Magazine*. Decisions of the *73 Magazine* Contest Committee are final.

ICOM America and *73 Magazine* proudly present the first annual Golden Gigahertz Contest. This 1.2 GHz contest will be held from 0001 UTC July 13 through 2400 UTC July 14. ALL ENTRANTS WILL RECEIVE A FREE HAT AND T-SHIRT COURTESY OF ICOM.

Please send me my Golden Gigahertz log sheets and my free hat and T-shirt.

Name: _____ Call: _____

Address: _____

City: _____ State: _____ Zip: _____

Circle T-Shirt Size: Small Medium Large X-Large

Circle License Class: Novice Technician General Advanced Extra

Mail to: Golden Gigahertz Contest, ICOM America, Inc.
2380-116th Ave. NE, Bellevue, WA 98004

Jim Grubbs K9EI
PO Box 3042
Springfield IL 62708

THE DIGITAL NOVICE

K9EI covers the basics and terminology of a ham's digital world—from Samuel Morse's basement to packet proficiency.

The news is out and it is good news indeed! The FCC has significantly enhanced the operating privileges of over 80,000 existing Novices (Technicians also can use the new Novice privileges). The most obvious addition is the reinstatement of some voice privileges for Novices. Yes, reinstatement is the right word. Back in the days before air and water, Novices had a two-meter voice band. Yours truly operated regularly as KN9EIV back in 1961.

This time around it's much better. . .SSB operation on a portion of the 10-meter band (28.3–28.5 MHz) and "all modes" on the 222.10–223.91-MHz band. Additionally, the entire band from 1270 to 1295 megahertz is available to Novices.

While handie-talkies are selling like hotcakes for the new bands and Novices are crowding onto the SSB subband on ten, a vast new world of additional modes is beckoning the newcomer to some exciting challenges.

Digital Privileges

It's popular to say these days that Novices have been granted "digital privileges." The truth is, Novices have enjoyed digital communication for many years. For a long time, it was the only mode they were permitted!

Though it may not be fashionable to think in these terms, Morse code is an early form of digital transmission. It has laid the groundwork for far more complicated systems. The best place to start, as they say, is at the beginning, so let's take a quick sweep through history and find out how we got to where we are today. It's going to be a quick ride, so hang on.

Pre-Morse

Let's go back thousands of years ago and look in on Joe and Jane Caveperson. Things were pretty simple then. Spoken language consisted of a few grunts and an occasional whomp on the head with an early form of the Wouff-Hong. Chances are very good, though, that at some point they felt a need to "count" things. Fingers and toes make a good way to keep track of things as long as there aren't too many things. Each finger or toe represents the same quantity. It's not an accident that in modern times we refer to these appendages as "digits." In reality, Joe and Jane were already involved in "digital" computing.

S.F.B. Morse

It would be a number of years before any significant change would take place in digital communication. In the 1800s Samuel Morse would introduce a simple electronic system for sending messages over large distances. Interestingly, the original Morse system actually used a "teleprinter" of sorts rather than relying directly on human interception of his code. An early form of chart recorder placed a moving paper tape under a pen. As a signal was received, the pen came in contact with the paper leaving a series of "marks" and "spaces." An operator could then look at the paper tape and "read" the message.

Later systems involved the use of nothing but a sounding unit. The story goes that some operators developed the talent of copying messages with the pen units by listening directly to the sound made as the pen moved up and down. Regardless, what Morse did was to create an electronic system of communication using combinations of on and off signaling. That's one of the basic rules for digital communication.

You must be able to reduce the transmission to one of two states. Morse's system did that. The special combination of dits and dahs that form Morse code are derived from a set of rules defining each element and how they are assembled into words and messages. In modern terms, **protocol** is the word we use to describe those rules.

When radio experimenters began having success, Morse code was a natural way to communicate by radio waves. It would be a few years before voice transmissions would become commonplace. In modified form, Morse code reigned supreme.

Teletype

It is the nature of the human race to want to do things more easily and communicators are no exception. Several things happened that resulted in what we now call **Teletype**™. (Although the word has come to be used generically, Teletype is a registered trademark.)

Telegraphers and experimenters including a man named Baudot were searching for a way to group several code transmissions together over a single landline circuit. Baudot invented a system that was a form of time-sharing allowing five operators to all use the same circuit. It consisted of a rotor system that passed over a metal ring broken into five parts. A similar device was placed on each end and synchronized so that the circuit was available to each operator in rotation for a short period of time. Crude, but effective.

The desire to have a real teletypewriter led ultimately to using Baudot's system in a slightly different way. Rather than using Morse's code, a system of signaling was created that required exactly five elements to create every character. Through binary arithmetic we can see that 32 distinct combinations can be created with such a code. That's enough to cover all of the alphabet and some of the numbers. By designating one of the combinations as a shift code, a separate letters case and figures case was created, almost doubling the number of combinations available.

A few other things come into play when we talk about Teletype techniques. First, remember that each element within each character is sent sequentially. The individual elements flow one after another in a **serial** fashion. Additionally, you can start and stop sending characters at any time with a standard Teletype system. When characters can start at any time, the system is called **asynchronous**. It is necessary to let the receiving station know when a character is going to begin, so an additional bit of information is required, called a start bit, at the beginning of every letter sent.

Finally, mechanical machines are very hard to keep in close tolerance. Inventors found that the addition of one or more stop bits at the end of each character allowed the mechanics of the receiving machine to get ready for the next character.

The system just described is still in wide use today, though computer devices have replaced the mechanical machines for the most part. Standard amateur speeds include 60-word-per-minute and 100-wpm teletype. Radioteletype (abbreviated as **RTTY**) is the first "new" digital mode that is now open to Novices on the 28-, 221-, and 1270-MHz bands.

More Bits

Particularly as computers became a reality

in the business world, a real need existed for a code similar to Baudot or Teletype code (also known as Murray Code) that allowed more combinations. American Standard Code for Information Interchange, or **ASCII**, is the result. It is a seven-bit code that allows 128 separate combinations. An eighth bit can be used for some rudimentary error-checking. Modern computer designers have elected to use the eighth bit to designate an additional 128 characters, often used for special control signals and graphics. In practical operation, ASCII sounds just like RTTY and remains a serial, asynchronous form of communication. It's also available to the digital Novice on the same bands already mentioned. It opens up the possibility for easy computer program exchange over paths that aren't subject to noise. Line-of-sight communication on 221 would be a good choice, for example.

While all of this is nice, what about all the really modern things you've read about? They are yours, too, and here's a brief rundown on the basics.

AMTOR

Maritime interests have long used Teletype circuits and Morse to relay messages from ship to shore. Commercial interests were frustrated by poor conditions that often required manual retransmission of messages. They longed for a way to automatically recognize errors and correct them "on-the-fly." Amateurs were intrigued by the possibility, too, and created something called **AMTOR** for Amateur Teletype Over Radio.

AMTOR is a seven-bit code with a difference. It is designed so that there must always be a balance of four marks (or ones) to three spaces (or zeros) in each character. That stipulation reduces the number of characters available to just about that of standard Baudot transmissions. It makes it easy to spot errors, however, since the wrong combination results in the receiving system marking the character invalid.

Secondly, AMTOR is a synchronous system. The transmitting and receiving station must stay locked together in near perfect harmony. In simple terms, a short block of characters is transmitted, then the sending station pauses and listens for an acknowledgment. If everything is OK, the next group is sent; if everything's not OK, the bad block is repeated until it is acknowledged.

A control code allows the stations to switch roles between master and slave, allowing both the chance to transmit. What you hear on the air sounds like two birds chirping at each other.

AMTOR can also be used by Novices, but it's not the easiest mode to use. While several packages are available for popular home computers, there are some timing problems that can easily come into play either in the computer itself or in your particular radio. If you are considering AMTOR, you might want to see it in operation before investing. There are hardware AMTOR units available that are highly reliable, but they come at a premium price.

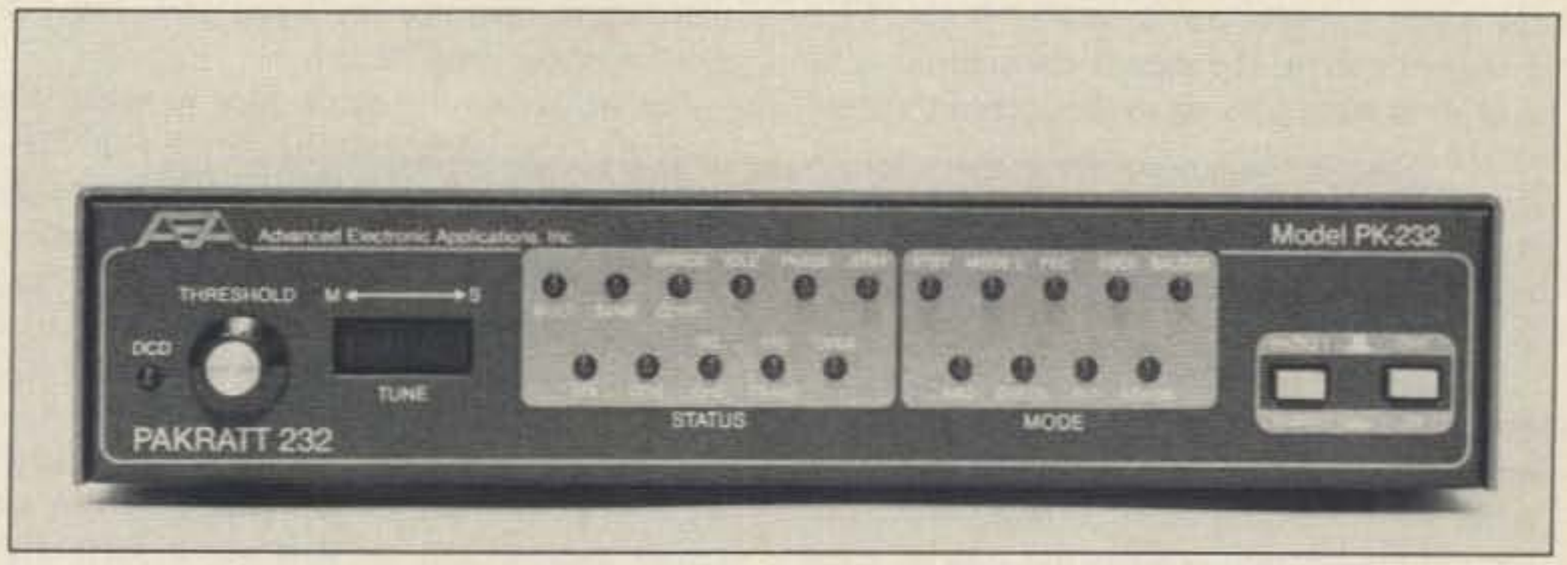


Photo A. AEA's PK-232 is an example of a station controller that allows you to operate all digital modes with a computer. The PK-232 can operate VHF and HF packet, CW, RTTY, ASCII, and AMTOR.

Photo B. MFJ's 1274 is an example of a packet terminal node controller (TNC). It is equipped to operate both HF and VHF packet.

A second AMTOR mode does allow for one-way bulletin-type transmissions. AMTOR Mode B, as it is called, uses a form of "Forward Error Correction." Mode B does allow for a higher degree of reliability than standard RTTY, but not as great as Mode A (which was described before).

Packet

Unless you have been hiding under a rock, packet radio has no doubt come to your attention. What is it? Well here's a brief introduction to get you started.

First of all, packet uses synchronous transmission techniques. Each character or unit of information has a distinct time slot. Exact timing between stations is required. Fortunately that's not too hard to do. Rather than using start and stop bits as standard Baudot does, something called a **flag** is attached to the beginning and end of each group of data. It's nothing more than a special combination of zeros and ones that has been reserved for this special use. Special circuitry is able to pick out the "clock rate" or speed from the signal itself so that the receiving station can stay synchronized to the transmitting station.

Flags are used in lieu of start signals. Rather than each character having an individual beginning element, a large block of information begins with a flag instead. In common amateur practice, 128 or even 256 characters can follow a single flag. Even larger blocks are possible.

Every bit that follows a flag signal has a unique time period. If no information is available for transmission, a null signal must still be sent to ensure the proper timing. As a result, it is common in such synchronous systems to buffer the transmitted data (store the entire message in computer memory before establishing contact) to eliminate wasted time on the air.

It is important to note that the information that follows the flag can be anything. It can indeed be ASCII characters, and most packet operation today consists of such transmissions. It could just as easily be binary program information for a computer or, for whatever reason you might want to do it, it could be Baudot or any other code. This kind of versatility opens up the possibility for visual image transmission and even digital audio. Wayne is still waiting for a report of the first transmission of digital audio via packet! It surely can't be far away.

With what I have described, we have a completely viable communication system, but it is not packet radio. We simply have a synchronous communication path. If we agree, by standard, to set aside a certain number of bits of information following each flag for special information, we begin to create the system we call packet radio.

One of the key ingredients in this special information is something called the **Frame Check Sequence** or **FCS**. Remember that we are buffering all of our transmitted data. By applying some sophisticated mathematics to the data, an all but unique number can be generated. That number, the FCS, is included in the transmission. On the receiving end,

the same calculation is made. If the FCS numbers match, the data is considered valid and allowed to pass on to the screen or printer. If not, the receiving station does not acknowledge that particular block of data. After a short period of time, the transmitting station will resend the data, still looking for an acknowledgment.

The **AX.25** protocol is the set of rules generally used in amateur circles today. A second protocol called Vancouver is popular in some areas of the world. It was created by early digital experimenters in Canada. Keep in mind that one protocol is not inherently better than the other. It is simply a matter of convention that AX.25 is in wider use.

The term packet radio comes from the idea that information destined for the same location is grouped together in packages or "packets" before transmission!

Much, much more goes into the specifics of packet radio protocol, but if you understand the simple concepts I've outlined here, you are sure to know more than the majority of old-timers already.

What Now?

What else can you do as a digital Novice? The possibilities are probably only limited by your imagination. Keep in mind that while at the present time it isn't a digital mode, you can even operate a fast-scan television station on the 1270-MHz band! Up there, you can do anything the Extra-class licensees can do, only with reduced power. You also can't be the control operator for a repeater, but you can operate through them.

Let's take a very quick look at what you need to experiment with some of your new privileges. Chances are good that you already own a personal computer. Most *73* readers do. If that is the case, you'll need a hardware interface, often called a terminal unit (**TU**) or computer patch, to match your computer signals to your radio. You'll also need some software capable of operation on your mode or modes of choice. If packet is what you are really interested in, the best way to go is with a special radio modem called a terminal node controller (**TNC**). While a TNC is a very sophisticated form of modem, it is one of the best dollar values on the market today. For not much more than $100, you can purchase a state-of-the-art unit!

Universal modems that allow all digital modes with virtually any home computer are becoming very popular and I'm sure that Novice enhancement will add fuel to the fire. They tend to be somewhat more expensive, but are often worth the price if you want to try everything available to you.

If you don't own a personal computer or any interface equipment yet, don't be afraid to search out an old VIC-20 in the flea market. While it does have some limitations, you can still use it quite effectively with your new privileges. While other low-price machines certainly will work, they often aren't supported with the same wide variety of software and information.

I told you it was going to be a quick trip through the digital modes! I hope you got a feel for the way in which digital communication has developed, and some of the basics involved in each mode. Most importantly, I hope you will get involved. Just because other folks may be using state-of-the-art packet systems doesn't mean you and your buddies can't experiment with straight ASCII transmissions. You don't need a new computer system. The one you have will work fine—or you can make a minimal investment in somebody else's castoffs. In many cases, you might even find an "Elmer" willing to loan you an old unit that he/she isn't using any longer.

If you are looking for more information, check the old issues of *73*. Most of the popular interfaces and software have been reviewed over the last few years. My own books (see below) may be of help. Get involved! Enjoy the new privileges, and show off what you can do to your family and friends.

Remember, Sam Morse was a digital communicator . . . and you are too! ■

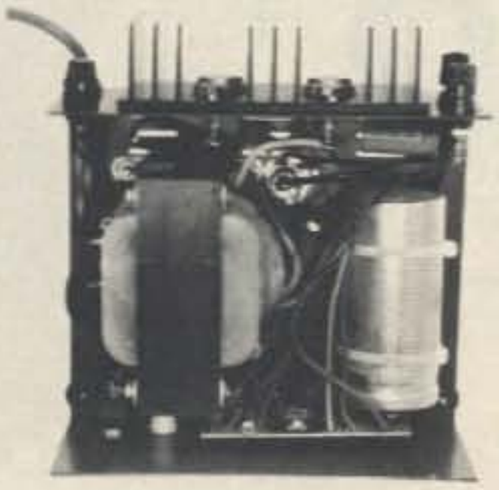
Jim Grubbs K9EI is the author of The Digital Novice *and* Get *** CONNECTED to Packet Radio. *Both are available from QSKY Publishing, PO Box 3042, Springfield IL 62708.*

ASTRON CORPORATION
9 Autry
Irvine, CA 92718
(714) 458-7277

Canadian Distributor
Eastcom Industries, Ltd.
430 Signet Dr.
Weston, Ontario, Canada M9L2T6
(416) 743-7801

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •



INSIDE VIEW – RS-12A

RS and VS SERIES

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-4A.
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage.
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD
- 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)

MODEL RS-50A

MODEL RS-50M

MODEL VS-50M

RM-A Series

MODEL RM-35A

19" X 5¼ RACK MOUNT POWER SUPPLIES

Model	Continuous Duty (AMPS)	ICS* (AMPS)	Size (IN) HXWXD	Shipping Wt. (lbs.)
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
• SEPARATE VOLT & AMP METERS				
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50

RS-A SERIES

MODEL RS-7A

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W X D	Shipping Wt (lbs)
RS-4A	3	4	3¾ x 6½ x 9	5
RS-7A	5	7	3¾ x 6½ x 9	9
RS-7B	5	7	4 × 7½ × 10¾	10
RS-10A	7.5	10	4 x 7½ x 10¾	11
RS-12A	9	12	4½ x 8 x 9	13
RS-20A	16	20	5 x 9 x 10½	18
RS-35A	25	35	5 x 11 x 11	27
RS-50A	37	50	6 x 13¾ x 11	46

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	4½ x 8 x 9	13
• Separate Volt and Amp Meters				
RS-20M	16	20	5 x 9 x 10½	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13¾ x 11	46

VS-M SERIES

MODEL VS-20M

- 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) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H x W x D	Shipping Wt (lbs)
VS-20M	16	9	4	20	5 x 9 x 10½	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13¾ x 11	46

RS-S SERIES

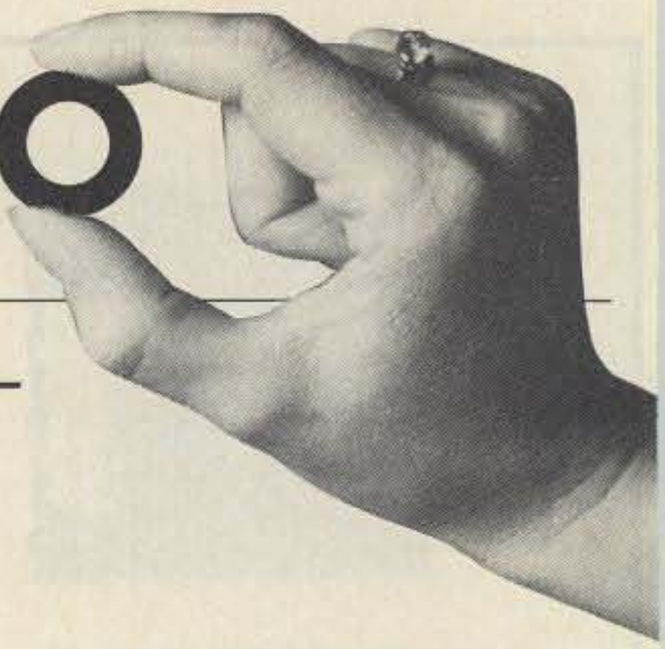
MODEL RS-12S

- Built in speaker

MODEL	Continous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt (lbs)
RS-7S	5	7	4 x 7½ x 10¾	10
RS-10S	7.5	10	4 x 7½ x 10¾	12
RS-10L(For LTR)	7.5	10	4 × 9 × 13	13
RS-12S	9	12	4½ x 8 x 9	13
RS-20S	16	20	5 x 9 x 10½	18

R. Gary Hendrickson W3DTN
1419 Larch Road
Severn MD 21144

Tune In 220



Convert GE's MASTR-PRO receiver to 220 MHz—it's as easy as winding a few coils.

As most 220-MHz repeater owners and users are well aware, there is a very limited source of high-quality commercial FM receivers for this band. The GE MASTR-PRO UHF receiver (type ER-42[X]) makes an excellent 220-MHz repeater, mobile, or base-station receiver after this relatively simple conversion, which can easily be accomplished over a weekend. The converted receiver has excellent sensitivity and front-end selectivity, and it retains all of the other qualities of the original unit.

The easiest version to convert is the 406–420-MHz unit. However, the 450–470-MHz and 470–512-MHz versions require only a little more effort. Note that some versions of the 406–420-MHz units are designed for wideband FM use (±15-kHz deviation). These units should be perfect for packet radio use in the high-speed digital "backbone" networks that are in the planning/construction stages in some parts of the country.

Conversion

The main part of this conversion consists of replacing the coils in the helical resonators in the receiver front end. A few other minor changes can be made to optimize sensitivity after the resonator coils have been changed. Caution: Make certain the receiver is functioning properly on the original frequency before you start the conversion. If there are any problems, correct them first!

To gain ready access to the coils and to make the job of changing them easier, first remove the frame from around the receiver casting. Remove all mounting screws, including the power and antenna connector mounting screws. Remove the cover plate from the top of the casting, exposing the resonator coils. It will also simplify the job if you remove the i-f/audio/squelch board by unplugging the cable harness from the pins on the board.

Wind new coils for all of the helical resonators according to Table 1. Use #12 bare copper wire (it need not be enamel-covered). Wind the new coils around a 1/2-inch-diameter rod and adjust the turn spacing so the coils are the same length as the original coils that are being replaced. The completed coils should have an inside diameter of about 33/64″ (slightly over 1/2″).

To remove the old coils and install the new ones, mount the receiver casting in a vise and direct the flame from a home-type propane torch directly at the solder mounting point of each coil. Be careful to direct the flame away from any nearby wiring. After a few seconds, the old coil will drop out of its mounting hole.

Remove the solder lugs from the tapped coils and slide them onto the replacement coils. Pre-tin the lead of the replacement coil and install it in position, being careful to center the coil in the middle of the resonator cavity. Removal of the old coils and installation of the new ones will be easier if you first either remove the tuning discs or screw them flush against the bottom of the cavity.

After all resonator coils have been changed, screw the tuning discs in toward the open end of the coils and carefully bend the coils so the discs will turn inside the coils up to about 1/2 coil turn without touching the coils. Remove the output coupling link (L432) from the last multiplier resonator and replace it with a longer link to increase the amount of coupling and LO injection (see Fig. 1). Adjust the link so it comes close to the coil without touching it.

If the original receiver was intended to tune the 450–512-MHz range, some fixed capacitors in the LO/multiplier chain will have to be changed. Replace these caps with values shown on the schematic for the 406–420-MHz version of this receiver. If your receiver is the 406–420 version, ignore this step. The

Coil #	Function	Number of Turns	Tap (Turns Above Gnd.)
L410/412	Antenna input	7-1/4	1/2
L411/413	Rf amplifier input	7-1/4	3/8
L414/419	Rf amplifier output	7	1/4
L415/420	Rf interstage	7-1/4	None
L416/421	Rf interstage	7-1/4	None
L417/422	Rf interstage	7-1/4	None
L418/423	Mixer input	7	1-1/8
L424/426	Last multiplier collector	7	3/8
L425/427	Last multiplier output to mixer	7-1/4	None

Table 1. Coil data.

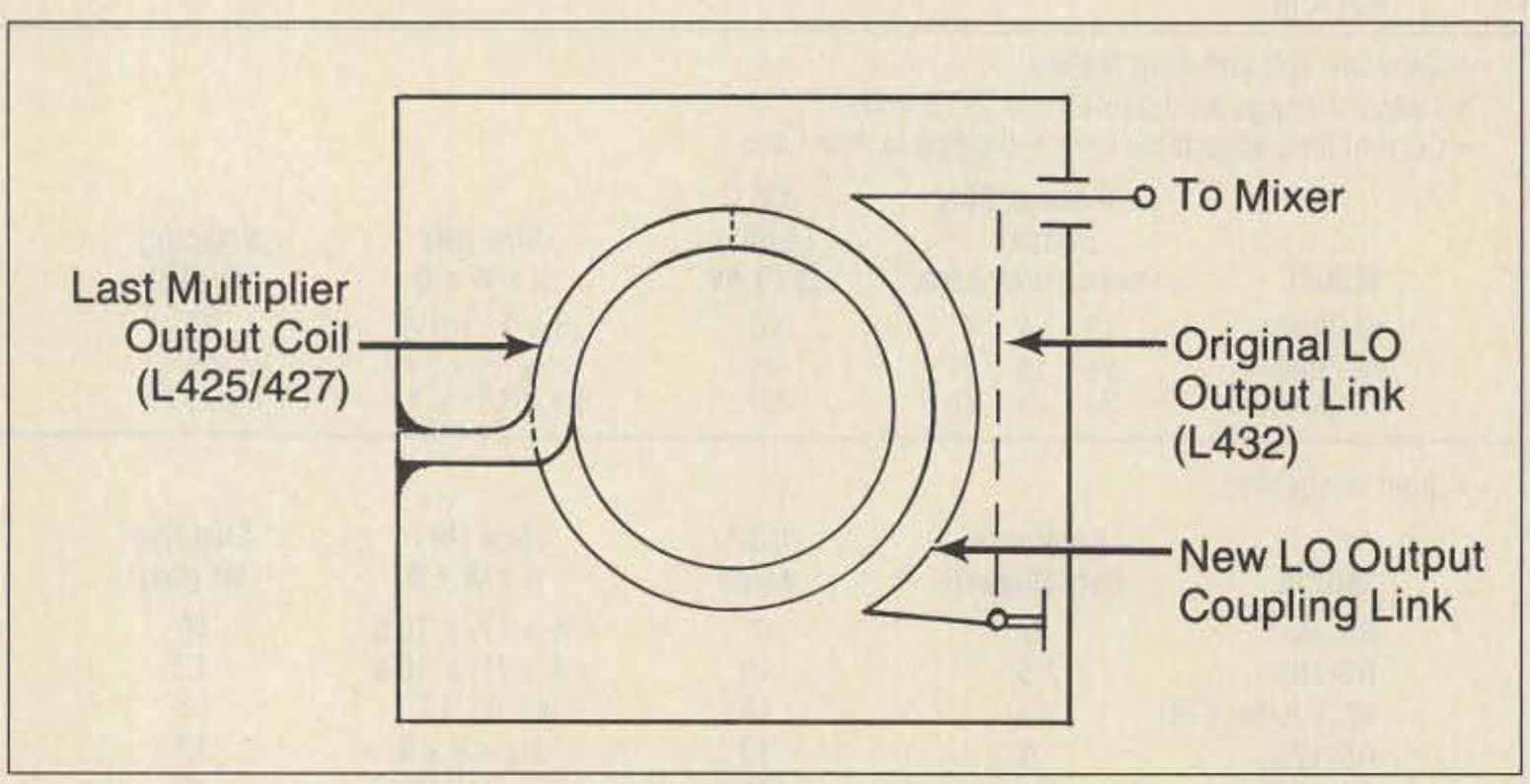


Fig. 1. Output coupling link adjustment.

caps in question are: C6/C7 or C40/C41 across T1–T2 or T7–T8 on the oscillator board (should be 39 pF), C2/C3 across L1 on the multiplier board (should be 30 pF), C5/C6 across L2 on the multiplier board (should be 6 pF), and C7/C8 across L2 on the multiplier board (should be 20 pF).

This completes the conversion process. Reassemble the receiver frame and install the i-f/audio/squelch board. Replace the cover over the helical resonators, but use only two or three screws to attach the cover if you intend to do any diddling with the coil taps.

Tune-up

The crystal formula is different from the original since the last multiplier stage in the LO/multiplier chain (A413/A414 [Q2], originally an X2 multiplier) now operates straight through as a buffer. The new crystal formula is: $F_{Xtal} = (F_{Oper.} - 12.4) / 12$ MHz. If you operate in the 220.5–225.0-MHz amateur band, the crystal will fall in the range of 17.3417 to 17.7167 MHz. All other crystal correlation data is unchanged.

Now align the receiver in the normal manner. You might be able to improve sensitivity by adjusting the positions of some of the coil taps or by adjusting the spacing of the coupling link from the output of the last multiplier resonator coil (L432) to the first mixer. The tap positions listed in Table 1 were determined by experimentation.

"The main part of this conversion consists of replacing the coils in the helical resonators in the receiver front end."

After you align and "diddle" with the receiver, sensitivity is about 0.25 uV for 20 dB of quieting on a U.H.S. receiver (the receiver with an rf amplifier stage—A410/A411). It has been suggested that the coupling apertures between resonator cavities may not be the correct size for minimum insertion loss/optimum selectivity at 220 MHz. I have not experimented with this and would be happy to hear from anyone who does try to optimize the coupling.

Note: Be sure to label the receiver to indicate that it has been converted, because there is no external visible evidence to reveal that the unit has been modified! Schematic diagrams or instruction manuals for these receivers are frequently available at hamfests, usually from people selling surplus FM gear.

That's it! I have converted several of these, and they all work fine. The first guinea pig is being used on the Maryland FM Association's 222.16/223.76-MHz repeater input at Jessup, Maryland, and is performing exceptionally well. I hope yours is equally successful. ■

"When You Buy, Say 73"

novice enhancement BUYER'S GUIDE

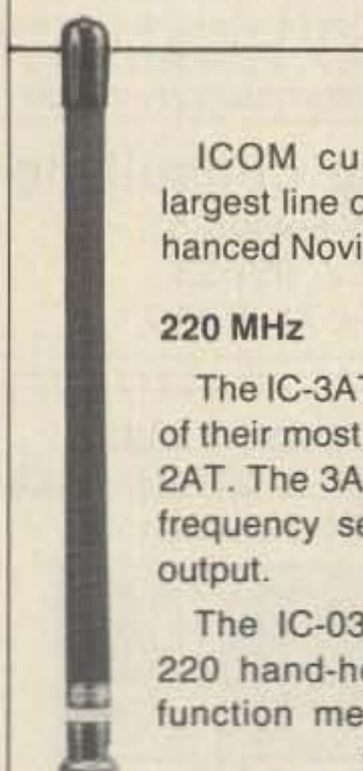
At 0001 UTC on March 21, 1987, Novices ceased to be the second-class CW citizens of the amateur airwaves. The average Novice operator can now open his mouth to do something other than curse the powers that created a Morse-only Novice license.

Novice privileges on 80, 40, and 15 meters remain unchanged. The new Novice privileges are as follows:

28.1–28.3 MHz	**CW, RTTY; 200 W PEP**
28.3–28.5 MHz	**CW, SSB; 200 W PEP**
222.1–223.91 MHz	**All Privileges*; 25 W PEP**
1270–1295 MHz	**All Privileges*; 5 W PEP**

*** Novices are not permitted to be repeater control operators.**

The buyer's guide that follows is our attempt to show the "enhanced" Novice what equipment is available for these new bands and modes. Manufacturers are still scrambling to develop equipment to tap the large Novice market, so this is just a taste of things to come.



ICOM

ICOM currently produces the largest line of equipment for the enhanced Novice.

220 MHz

The IC-3AT is ICOM's 220 version of their most popular hand-held, the 2AT. The 3AT features thumbwheel frequency selection and 1.5 Watts output.

The IC-03AT is ICOM's deluxe 220 hand-held, featuring 10 full-function memories, scanning, 32 built-in subaudible tones, 3 Watts output (with an option for 5 Watts), and an LCD readout. Frequency entry is via DTMF keypad.

The IC-37A is ICOM's "slim line" 25-Watt 220 mobile transceiver with 9 memories, 32 PL frequencies, four scanning systems (memory scan, band scan, program scan, and priority scan), and an LED readout. The 37A comes with a DTMF mike with up/down frequency and memory scan.

The IC-38A is ICOM's new 25-Watt mobile rig with controls designed to suit the mobile environment. It has a large LCD display, 21 memories, receive coverage of 215–230 MHz, scanning, and memory lock-out.

The IC-375A is a 25-Watt all-mode base-station transceiver for 220. The 375A covers 216–230 MHz and has 99 tunable full-function memories, passband tuning, notch filter, noise blanker, built-in swr bridge, and semi- or full-break-in CW. It has an amber LCD and a multi-function meter. Four scanning systems are available: band, programmable, mode, and memory scan with programmable lock-out. Subaudible tones are built-in, as are standard repeater splits. The 375A will be available in June 1987.

1.2 GHz

The IC-12AT is a 1-Watt hand-held that covers 1260–1300 MHz. The 12AT has 10 memory channels and has both program and memory-channel scan. It allows programming of 32 subaudible tones.

The IC-1200 is a 10-Watt mobile 1.2-GHz transceiver. The 1200 covers 1240–1300 MHz and features a large LCD readout with automatic dimmer, 21 memory channels, all subaudible tones built-in, and frequency/memory scan. It also incorporates ICOM's AFC (automatic frequency control) function, which automatically adjusts the receive frequency to the frequency of the transmitting station.

The IC-1271A is a 10-Watt base-station multimode transceiver for 1.2 GHz. It has 32 memory channels, scanning, and an LED display. The 1271A can be used for SSB, CW, and FM (including ATV). Front-end GaAsFETs provide exceptional receive sensitivity.

28 MHz

ICOM produces four HF transceivers that cover the 10-meter band: IC-735, IC-745, IC-751A, and IC-761.

For more information about these ICOM products, please contact your local ICOM dealer directly.

AEA

Advanced Electronic Applications, Inc., has announced their model RFM-220 9600-baud modem radio for the 220-MHz band. The RFM-220 is a synthesized transceiver that covers the entire 220-MHz band. It will operate at data rates from 0 to 9600 baud using external data controllers like the AEA PK-232 and PK-87. The CPU-controlled synthesizer allows 100 memory channels with memory scan and band scan. All synthesizer functions are remote-controllable. In addition to its data handling capabilities, the RFM is also a high-fidelity voice transceiver with deviation settable from 4 to 10 kHz. Sensitivity, selectivity, and dynamic range are achieved using a GaAsFET front end and multiple helical resonators. Power output is adjustable from 1 to 30 Watts. The RFM-220's price is expected to be about $600.

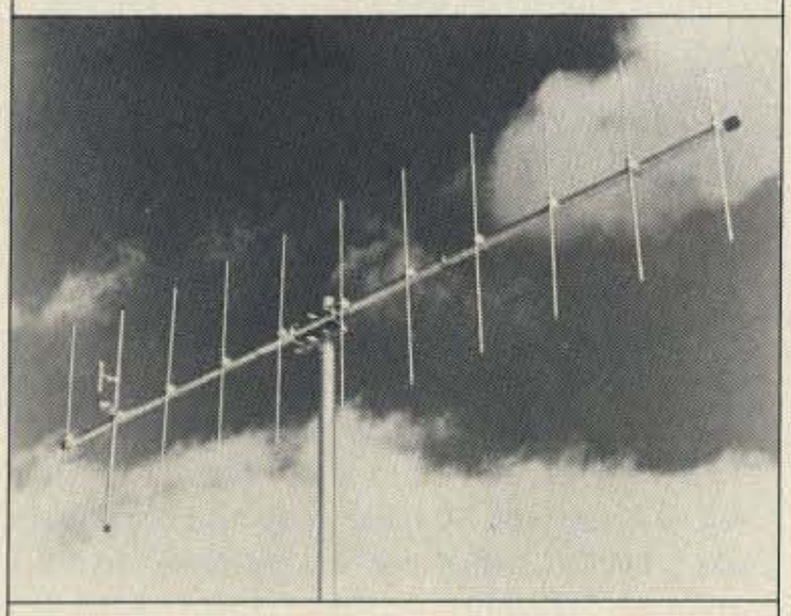
AEA has also announced their new 10-meter SSB/CW hand-held, the MX-28S. The MX-28S offers two variable crystal oscillators with operating ranges of 50 kHz each. The unit comes with crystals for 28.250–28.300 and 28.300–28.350 MHz (other crystal ranges are available for a nominal cost). It has an S-meter/output power meter and a noise blanker. CW operation can be accomplished using the built-in push-button or an external key/keyer. External speaker and mike jacks are provided. When used with the standard telescopic antenna, it provides respectable portable DX performance. Portable 10-meter data operation is also possible with the MX-28S when it is used

with a portable computer and data controller. Power is derived from 6 AA drycells or 7 AA NiCds. The MX-28S's price is expected to be $300.

For more information about these new AEA offerings, circle number 213 on your Reader Service card.

CUSHCRAFT

The Cushcraft A220-7 is a 7-element 220-MHz directional beam designed for FM and vertical polarization. The A220-7 is rear-end mounted so it can be put on a mast or tower leg. Forward gain is 11.0 dBd and front-to-back ratio (average) is 20 dB.



The Cushcraft A220-11 is an 11-element 220-MHz directional beam. Forward gain is 13.2 dBd and front-to-back ratio is 20 dB. It features the Reddi-Match system, which provides for easy tuning and a hassle-free 50-Ohm feed.

Cushcraft's 10-3CD and 10-4CD Skywalker 10-meter beams are yagis that have been computer-designed to have maximum gain and minimum sidelobes and swr. These lightweight antennas can be installed by one person. Forward gains for the 3CD and 4CD are 8 and 10 dBd, respectively, and bandwidths are 700 and 600 kHz, respectively.

Cushcraft also produces a full line of 220-MHz mobile and portable antennas, as well as multiband HF beams which can be used in the 10-meter Novice subband. For more information about Cushcraft antennas, circle number 214 on your Reader Service card.

MFJ

MFJ offers a wide variety of products for the enhanced Novice. The MFJ RTTY/CW Computer Interface allows you to send and receive RTTY, ASCII, AMTOR, and CW. A crosshair mark/space LED tuning array allows for accurate tuning even under poor S/N conditions. It transmits on both 170- and 850-Hz shift and includes a built-in RS-232 interface. Variable shift tuning lets you copy any shift from 100–1000 Hz and any speed (5–100 wpm RTTY/CW, 300 baud ASCII). The unit works with VIC-20/C-64, Apple, Co-Co, Atari, TI-99, and other computers. It can be used with MFJ, Kantronics, AEA, or other software. This unit is priced at $179.95.

The MFJ-1274 is a full-featured packet radio VHF/HF TAPR TNC-2 clone that includes an LED tuning indicator, a TTL serial port, and a lithium-battery memory backup. All you need to operate the 1274 is your rig, any computer with an RS-232 serial port, and a terminal program. Speeds in excess of 56K baud are possible with a suitable external modem. If you have a VIC-20/C-64/C-128, you can purchase an optional starter pack for $20 that includes interfacing cables and terminal software. The MFJ-1274 retails for $169.95.

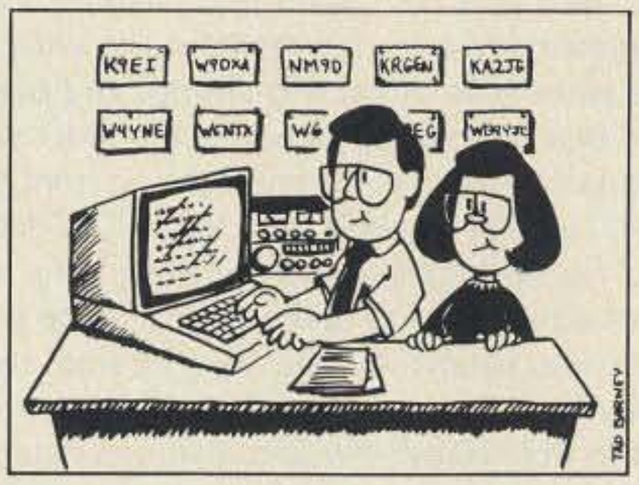
For more information about these MFJ products, circle number 215 on your Reader Service card.

QSKY PUBLISHING

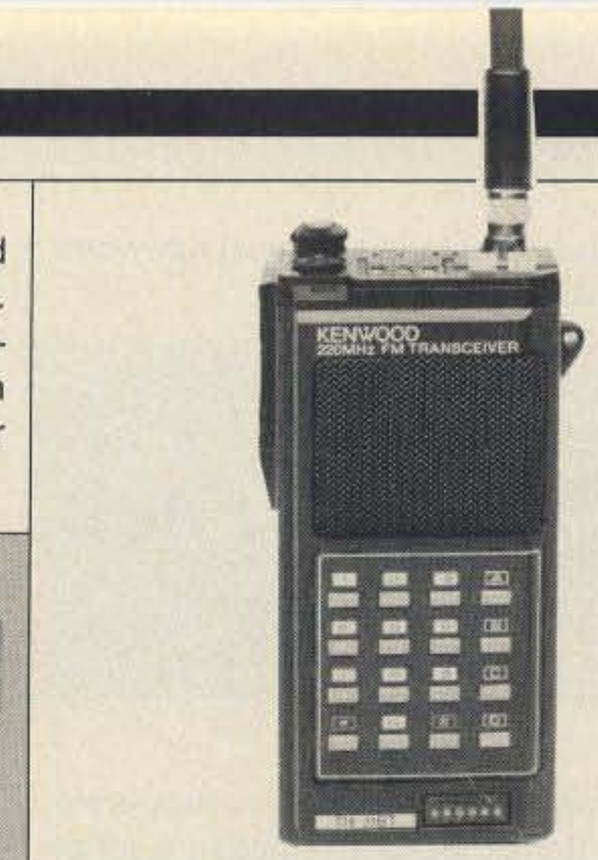
Jim Grubbs K9EI has released *The Digital Novice*, a primer on data communication for beginners. This book covers every digital mode from Morse through packet, explaining in detail how each mode works and its suitability for the Novice operator. The book is 128 pages and costs $12.45 ppd.

For more information about *The Digital Novice*, circle number 216 on your Reader Service card.

THE DIGITAL NOVICE



by Jim Grubbs, K9EI



KENWOOD

The TH-31BT is Kenwood's compact 1-Watt 220-MHz hand-held. Weighing only 8 oz., the 31BT has thumbwheel frequency selection, a DTMF keypad, and CTCSS tone switches. Standard repeater offsets are controlled by a simple switch. Standard accessories include a wall charger and a 180-mAh battery pack.

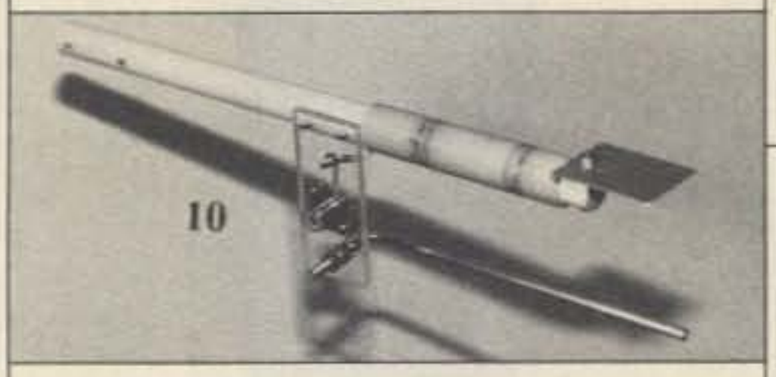
The Kenwood TM-3530A is a 25-Watt 220-MHz mobile/portable transceiver that features 15 seven-digit telephone number memories, automatic repeater offset selection, direct keyboard frequency entry, 23 memory channels, large multi-colored LCD, 16-key DTMF keypad, frequency lock switch, and GaAsFET front end. The 3530A (reviewed in this issue) is also suitable for base-station use.

Kenwood's TR-50 1-Watt portable 1.2-GHz transceiver features an LCD frequency readout, an S/rf power meter, 5 memory channels, and a 16-key DTMF microphone. The TR-50 comes with a shoulder strap, which makes it easier to take this microwave rig into the mountains.

Kenwood also covers the 10-meter band with a complete line of multiband HF transceivers.

For more information about these Ken-

wood products, contact your local Kenwood dealer directly.



BILAL

Bilal Isotron antennas allow you to operate on the HF bands without requiring a lot of room for antennas. Isotrons transmit as well as half-wave dipoles and have been tested at 3 dB less noise on reception compared to a half-wave dipole. The 10-meter Isotron measures 16″ x 1-1/2″ x 4″ and weighs only 1-1/2 pounds. It has a 1-MHz bandwidth and can handle 2 kW PEP. It is priced at $29.95 plus $3.50 s&h. Isotrons are also available for 80, 40, and 15 meters.

For more information about the Bilal Isotrons, circle number 217 on your Reader Service card.

YAESU

The FT-109RH is Yaesu's new 5-Watt 220-MHz hand-held. It covers 220–225 MHz in 5-kHz or 10-kHz steps. Features include 10 memories, battery saver, standard 1.6-MHz or nonstandard offset, and memory and priority scanning. It is equipped with a DTMF tone generator, front-panel multimeter, and a VOX system. Optional accessories are interchangeable with other units in the 109/209/709 series.

Yaesu also covers the 10-meter band with a complete line of multiband HF transceivers.

For more information about the Yaesu FT-109RH, circle number 218 on your Reader Service card.

SHURE

The Shure model 526T Series II Super Punch® is a transistorized base-station microphone that can be used to replace ceramic or dynamic high- or low-impedance microphones. The 526T features an adjustable volume control, a momentary or locking PTT switch, a transistorized preamplifier, excellent SSB response, low hum pickup, minimal susceptibility to RFI, and a universal six-wire cable for quick connection. It runs on a standard 9-volt battery.

For more information about the complete line of Shure microphones, circle number 219 on your Reader Service card.

ELECTRON PROCESSING

The Brapper Box from Electron Processing, Inc., is a peripheral that ensures TNC compatibility with any amateur rig while at the same time protecting the rig. The Brapper Box is installed between the TNC and the radio. Audio level sent to the rig from the TNC, as well as audio sent to the TNC from the rig, is precisely controllable from the front panel. Packet audio levels can be preset using panel-mounted pots. Internal reed relay keying protects the TNC's keying transistor from transients and reversed-polarity PTT lines, while making it easy to use a TNC with any radio (without using R-C networks or audio coupling transformers).

For more information about the Brapper Box, circle number 220 on your Reader Service card.

ACOA

The Antenna Company of America offers a cubical quad antenna for 220 MHz. It is of all-metal construction (except for the insulators), can be quickly and easily assembled, and requires no field adjustments. The antenna is fed with 50-Ohm coax and can handle 5 kW. It is also lightweight (less than 9 pounds), allowing it to be rotated using a light-duty rotor (e.g., one designed for TV antennas). The ACOA cubical quad for 220 MHz is priced at $159. ACOA also makes cubical quads for 144 MHz and 440 MHz.

For more information about ACOA antennas, circle number 221 on your Reader Service card.

KANTRONICS

The Kantronics KPC-4 dual-port communicator features two fully functional packet ports, digipeating on each port, and gateway between ports. You can bridge two frequencies on one band or operate crossband. Each port includes a watchdog timer. The KPC-4 contains Kantronics' Personal Packet Mailbox feature, which allows you and others to leave and collect messages. RS-232/TTL terminal interfacing provides compatibility to all computers. The KPC-4 has a 32K RAM, a 32K EPROM, and a 512-byte EEPROM. The KPC-4 retails for $329.

The Kantronics All Mode (KAM) communicator lets you operate VHF and HF packet, CW, RTTY, ASCII, and AMTOR all with one unit. The KAM features bar-graph tuning, user-programmable mark and space tones for RTTY/HF packet, and limiter/limiterless operation on HF for weak-signal work. KAM's CW demodulator is center-frequency and bandwidth programmable. The KAM has a 32K RAM, a 256K EPROM, and an EEPROM for parameter storage. The KAM retails for $319.

The Kantronics KPC-2 packet communicator allows you to work VHF/HF packet with any computer. The KPC-2 features a built-in HF and VHF modem, full-duplex operation, and multiple connect capabilities. It operates at 300, 400, 600, and 1200 baud. The KPC-2 retails for $169.

For more information about these Kantronics products, circle number 222 on your Reader Service card.

LUNAR

The Lunar Industries, Inc., model 1.3M4-30P is a 220-MHz linear amplifier designed specifically for 220 handie-talkie owners. This solid-state power amplifier will boost a 2-Watt HT output to 22 Watts, and the built-in preamp circuit will allow you to copy weaker repeaters or simplex signals. The 1.3M4-30P operates from 13.8 V dc and retails for $139.95.

Lunar's model PAI-28 is an automatic, switching-type, 14-dB preamplifier for 10 meters. The PAI-28 improves effective receiver sensitivity and requires 12 V dc and a short coax cable between radio and antenna. Lunar's 10-meter preamp retails for $49.95.

For more information about these Lunar products, circle number 223 on your Reader Service card.

COMMUNICATIONS SPECIALISTS

The SS-32PA encoder is the latest in a wide range of tone products offered by Communications Specialists, Inc. The board can be installed in a wide range of radios not already equipped with a subaudible tone squelch system. The SS-32PA is capable of producing 32 CTCSS tone frequencies, which are selected with a DIP switch on the board. For nonstandard tones, the SS-32P can be factory programmed for any tone frequency up to 256 Hz.

To receive a free copy of the CSI product list, circle number 224 on your Reader Service card.

MICROCRAFT

Microcraft's CODE*STAR decodes incoming Morse, Baudot, and ASCII transmissions and displays them on eight large LEDs. A microcomputer auto-tracks Morse from 3 to 70 wpm. An agc circuit provides up to 16 dB of gain to help maintain signals under fading conditions. A built-in code-practice oscillator is also included. An optional serial/parallel output port provides fully buffered simultaneous parallel and serial ASCII. Data rate is either 110 or 300 baud; electrical interface is either 20 mA or TTL/RS-232.

For more information about the CODE* STAR, circle number 225 on your Reader Service card.

WI-COMM

A narrowband preamplifier for the 220-MHz band has been introduced by WI-COMM Electronics, Inc. The model NLA62M preamplifier covers 210–230 MHz and, due to its filter-like bandpass response, can survive the worst possible overload. A 3.5-dB noise figure, together with a 3rd-order intercept point, guarantees a high spurious-free dynamic range. Gain is 20 dB typical, and a 1-dB gain compression level is 21 dBm. Input/output vswr is 1.5:1. The NLA62M is housed in a blue die-cast aluminum case and has BNC female connectors.

For more information about this WI-COMM product, circle number 226 on your Reader Service card.

NEWSOME ELECTRONICS

An interface/terminal unit for Commodore computer owners is available from Newsome Electronics. This RTTY/CW interface can send/receive five speeds of RTTY, two speeds of ASCII, and CW up to 100 wpm. Features include a 3K write-ahead buffer and 26 user-defined call-up message spots of 3K each. All incoming text can be saved to memory, and a searchable logging system is included. A code-practice program is also built-in. There is no additional software to buy; a disk drive is not required. Compatible with VIC-20/C-64/C-128 only.

"Pakmon" is a ROM program that enables reception of 1200-baud VHF packet radio. Features of the two plug-in modules include automatic memory save of all incoming text and recall on command. Compatible with VIC-20/C-64/C-128 only.

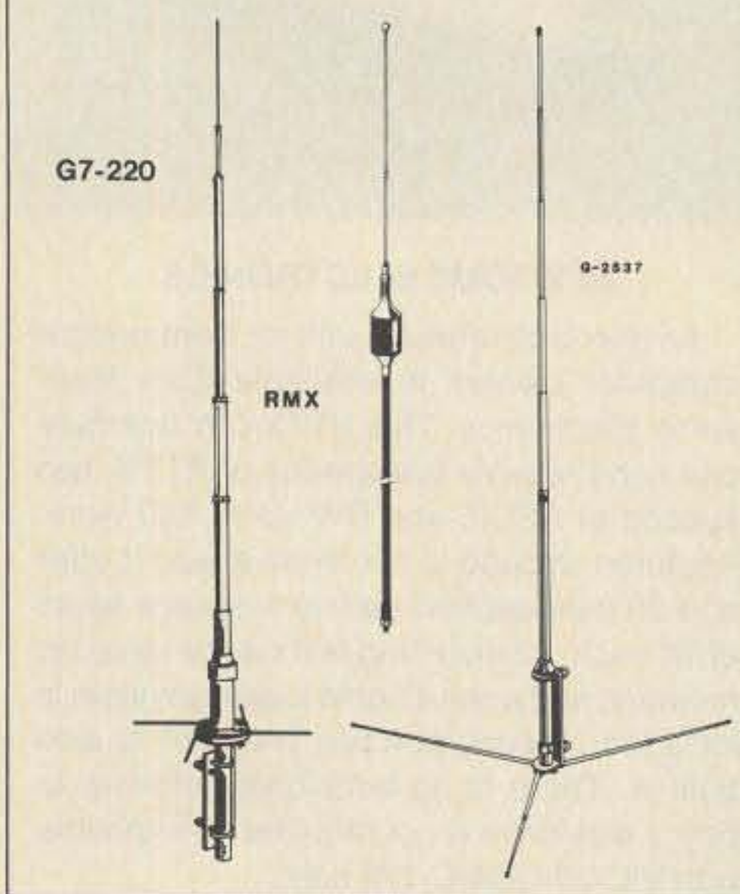
For more information about these Newsome Electronics products, circle number 227 on your Reader Service card.

HUSTLER

The CGT-220 is Hustler's ultimate 220-

MHz mobile antenna. A collinear design creates 5.2 dB of gain. The CGT-220 includes a trunk-lip mount with swivel ball and 17′ of coax. The antenna only is available as model CG-220.

Hustler's G7-220 is a 220-MHz vertical antenna with 7 dB of gain compared to a half-wave dipole. The G7-220 is 10′2″ tall and weighs 7 pounds. It is intended for repeater or home use.



The G-2537 is Hustler's 10-meter omnidirectional antenna that offers more gain than a 5/8- or 1/2-wave antenna. An extended collinear .64-wavelength radiator increases the coverage available from a vertical antenna by as much as 20%. Full-length radials ensure complete rf decoupling and a low angle of radiation. Bandwidth is 1 MHz and power rating is 300 Watts. The 19′8″ G-2537 is shunt-fed/dc grounded for lightning protection.

The RMX is a 10-meter mobile antenna that combines Hustler's Super Resonator coil with a shortened mast to create an antenna that is only 46″ tall. A stainless-steel spring above the coil provides impact protection. The RMX's bandwidth is 400 kHz under 2:1, and its power rating is 1,000 Watts.

For more information about Hustler antennas, circle number 228 on your Reader Service card.

SPECTRUM COMMUNICATIONS

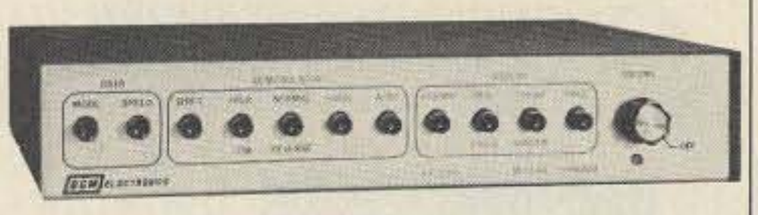
The SCR77 from Spectrum Communications Corp. is a basic, low-cost, 30-Watt 220-MHz repeater for voice or packet. Features include excellent receiver sensitivity (.22 uV/12 dB Sinad), an 8-pole front-end filter, a double-balanced mixer for superior intermod rejection, a 12- or 14-pole i-f filter, a built-in plug-in CW IDer, a timeout timer, and automatic switchover to battery backup. An optional rack-mount autopatch is available.

The SCR1000A is Spectrum Communication's deluxe 65-Watt 220-MHz repeater. In addition to the features listed for the SCR77, it includes a courtesy tone, "kerchunk killer," and touchtone remote control functions. All important operating parameters are adjustable and measurable from the front panel. Custom-designed options are available.

For more information about repeaters from Spectrum Communications, circle number 229 on your Reader Service card.

DGM ELECTRONICS

The MKB-2000 Morse keyboard from DGM allows you to send perfect code from 1–199 wpm just by typing the characters. It has a 500-character text buffer, ten 40-character programmable memories, and a random code generator. The MKB-200 has outputs to key any transceiver.



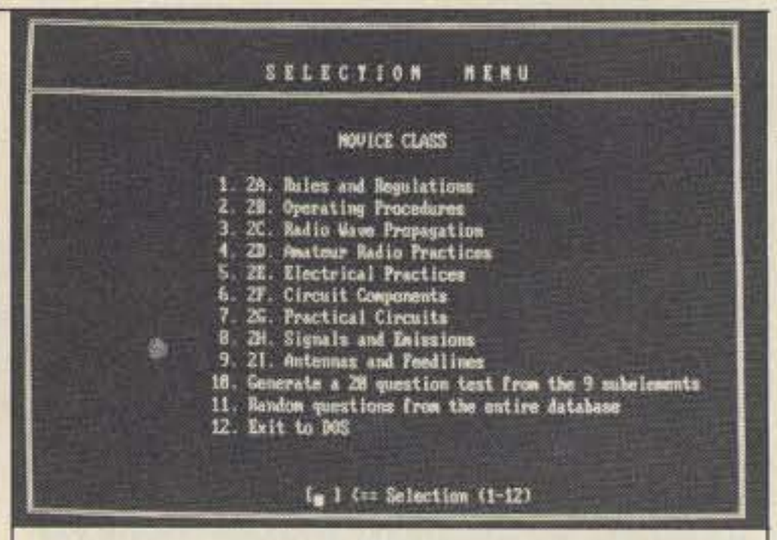
DGM's RT-1200 receive terminal will copy Baudot, ASCII, and Morse and display the text on a video monitor. A built-in demodulator will copy 17-, 425-, and 850-Hz shift RTTY signals using either high or low tone pairs. An on-screen status line displays mode, speed, and demodulator status. A Morse speed indicator is also included.

The DGM-1 RTTY/CW computer interface allows you to use your computer with your transceiver. The DGM-1 has a sensitive demodulator that will copy 170-, 425-, and 850-Hz RTTY signals and 800-Hz CW signals. The unit provides AFSK and FSK outputs for RTTY and keyed outputs for CW. An LED bar-graph tuning indicator is included. Computer connection is made via RS-232/TTL.

For more information about these DGM products, circle number 230 on your Reader Service card.

HEATHKIT

Heathkit has updated its computer assisted instruction (CAI) software to reflect the changes caused by Novice Enhancement.



This PC-compatible software offers FCC-approved questions for all license classes. Users can create sample tests containing multiple choice questions and a CW practice program.

For more information, circle number 231 on your Reader Service card.

CALIFORNIA PACKET CONCEPTS

The TNC II from California Packet Concepts is a licensed copy of the TAPR TNC-2. TAPR's original design is kept intact to offer absolute compatibility with software updates and new network offerings. All sockets use dual beam gold contact. Each TNC II is burned in for 48 hours prior to shipment. The latest 1.1.4 software is available and the TNC II comes standard with all headers installed.

For more information about the TNC II, circle number 232 on your Reader Service card.

HAMTRONICS

The model REP 100 220-MHz repeater from Hamtronics, Inc., is available in either kit ($630) or wired-and-tested ($880) form. Although Novices cannot be repeater control operators, a repeater promotes 220 activity and makes the band much more exciting.

For more information about Hamtronics repeaters, circle number 233 on your Reader Service card.

MOTRON

The AK-10 Auto-Kall from Motron is a DTMF/touchtone decoder that can be attached to your 220-MHz or 1.2-GHz

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 . . .

MAY We Help You With the Best in Commercial and Amateur Radios? Jan KB2RV, Toni, Kitty WA2BAP, Mark K2CON

See You May 31st Newington High School CT
See You June 7th Deal CHAVIRIM, NJ (Speech)
See You June 12th Candlewood ARA, CT (Speech)
See You June 14th HOSARC, Queens, NY
See You June 20th W2QW Flea Market Dunellen, NJ

KITTY SAYS: WE ARE NOW OPEN 7 DAYS A WEEK.
Saturday & Sunday 10 to 5 P.M.
Monday-Friday 9 to 6:30 PM Thurs. to 8 PM
Come to Barry's for the best buys in town.

ONV Safety belts-in stock

ICOM

IC-R71A, 751A, 745, 28A/H, 38A, 48A, Micro 2/4, R-7000, IC-761, IC-375A, 275A/H, 3200A, 475A/H, 735

YAESU

FT-767GX, FT-980, FT-757GX, FRG-8800, FT-726, FRG-9600, FT-211/711RH, FT-2700RH

SMART PATCH

CES-Simplex Autopatch 510-SA Will Patch FM Transceiver To Your Telephone Great For Telephone Calls From Mobile To Base Simple To Use.

PRIVATE PATCH III, Duplex 8000 in stock

Budwig ANT. Products

FLUKE 77 Multimeter

KENWOOD

Antennas
A-S
Cushcraft
Hy-Gain
Hustler
KLM
METZ
Mini-Products
MULTIBAND
Mosley
MODUBLOX

YAESU FT-23/73/727R FT-2/1/709R/H FT-1903/1123
ICOM IC2AT/12AT ICO2AT IC-03/04AT IC-A2/U16
Land-Mobile H/T Midland/Standard Wilson Maxon
Yaesu FTC 1123, FTC 1143
ICOM IC-M5 (Marine) M700 Tempo M-1

TS440S/AT, R-5000, R-2000, TS-940 S/AT, TM-201B, TM 221A/421A, TM-2570A/50A/30A, TR-751A, Kenwood Service/Repair, TH 21/31/41 BT, TS-711A811A, TM3530A, TH205AT, TH215A

RF Concepts

NEL-TECH DVK-100 Digital Voice Keyer

COMPU-FIRE EXTINGUISHERS

VoCom/Mirage/Alinco
Tokyo Hy-Power/TE SYSTEMS
Amplifiers &
5/8λHT Gain
Antennas IN STOCK

AMERITRON AMPLIFIER AUTHORIZED DEALER

Yaesu FTR-2410, Wilson
ICOM IC-RP 3010 (440 MHz)
ICOM IC-RP 1210 (1.2 GHz)

SANTEC
ST-222/UP
ST-20T
ST-442/UP
HT-7

Nye MBV-A
3 Kilowatt Tuner

Ten-Tec Tuner 229A

Soldering Station,
48 Watts, $68
MICROLOG-ART 1, Air Disk, SWL, Morse Coach

Computer Interfaces stocked: MFJ-1270B, MFJ-1272, MFJ-1224, AEA CP-1 PK-87, PK-64A, PK-64, PM-1, PK-232

ETO

ALPHA AMPLIFIERS

MFJ Models
422, 313, 989B, & 941D

SANGEAN Portable Shortwave Radios

Complete Butternut Antenna Inventory In Stock!

KANTRONICS
UTU, KAM, UTU-XT, KPC 2400, KPC IV

DIGITAL FREQUENCY COUNTERS
Trionyx, Model TR-1000, 0-600 MHz

AMP SUPPLY STOCKED
Long-range Wireless
Telephone for export in stock

BENCHER PADDLES, BALUNS, IN STOCK

MIRAGE AMPLIFIERS
ASTRON POWER SUPPLIES
Saxton Wire & Cable

HEIL EQUIPMENT IN STOCK

EIMAC
3-500Z
572B, 6JS6C
12BY7A &
4-400A

BIRD
Wattmeters & Elements In Stock

AEA 144 MHz
AEA 220 MHz
AEA 440 MHz
ANTENNAS

New TEN-TEC
Corsair II, PARAGON, Century 22, RX-325

Tri-Ex Towers
Hy-Gain Towers & Antennas, and Roters will be shipped direct to you FREE of shipping cost.

MAIL ALL ORDERS TO **BARRY ELECTRONICS CORP., 512 BROADWAY, NEW YORK CITY, NY 10012.**

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

"Aqui Se Habla Espanol"

BARRY INTERNATIONAL TELEX 12-7670
MERCHANDISE TAKEN ON CONSIGNMENT FOR TOP PRICES

Monday-Friday 9 A.M. to 6:30 P.M. Thursday to 8 P.M.
Saturday & Sunday 10 A.M. to 5 P.M. (Free Parking)

AUTHORIZED DISTS. MCKAY DYMEK FOR SHORTWAVE ANTENNAS & RECEIVERS.

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

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

Commercial Equipment Stocked: ICOM, MAXON, Midland, Standard, Wilson, Yaesu. We serve municipalities, businesses, Civil Defense, etc. Portables, mobiles, bases, repeaters...

We Stock: AEA, ARRL, Alpha, Ameco, Antenna Specialists, Astatic, Astron, B & K, B & W, Bencher, Bird, Butternut, CDE, CES, Collins, Communications Spec. Connectors, Covercraft, Cushcraft, Daiwa, Dentron, Digimax, Drake, ETO (Alpha), Eimac, Encomm, HeilSound, Henry, Hustler (Newtronics), Hy-Gain, Icom, KLM, Kantronics, Larsen, MCM (Daiwa), MFJ, J.W. Miller, Mini-Products, Mirage, Newtronics, Nye Viking, Palomar, RF Products, Radio Amateur Callbook, Rockwell Collins, Saxton, Shure, Telex, Tempo, Ten-Tec, Tokyo Hi Power, Trionyx TUBES, W2AU, Waber, Wilson, Yaesu Ham and Commercial Radios, Vocom, Vibroplex, Curtis, Tri-Ex, Wacom Duplexers, Repeaters, Phelps Dodge, Fanon Intercoms, Scanners, Crystals, 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. TELEX 12-7670

ALL SALES FINAL

CIRCLE 41 ON READER SERVICE CARD

transceiver. The AK-10 mutes the speaker until a caller keys in your personal three-digit touchtone code. The speaker resets to silent standby if you're not around to receive the call—an LED is lit to let you know that someone called. Your personal code is entered via three small 16-position rotary switches. To install the AK-10, all you have to do is plug in the supplied autopatch cord into your external speaker jack. The AK-10 retails for $89.95 plus $3 s&h.

For more information about the AK-10, circle number 234 on your Reader Service card.

THE RADIO WORKS

The BigSig Loop from The Radio Works is a high-performance, low-cost 3/2-wavelength loop for 10 meters. The 13′ square BigSig comes with a dedicated matching unit that matches the loop to 50-Ohm coax. The BigSig is easy to get up and get going.

The Radio Works sells many other antennas for 10 and 220 MHz. For a free catalog, circle number 235 on your Reader Service card.

BUTTERNUT

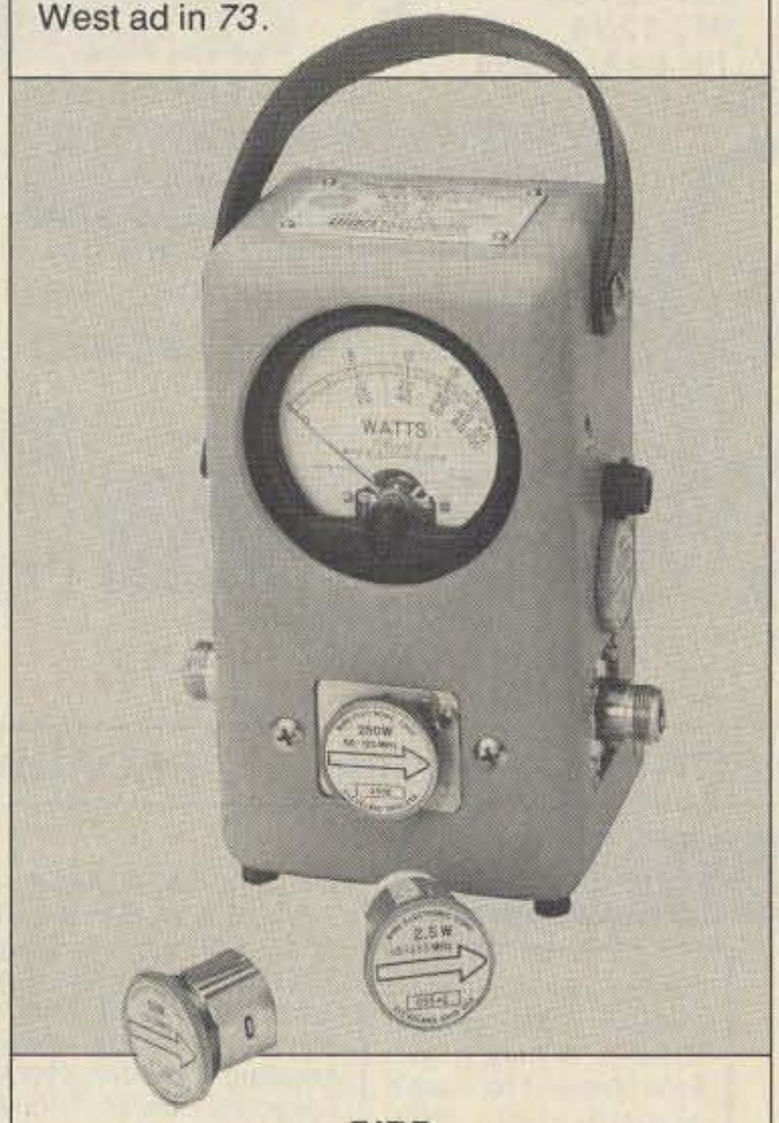
The model 220CV-5 is Butternut's omnidirectional 5-dB-gain vertical antenna for 220 MHz. Butternut's Trombone™ phasing sections offer high gain and reliability under the most severe weather conditions. There are no coils or internal connections that can pull apart, and no insulators that can break. It is fed by means of an adjustable gamma match for lowest swr. Resonant radials decouple the radiator and its supporting structure and feedline to suppress unwanted high-angle radiation.

For more information about the Butternut 220CV-5, contact your local Butternut dealer directly.

GORDON WEST

The Complete Voice Novice from Gordon West Radio School is a set of study materials

to be used in preparing for the new Novice exam. The package includes four Morse code tapes, two theory tapes, the ARRL's *Tune in the World*, an FCC rule book, a code oscillator and key, instructions for proper code sending, 300 FCC Novice test questions, FCC Form 610, VEC examiner lists, a confidential written exam and ten 5-wpm tests for the examiners, and instructions for the examiners. All materials have been updated to reflect the new Novice Enhancement testing requirements. The Complete Voice Novice retails for $49.95 plus $5 s&h. Gordon West Radio School promises that you'll pass your Novice exam or your money back. For more information, contact your local ham radio retailer or look for the Gordon West ad in *73*.



BIRD

The Novice must be able to know the power output of his transmitter to match his antenna system and to stay within legal limits. The Bird Model 43 wattmeter is expandable to measure power in every amateur band from 1.8 MHz through 2300 MHz, from milliwatts through the legal limit.

For more information about the Bird 43, circle number 236 on your Reader Service card.

NYE-VIKING

Before you can use your new Novice voice privileges, you have to earn them. The Nye-Viking code practice set is built for the beginner. It includes standard key, oscillator, amplifier, and 2″ speaker—all mounted on a base with non-skid feet. It gives you chirp-free keying and can be reused with any transmitter.

For more information, circle number 239 on your Reader Service card.

RADIO AMATEUR *CALLBOOK*

Want to QSL those new phone contacts? The 1987 North American and International *Callbook*s list the calls, names, and mailing addresses for over 950,000 licensed amateurs around the world. In addition, they include international postal information, worldwide QSL bureaus, standard time charts, prefixes of the world, a census of amateur licenses in each country, and more.

For more information about the *Callbook*, circle number 238 on your Reader Service card.

THE LANZ COMPANY

A complete Novice study guide and code practice program is available on-disk for the C-64/C-128 computers from The Lanz Company. This program includes the FCC pool of questions, formulas, schematic symbols, sample tests, random code, and sample QSOs. This program retails for $19.95 ($29.90 with printing disk).

A 5 through 30 wpm code practice program is available on either disk or data cassette tape for $9.95. A Novice study guide is available on audio cassette tape for $10.95; a 5–7-wpm code tape is available for $5.95. A 5–16-wpm code practice video tape (VHS) is available for $15.95.

For more information about these products, circle number 240 on your Reader Service card.

COTEC

Amateur radio software for the Apple II family of computers is available from COTEC. Connections between the radio equipment and the computer are through shielded

audio cables to the cassette ports of the Apple. The software demodulates the tone information and converts it to timing signals. These, in turn, are converted to ASCII data that the computer can display as text. A software phase-locked loop is used to synchronize with and decode the incoming signal. For transmission, tones are sent from the cassette output to the transmitter microphone input.

Code Machine ($29.95) is COTEC's Morse terminal program. Frequency tracking is fully automatic from 600 Hz to 1300 Hz. Speed is from 10–60 wpm. The Code Machine software features a 24,000-character receive buffer, a 320-character type-ahead transmit buffer, a 255-character text buffer, and a 24,000-character text buffer. It allows variable spacing between characters.

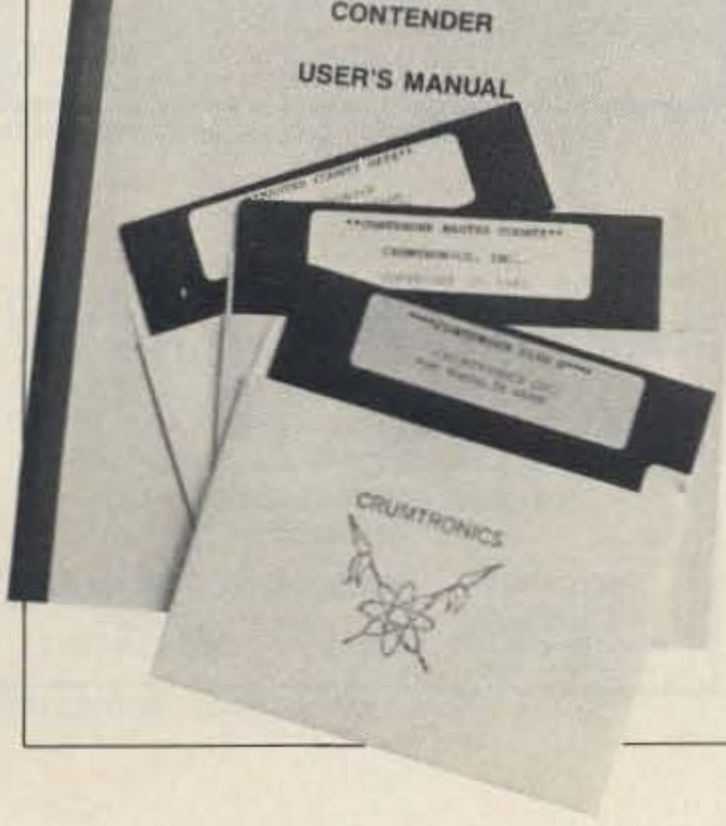
RTTY Machine ($29.95) is COTEC's RTTY terminal unit. It runs at 60 wpm. All audio frequency processing is done in the software. RTTY Machine has a 24,000-character receive buffer and transmits in three ways: (1) each character is sent as a key is pressed, (2) a 255-character transmit buffer is sent, (3) a 24,000-character transmit buffer is sent. All forms of transmission are encoded to Baudot and sent to the cassette outputs as mark (2125 Hz) and space (2295 Hz) tones. When fed into the microphone of an FM transmitter, this produces AFSK. When fed into an SSB transceiver, this produces FSK offset from the indicated frequency by the mark/space frequencies.

For more information about Apple software from COTEC, circle number 241 on your Reader Service card.

CRUMTRONICS

The Contender Plus II is a computerized logging and awards record keeping system for the Commodore 64/128. Automatic logging features include time/date, band/mode, and QSO number. Printer options include QSL cards, labels, dupe sheets, and awards summaries.

For more information, circle number 242 on your Reader Service card.

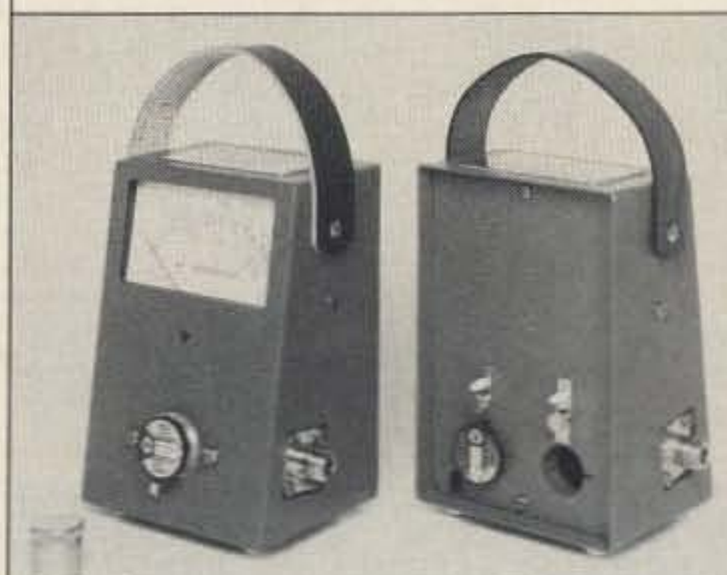


AMATEUR RADIO SCHOOL

The KB6MT Amateur Radio School code course teaches you code using a character sending rate of 21 wpm (spacing between characters is decreased as you progress through the course). Rhythm patterns are memorized (rhythm patterns don't exist below 17 wpm) and the course is designed to take you from 0 to 21 wpm—regardless of what level you start at. The cost for 4-1/2 hours of taped code instructions and code practice, including a written manual, is $20.

Theory courses on cassettes for each license class are also available, as are simulated VEC code tests at 13 and 20 wpm.

For more information, circle number 243 on your Reader Service card.



COAXIAL DYNAMICS

The model 81000A wattmeter from Coaxial Dynamics, Inc., measures rf power in 50-Ohm coaxial cables and transmission lines. The built-in line section can be removed and used with accessory cables from 33″ to 200′ from the meter. On the back are two sockets for storing extra measuring elements. The 81000A covers from 0.1 Watts to 5,000 Watts full scale, and from 2 to 1000 MHz.

For more information, circle number 244 on your Reader Service card.

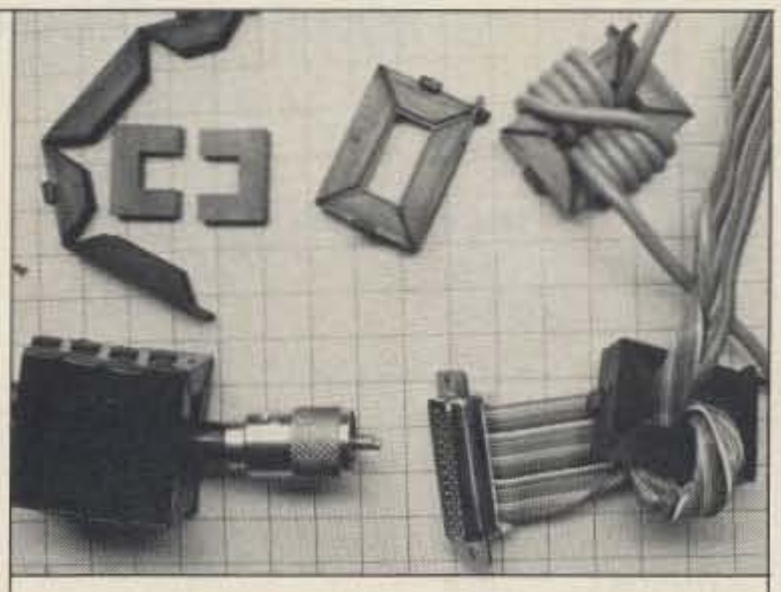
KALT & ASSOCIATES

DIGIPAC I is digital communications software for PCs and compatibles from Kalt & Associates. In addition to full message forms and a pop-up help system, DIGIPAC I features include split-screen, ASCII/binary file transfers, macro keys, macro files, DOS shell, character and line buffer mode, auto line-feed, screen/recall printer, and disk logging. DIGIPAC I is priced at $49.95 plus $3 s&h.

For more information, circle number 246 on your Reader Service card.

COMPUTERADIO

Novices on 10 meters can greatly attenuate interference to TV and hi-fi equipment using Snap-On-Choke from Computeradio.



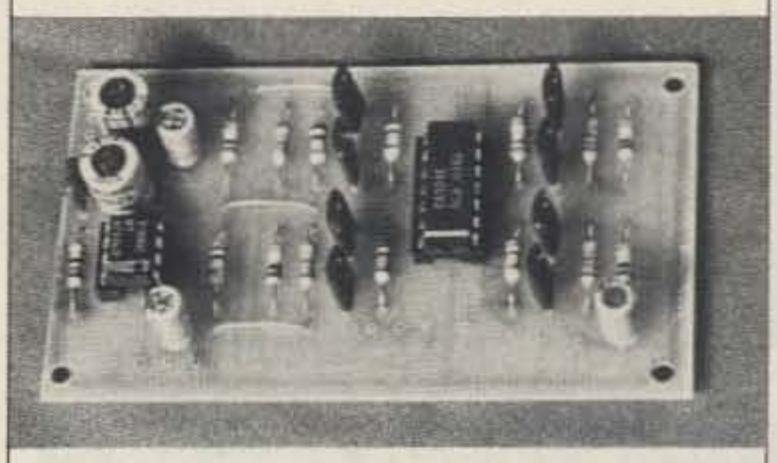
The device consists of a two-piece ferrite core and a plastic clamp. It is effective within a 0.5–200-MHz range and can be clamped onto cables of up to 10 mm in diameter. Installation doesn't require removing connectors and desoldering connections. A single choke is $4; a package of four is $15 (prices do not include s&h).

For more information, circle number 245 on your Reader Service card.

AZIMUTH

The model WT-80A world time clock features digital readouts of both local time and world time. A 24-position slider is used to select which part of the world you would like local time for, and UTC is shown with the slider on London. This world time clock is priced at $19.95 plus $1.95.

For more information, circle number 247 on your Reader Service card.



BEL-TEK

The CW-1 active CW filter kit from BEL-TEK has selectable bandwidths of 90, 130, and 200 Hz with a center frequency of 800 Hz. It has a built-in audio amplifier to directly drive a loudspeaker. The CW-1 is powered by a 9-volt battery and retails for $19.95.

For more information, circle number 248 on your Reader Service card.

TOP CLAIMED SCORES—1987 WORLD SSB CHAMPIONSHIPS

10 METERS

Single-op

Call	QSOs	States/Provinces	DX	Total Score
VP9AD	1,487	45	10	411,675
KD8AQ	549	39	1	107,250
AA4LE	537	36	0	96,660
K1NYK	525	32	3	92,050
N3II	386	40	5	87,300

Multi-op

N4EJV	941	44	3	219,255
KB4RXM	623	42	6	151,920
K5LZO	572	43	7	137,000
N2EOC	532	40	4	117,260
KA5DLM	431	35	2	79,735

20 METERS

Single-op

VO1SA	1,328	61	97	1,605,280
NR5M	1,328	56	60	1,069,520
4Z7T	792	41	110	845,900
OK3CMZ	840	52	53	754,425
KA1GG	879	53	60	731,110

Multi-op

NO9H	741	54	59	638,450
K3IVD	596	50	53	428,995
JA9YBA	430	44	44	373,120
W7MR	419	45	33	229,710
KØKU	378	42	26	142,800

40 METERS

Single-op

KP4FI	1,233	53	89	1,400,830
KE5CV	1,756	56	43	928,620
KJ4CQ	1,196	56	18	451,770
8P9AF	447	40	53	329,685
KS9O	858	56	17	320,105

Multi-op

W2ZQ	1,177	55	21	460,940
KB4RXM	1,152	55	8	365,400
NT5D	847	55	8	327,000
KS3F	851	54	19	316,455
NK7U	849	56	14	301,700

75 METERS

Single-op

NP4P	669	55	49	428,480
KQ3V	641	58	38	336,960
KE5FI	680	56	37	332,940
K5ZD/1	651	55	37	329,360
KØHA	795	58	18	309,700

Multi-op

K2PM	1,310	59	56	890,100
W7MR	689	57	16	257,325
KS3F	698	57	14	249,920
KB9S	640	56	12	219,300
KB4RXM	608	54	4	177,480

160 METERS

Single-op

WB9HAD	1,783	59	40	915,255
KE5FI	1,010	58	25	428,280
W9UP	919	58	5	289,800
ADØO	862	57	10	289,775
VE3XN	748	58	11	261,510

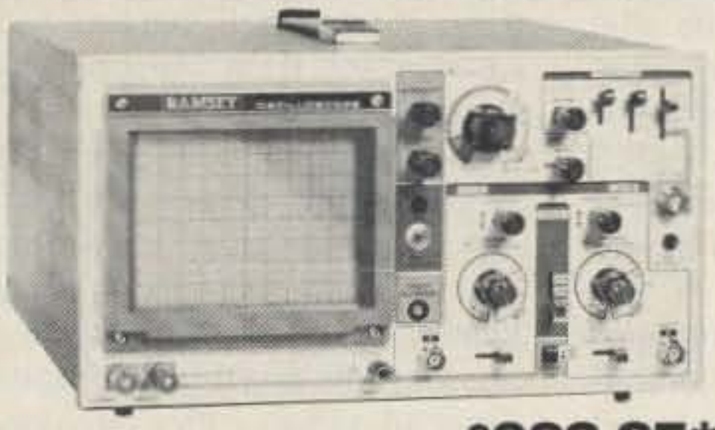
Multi-op

WB8IFP	1,494	58	27	653,225
KC1U	1,256	57	25	529,720
KC8P	1,091	57	18	414,000
WB8IGY	1,066	54	11	348,400
WA4JXI	571	56	33	322,180

RAMSEY

RAMSEY ELECTRONICS

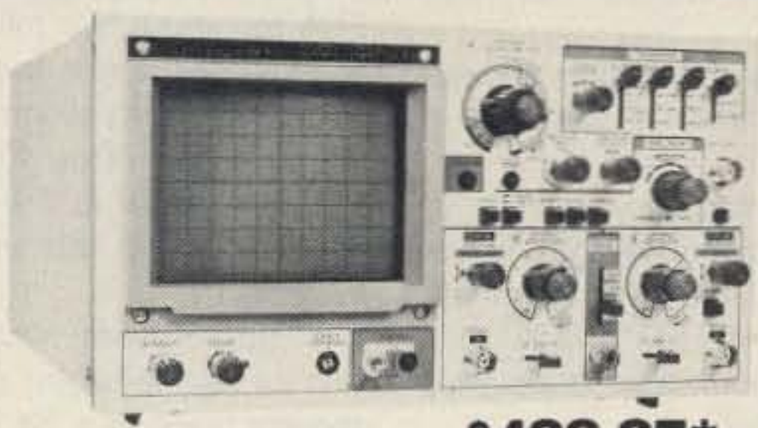
QUALITY TEST GEAR YOU CAN COUNT ON



INCLUDES 2 HOOK-ON PROBES **$369.95***

20 MHz DUAL TRACE

Features component testing circuit for resistors, capacitors, digital circuits and diodes—TV sync filter—high sensitivity—Z axis—XY mode—built-in calibrator—5X horizontal magnifier



INCLUDES 2 HOOK-ON PROBES **$499.95***

35 MHz DUAL TRACE

wide frequency bandwidth—optimal sensitivity —delayed triggering sweep—hold off—ALT trigger—single sweep TV sync 5X magnification—XY or XYZ operation— HF/LF noise reduction

NEW

INCLUDES 2 HOOK-ON PROBES **$449.95***

15 MHz DUAL TRACE PORTABLE

Field/bench applications—built-in charger and battery pack —up to 2 hours operation per charge—5X horizontal magnification—high brightness CRT—front panel trace rotator

RAMSEY OSCILLOSCOPES

All Ramsey oscilloscopes feature unsurpassed quality at an unbeatable price. Of heavy duty construction, they are suitable for hobby, service and production applications.

***Add an additional $10.00 for each unit for shipping.**

MODEL	BAND WIDTH	# TRACES	CRT SIZE	VERTICAL SENSITIVITY	MAXIMUM TRIG FREQ	USEABLE MAXIMUM BANDWIDTH
2200	20 MHz	(2)	8x10CM	5 mV per div	35 MHz	30 MHz
2500	15 MHz	(2)	3.5 inch	2 mV per div	30 MHz	25 MHz
3500	35 MHz	(2)	8x10CM	1 mV per div	50 MHz	60 MHz

All include high quality 1:1, 10:1 hook on probes, instruction/service manual with schematic and component layout. 1 year warranty.

MINI-100 COUNTER

$119.95 CHARGER, NICAD BATTERIES, AC ADAPTER INCLUDED

CT-70 7 DIGIT 525 MHz

$139.95 WIRED, INCLUDES AC ADAPTER

CT-90 9 DIGIT 600 MHz

$169.95 WIRED INCLUDES AC ADAPTER

CT-50 8 DIGIT 600 MHz

$189.95 WIRED INCLUDES AC ADAPTER

CT-125 9 DIGIT 1.2 GHz

$189.95 WIRED INCLUDES AC ADAPTER

MODEL	FREQ RANGE	SENSITIVITY	ACCURACY	DIGITS	RESOLUTION	PRICE
MINI-100	1-500 MHz	Less than 250mv	1 PPM	7	100 Hz, 1 KHz	119.95
CT-70	20 Hz-550 MHz	< 50mv To 150 MHz	1 PPM	7	1Hz, 10Hz, 100Hz	139.95
CT-90	10 Hz-600 MHz	< 10mv To 150 MHz < 150mv To 600 MHz	1 PPM	9	0.1Hz, 1Hz, 10Hz	169.95
CT-50	5 Hz-600 MHz	LESS THAN 25 mv	1 PPM	8	1Hz, 10Hz	189.95
CT-125	10 Hz-1.25 GHz	< 25mv @ 50 MHz < 15mv @ 500 MHz < 100 mv @ 800 MHz	1 PPM	9	0.1Hz, 1Hz, 10Hz	189.95
CT-90 WITH OV-1 OPTION	10 Hz-600 MHz	< 10mv To 150 MHz < 150mv To 600 MHz	0.1 PPM	9	0.1Hz, 1Hz, 10Hz	229.90

RAMSEY FREQUENCY COUNTERS

Ramsey Electronics has been manufacturing electronic test gear for over 10 years and is recognized for lab quality products at breakthrough prices. Our frequency counters have features and capabilities of counters costing twice as much.

RAMSEY D-4100 COMPACT DIGITAL MULTITESTER

$24.95

test leads and battery included

NEW

Compact sized reliability and accuracy. This LCD digital multitester easily fits in your pocket, you can take it anywhere. It features full overload protection • 3½ digit LCD readout • recessed input jacks • safety probes • diode check function • 2000 hours battery life

RAMSEY D-5100 HANDHELD DIGITAL AUTORANGING METER

$49.95

Includes Probes 1 Year Warranty

Provides distinctive audible chirp after contact has been made and meter reading has stabilized. Has TOUCH-HOLD feature to allow readings to be logged or referred to before making the next reading. Up to 10 AMP current capability and a continuity function which beeps on zero Ohms.

$44.95 wired includes AC adapter

PR-2 kit **$39.95**

PR-2 COUNTER PREAMP

The PR-2 is ideal for measuring weak signals from 10 to 1,000 MHz • flat 25 db gain • BNC connectors • great for sniffing RF • ideal receiver/TV preamp

$69.95 wired

PS-2 kit **$49.95**

PS-2 AUDIO MULTIPLIER

The PS-2 is handy for high resolution audio resolution measurements, multiplies Up in frequency • great for PL tone measurements • multiples by 10 or 100 • 0.01 Hz resolution & built-in signal preamp/conditioner

$89.95 wired includes AC adapter

PS-10B 1 GHz PRESCALER

Extends the range of your present counter to 1 GHz • 2 stage preamp • divide by 1000 circuitry • super sensitive (50 mV typical) • BNC connectors • 1 GHz in, 1 MHz out • drives any counter

MINI KITS—EASY TO ASSEMBLE—FUN TO USE—FOR BEGINNERS, STUDENTS AND PROS

TONE DECODER
A complete tone decoder on a single PC board. Features: 400-5000 Hz adjustable range via 20 turn pot, voltage regulation, 567 IC. Useful for touch-tone burst detection, FSK, etc. Can also be used as a stable tone encoder. Runs on 5 to 12 volts.
Complete kit, TD-1 **$5.95**

40 WATT 2 mtr PWR AMP
Simple Class C power amp features 8 times power gain 1 W in for 8 out, 2 W in for 15 out, 5 W in for 40 W out. Max output of 50 W, incredible value, complete with all parts, less case and T-R relay.
PA-1, 40 W pwr amp kit **$22.95**
TR-1, RF sensed T-R relay kit **6.95**

COLOR ORGAN
See music come alive! 3 different lights flicker with music. One light each for, high, mid-range and lows. Each individually adjustable and drives up to 300 W. runs on 110VAC.
ML-1 Kit. **$8.95**

VOICE ACTIVATED SWITCH
Voice activated switch kit provides switched output with current capability up to 100 mA. Can drive relays, lights, LED or even a tape recorder motor. Runs on 9 VDC.
VS-1 KIT
$6.95

VIDEO MODULATOR
Converts any TV to video monitor. Super stable, tunable over ch 4-6. Runs on 5-15V accepts std. video signal. Best unit on the market! Complete kit, VD-1 **$7.95**

LED BLINKY KIT
Alternately flashes 2 jumbo LEDs. Use for name badges, buttons, warning panel lights. Runs on 3 to 15 volts.
BL-1 Kit. **$2.95**

UNIVERSAL TIMER
Provides the basic parts and PC board required to provide a source of precision timing and pulse generation. Uses 555 timer IC and includes a range of parts for most timing needs.
UT-5 Kit **$5.95**

MAD BLASTER
Produces LOUD ear shattering and attention getting siren like sound. Can supply up to 15 watts of obnoxious audio. Runs on 6-15 VDC
MB-1 Kit **$4.95**

WHISPER LIGHT
An interesting kit, small mike picks up sounds and converts them to light. The louder the sound, the brighter the light. Includes mike, controls up to 300 W, runs on 110 VAC.
WL-1 Kit **$6.95**

FM WIRELESS MIKE
Transmits up to 300' to any FM broadcast radio, uses any type of mike. Runs on 3 to 9V. Type FM-2 has added sensitive mike preamp stage.
FM-1 Kit **$3.95**
FM-2 Kit **$4.95**

SIREN
Produces upward and downward wail. 5 W peak audio output, runs on 3-15 volts, uses 3-45 ohm speaker.
Complete kit, SM-3
$2.95

SUPER SLEUTH
A super sensitive amplifier which will pick up a pin drop at 15 feet! Great for monitoring baby's room or as general purpose amplifier. Full 2W rms output, runs on 6 to 15 volts, uses 8-45 ohm speaker.
BN-9 Kit **$5.95**

60 Hz TIME BASE
Runs on 5-15 VDC
Low current (25ma)
1 min/month accuracy
TB-6 Kit **$5.50**
TB-6 Assy **$9.95**

NEW

TELEPHONE TRANSMITTER
Low cost with professional performance. Features include: self phone line powered, tunable from 76 to 100 MHz, polarity antisensitive, compact size (½" x 1¼"), easily installs anywhere on the phone line or inside the instrument itself.
PB-1 KIT
$14.95

NEW

FM RECEIVER
For built-in applications or hobby experimentation. Full fledged superhetrodyne receiver, microvolt sensitivity, 10.7 MHz IF, Integrated Circuit detector, 50 mw audio amplifier, 9V external power source, operation on standard FM broadcast band as well as large portions on each side, compact (6" square), for bug detection or reception
FR-1 KIT **$14.95**

FM MINI MIKE
A super high performance FM wireless mike kit! Transmits a stable signal up to 300 yards with exceptional audio quality by means of its built in electret mike. Kit includes case, mike, on-off switch, antenna, battery and super instructions. This is the finest unit available.
FM-3 Kit **$14.95**
FM-3 Wired and Tested
19.95

ACCESSORIES FOR RAMSEY COUNTERS

Telescopic whip antenna—BNC plug	$ 8.95
High impedance probe, light loading	16.95
Low pass probe, audio use	16.95
Direct probe, general purpose use	13.95
Tilt bail, for CT-70, 90, 125	3.95

VISA

PHONE ORDERS CALL 716-586-3950

TELEX 466735 RAMSEY CI
FAX 716-586-4754

MasterCard

TERMS: • satisfaction guaranteed • examine for 10 days; if not pleased, return in original form for refund • add 6% for shipping and insurance to a maximum of $10.00 • foreign add 15% for surface mail • COD add $2.50 (COD in USA only) • orders under $15.00 add $1.50 • NY residents add 7% sales tax • 90 day parts warranty on all kits • 1 year parts & labor warranty on all wired units.

RAMSEY ELECTRONICS, INC.
2575 Baird Rd. Dept. 73
Penfield, N.Y. 14526

CIRCLE 34 ON READER SERVICE CARD

WEATHERSAT

Dr. Ralph E. Taggart WB8DQT
602 S. Jefferson
Mason MI 48854

STATION AUTOMATION

The subject for this month is automatic control of your station. It is a fact of life that most of the interesting activity in terms of weather satellites happens during the day. It is also a sad fact of economic life that most of us are tied up for five days out of every seven doing what it takes to help house and feed the family, pay the bills, and last but not least, upgrade the satellite station!

Once you are truly hooked on this hobby, it is hard to limit yourself to looking at pictures just on weekends, particularly in a perverse world where the most interesting frontal patterns, monstrous hurricanes, eclipses of the sun, or whatever appear to occur during the prime working hours. The solution, of course, is to use some of your hardware to get around the problem of how to acquire pictures when you aren't around to push all the buttons.

To many, the automation of a station conjures up visions of a completely automatic tracking system. Granted, with the computers and accessory hardware available today, it is entirely possible to construct an auto-tracking system driven directly from a computer.

That computer can be working with several satellites at once, and when each one comes over the horizon, based on the computer's determination of the orbit, the system could switch your receiver to the correct frequency, turn on the tape recorder, and track the antenna for the duration of the pass. The system would then shut down until the next spacecraft was expected.

Although this type of system is quite practical and need not be particularly expensive, essentially equivalent results can be obtained with far less effort. The key, in terms of the polar orbiters, is to use an omnidirectional antenna, such as the one in the *WSH*, that doesn't require tracking. With modern preamps, mounted at the antenna, the results with an omni-antenna can be quite reliable and will save all the fuss and bother of a larger directional array, elevation and azimuth rotors, and the interfaces to control them.

All the discussions relative to polar-orbit satellites that follow will assume the use of an omni-antenna system. Let's look at a range of options from the simple to the complex.

Single-Event System

The simplest system is one designed to acquire a single picture or pass each day. You might wish to tape a GOES visible-light frame or the best visible pass of the day for a specific polar orbiter.

Your best friend in this case is one of the newer digital appliance timers. These are designed to turn lamps and other appliances on and off at a particular time. They are like the old-fashioned clockwork timers but are accurate to a fraction of a second compared to the 15-minute resolution that could be expected with the mechanical systems.

For several years now I have used a Micronta 63-886 24-hour timer that was sold by Radio Shack; many equivalent models are available almost anywhere. These days there is a big market for these devices in home security to turn your house lights on and off, and some of the more elaborate models can be programmed for different on and off times each day over a period of a week or more.

The use of such a timer simply involves setting the receiver to the proper frequency, setting your tape recorder to record, and using the timer to turn the tape system on and then off at precisely the time you want. In the case of a WEFAX frame or sequence of frames, I usually program the system to come on about a minute prior to the scheduled time and then set the "off" time for about two minutes after the end of the last frame I want. You could easily record the prime visible-light frame from GOES throughout an entire two-week vacation using this very simple technique.

A single-event system works just as well for polar orbiters, although there is a bit more work since NOAAs and METEORs don't follow a uniform daily schedule like GOES. Their orbits do provide a schedule, however, that can be interpreted with even more accuracy if you have some basic predict information.

Let's say you are using a program like PREDICT from the *WSH*. It tells you that your favorite polar-orbiting bird will be making an overhead pass tomorrow, crossing 262 W at 1259:48 UTC. There is no need to go to the plotting board to figure what out times have to be. If you use a period of 102 minutes, it is obvious that the satellite traverses 360 degrees (one orbit) in 102 minutes—about 3.53 degrees per minute.

Since a crossing at 262 degrees W is a descending pass for North America, the satellite is going to have to travel almost halfway around the world to get overhead. Let's say you reside at 40° N. If the satellite had to travel from equator to equator, it would travel 180° in its orbit, but to get to the overhead point for your station, it must travel 180 − 40 or 140 degrees along its track. At 3.53 degrees each minute, this would require about 40 minutes (140/3.53 = 39.66 minutes).

If you assume the reference crossing to be at about 1300 (rounding off the actual value to the nearest minute), the satellite will be overhead at about 1340. If your antenna system will deliver a good signal for, say, 16 minutes, you would actually want to turn the recorder on at 1332 and then off again at 1348 (−8 minutes and +8 minutes from the nominal overhead time).

Once you get this far, it should be evident that for *any* descending overhead pass, you would want to turn the recorder on about 32 minutes after the reference crossing time and turn it off again about 48 minutes after crossing. The same range is quite close enough for other satellites in the 100–104-minute range of periods and is entirely satisfactory for the "best pass" on either side of overhead as well.

What about an ascending pass? I'll let you try out the math, but your answer should be about reference +3 minutes for "on" and reference +19 minutes for "off." The precise values for your own station can be calculated based on your actual latitude, but the process is the same.

You can do this simple calculation based on the predict printout for each day or, better still, modify your program to let the computer do it for you. The added "on/off" time routine can involve simply adding the fixed offsets to the reference time or you can have the computer incorporate the same calculations we did manually.

If the computer knows when the recorder should be turned on and off each day, it could actually do the job itself if it also knows the time. One of my Color Computers is equipped with a real-time clock from Speech Systems and it does everything. It computes the orbits and then turns on the recorder using the internal cassette relay (MOTOR ON and MOTOR OFF commands in Color Basic) and the ac-switching circuit shown in Fig. 1.

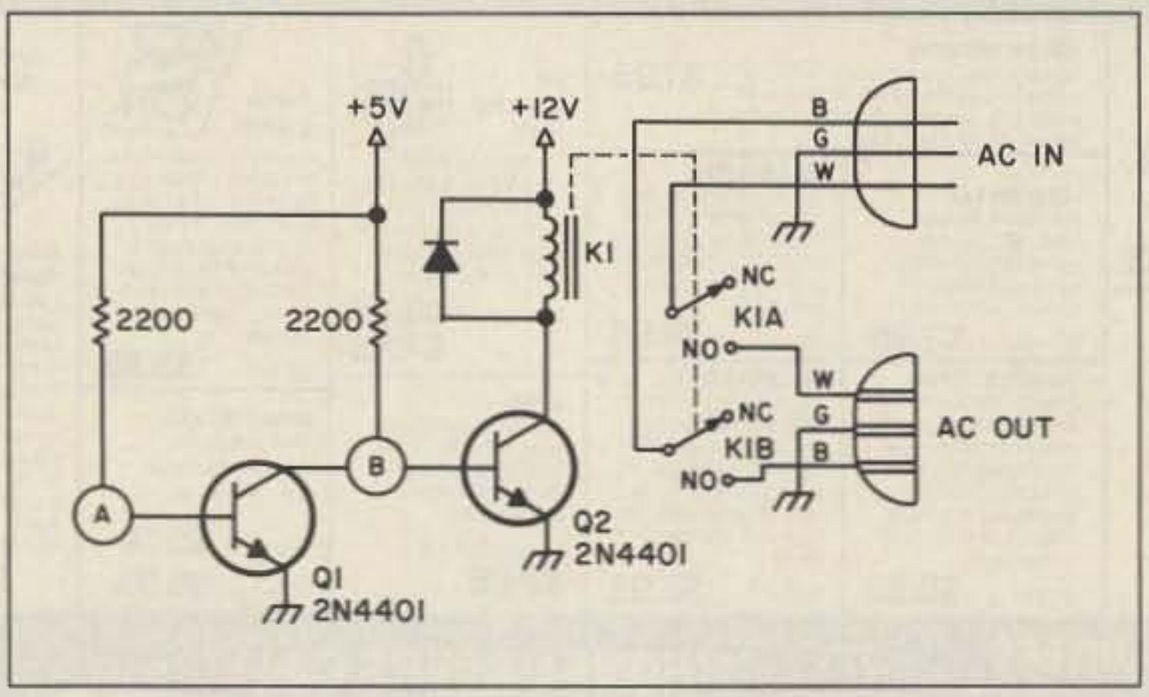


Fig. 1. Ac-switching circuit.

Many other computers have either software or hardware clocks and can perform the same functions with some added I/O hardware. The circuit in Fig. 1 incorporates switching via a TTL HIGH or LOW signal as well as relay control, depending on the I/O ports available. K1 is a standard 12-V-dc DPDT relay, which is used to switch both sides of the ac line to turn on the tape system.

Basically, the relay is inserted into the hot leads of a standard 3-wire extension cord. The relay and all "hot" ac connections

Superior Communications Accessories

DAIWA Cross Needle SWR/Power Meters For Utmost Quality and Convenience

Compact
Model CN-520

Base/Mobile
Model CN-460M

Base
Model NS-660PA

See table below for full range of models.

COAXIAL SWITCHES
PAT. No. 59-000803

CS-201

CS-401

	CS-201 2position	CS-201G 2position	CS-401 4position	CS-401G 4position	CS-4 4position
Frequency:	600 MHz	1.3 GHz	600 MHz	1.3GHz	1.3 GHz
Connectors:	SO-239	N type	SO-239	N type	BNC type
VSWR:	Below 1:1.2				
Insertion Loss:	Less than 0.2 dB				

POWER SUPPLIES

PS-51XM

Model	IMAX/ICONT	Variable Output VDC
PS-51XM	5.6A/5A	9–15
PS-120M	12A/10A	3–15
PS-30XM	31A/24A	1–15
PS-560MD*	56A/44A	13–8
PS-560W	56A/44A (Low V)	3–15 Variable
	28A/22A (High V)	6–30 Variable

*Sub-DC Outlets: 10.6A/1–15 VDC

ANTENNA TUNERS

CNW-419

Frequency Range:	CNW-419 1.8-30 MHz (17 bands)	CNW-919 140–150 MHz	CL-680 (no metering) 1.8-30 MHz (17 bands)
Power Rating:	200 W CW (3.5-30 MHz) 100W CW (1.8-3.4 MHz)	200W CW	200W CW (3.5-30 MHz) 100W CW (1.8-3.4 MHz)
Output Impedance:	10-250 ohm	10–250ohm	10–250 ohm

POWER AMPLIFIERS

LA-2155W

Band:	LA-2035R 144-148 MHz	LA-2065R 144-148 MHz	LA-4040R 430-450 MHz	LA-2155W 144-148 MHz
Input Power:	0.5-3 W	0.5-5 W	10 W	10-35 W
Max. Output Power:	30 W plus	60 W plus	35 W	30-150 W

Pre-Amp (Gain) 15 dB

DK-210

ELECTRONIC KEYER
Sharpen your "fist" with Daiwa precision!

CIRCLE 264 ON READER SERVICE CARD

Cross Needle SWR/Power Meters for All Bands

CN-720B

Model	Freq. Range Int. Sensor	Forward Power	Connectors
CN-720B	1.8–150 MHz	20/200 W/2 kW	SO-239
NS-660PA	1.8–150 MHz	30/300 W/3 kW	SO-239
NS-663PA/N	140-525 MHz	3/30/300 W	SO-239/N Type
NS-668	900 MHz–1.3 GHz	1.5/15/60 W	N Type

MOBILE/BASE CROSS NEEDLE SWR/POWER METERS

CN-410M

NS-448

Model	Freq. Range Int. Sensor	Forward Power	Connectors
CN-410M*	3.5–150 MHz	15/150 W	SO-239
NS-448**	900 MHz–1.3 GHz	5/20 W	SO-239
CN-460M*	140–450 MHz	15/150 W	SO-239
CN-465*	140–450 MHz	15/75 W	SO-239
CN-520	1.8–60 MHz	200 W/2 kW	SO-239
CN-550	144–250 MHz	20/200 W	SO-239

*Back lit with mobile bracket **Separate sensor type

REMOTE EXTERNAL SENSORS (For indoor/outdoor use)

Permit operation over range of 1.8 MHz through 1.3 GHz.
Optional for use with NS-660 series meters.
U-66H, 1.8–150 MHz, Max 3 kW, SO-239 Connectors
U-66V, 140–525 MHz, Max 300W, SO-239 Connectors
U-66VN, 140–525 MHz, Max 300W, N Type Connectors
U-66S1, 900 MHz–1.3 GHz, Max 60W, N Type Connectors
SC-20 60 ft. Cable with connectors for use with remote sensors

U-66V

AF-606K *AUDIO FILTERS*

Four stages of filtering...variable bandwidth over broad range...razor sharp CW reception...built-in speaker...PLL Tone Decoder circuitry.

AF-606K

DAIWA®
Electronics Corporation
1908A Del Amo Blvd. ▪ Torrance, CA 90501
(213) 212-6057 ▪ (213) 212-6058

Specifications subject to change without notice. ▪ All models and types not represented.

ege, inc.

When You Decide to Decipher de Code

EGE VIRGINIA
13646 Jefferson Davis Highway
Woodbridge, Virginia 22191
Information: (703) 643-1063
Service Department: (703) 494-8750

Store Hours:
M-Th: 10 a.m.—6 p.m.
F: 10 a.m.—8 p.m.
Sat: 10 a.m.—4 p.m.

Order Hours: M-F 9 a.m.-7 p.m.
Sat 10 a.m.-4 p.m.

EGE NEW ENGLAND
8 Stiles Road
Salem, New Hampshire 03079
New Hampshire Orders,*
Information & Service: (603) 898-3750
or call 800-336-4799

Store Hours:
MTWSat: 10 a.m.—4 p.m.
ThF: 12 noon—8 p.m.
*Order and we'll credit you $1 for the call.

Spring Buyer's Guide Catalog Available - Send $1

LACOMBE DISTRIBUTORS
Our associate store
Davis & Jackson Road, P.O. Box 293
Lacombe, Louisiana 70445
Information & Service: (504) 882-5355

VISA MasterCard DISCOVER

Terms: *No personal checks accepted. Prices do not include shipping. UPS COD fee: $2.35 per package. Prices are subject to change without notice or obligation. Products are not sold for evaluation. Authorized returns are subject to a 15% restocking and handling fee and credit will be issued for use on your next purchase. EGE supports the manufacturers' warranties. To get a copy of a warranty prior to purchase, call customer service at 703-643-1063 and it will be furnished at no cost.*

Dealer Inquiries Invited

Hard to get through on our 800 number?
Call before 10 a.m. or after 5 p.m., or call one of our regular numbers. If you pay for the call and order, we'll credit your order with $1.

ICOM

IC 751A
HF Transceiver with
General Coverage Receiver

Micro 2AT
Mini 2m Handheld
Now in Stock

NEW IC 12AT
for 1.2 GHz

IC 3200
2m/440 MHz Mobile

IC 745
HF Transceiver with
General Coverage Receiver

R 7000
General Coverage Receiver

IC 02AT/04AT
Handheld for 2m/440 MHz

KENWOOD

R 5000
General Coverage Receiver

NEW TH-205AT
2m 5-Watt Handheld

TS 940S
HF Transceiver with
General Coverage Receiver

TH-215AT
2m FM Handheld

TS 430S
HF Transceiver with
General Coverage Receiver
NEW LOW PRICE — CALL

EXTENDED SERVICE AGREEMENTS AVAILABLE

New TS 440
HF Transceiver
with Antenna Tuner

SPECIAL PACKAGE DEALS FOR NOVICES
Radios/Antennas
Call for info

BEARCAT

100XL 16-channel handheld	199.95
800XLT 40-ch, 800 MHz	319.00
145XL 16-ch, 10-band	99.95
175XL 16-ch with aircraft	154.95
50XL 10-ch, handheld	120.00
210XW	199.95

UNIDEN

Radar Detectors	Call
CB Radios	Call

SONY

2002 SWL Receiver	219.95
2010 SWL Receiver	319.95

PANASONIC SWL CALL

COBRA CBs/RADAR DETECTORS

MIDLAND CBs CALL

WHISTLER RADAR DETECTORS

HARDWARE

MFJ 1224 with MFJ C-64/V-20 Soft	85.95
MFJ New 1229	159.95
Kantronics Interface II	210.95
Kantronics UTU Interface	169.95
Kantronics UTU-XT	279.95
New Microlog ART-1	Call

SOFTWARE

Kantronics Hamtext
Vic-20, C-64, Apple, Atari ... Call

Kantronics Hamsoft
Vic-20, Apple, Atari, TI-99 ... Call

Kantronics Hamsoft/Amtor
Vic-20, C-64, Atari ... 69.95

Kantronics Amtorsoft
Vic-20, C-64 ... 79.95
Apple ... 119.95

Microlog Air Disk
Vic-20 and C-64 Disk ... 39.95
Cartridge ... 56.95

PACKET

MFJ 1270B/1274 Packet	124.95/149.95
Kantronics Packet PKT2	154.95
New Kantronics KAM	299.95
Kantronics KPC2400	Call
Kantronics 2400 TNC Modem	Call

ege, inc.
Your Factory Authorized Service Center for Icom, Yaesu, & Kenwood
EGE offers ***extended service contracts*** *on Yaesu, Kenwood, and Icom products. Prices from $10-25. Ask for details.*

ASTRON POWER SUPPLIES

RS7A	49.95	RS20M	104.95
RS12A	69.95	RS35M	149.95
RS20A	89.95	VS20M	124.95
RS35A	133.95	VS35M	169.95
RS50A	189.95	RS50M	209.95

This is a partial list—
IF YOU DON'T SEE WHAT YOU WANT . . . CALL

TE SYSTEMS
RF AMPLIFIERS
With receive
GaAs FET Preamplifier
for superior weak signal reception with improved strong signal intermod rejection.

1410G 2m Amp 10W in-160 out	309.00
1412G 2m Amp 30W in-160 out	269.00
4410G 440 Amp 10W in-100 out	309.00
4412G 440 Amp 30W in-100 out	309.00

ege, inc.

For Orders and Quotes Call Toll Free: 800-336-4799
In New England (except NH) Call 800-237-0047 In Virginia Call 800-572-4201

YAESU

FT 757GX
HF Transceiver with
General Coverage Receiver

FT 209RH

NEW FT 727R
2m/440 MHz Dual Band HT

NEW FT 767GX
All Mode Transceiver
with CAT System

NEW FT23/73 Palmate
2m/440 MHz Mini Handhelds

FRG 8800
General Coverage Receiver
All mode 150kHz-30MHz

FRG 9600
Scanning Receiver
for 60-905 MHz FM/AM/SSB

ASK FOR QUOTES ON RADIO/ ACCESSORY PACKAGES

SANTEC

ST-20T
2m HT

KDK

FM240 2m, 25-watt

TEN-TEC

PARAGON HF Transceiver
& General Coverage Receiver

RX-325 Short Wave Receiver

Mobile HF Antennas
Call for Ten-Tec Prices

ANTENNAS & TOWERS

CUSHCRAFT

A3 3-element 10-15-20m	217.95
A4 4-element 10-15-20m	292.95
R3 10-15-20m Vertical	268.95
215WB SSB/FM 2m Boomer	82.95
ARX-2B 2m Ringo Ranger	36.50
4218XL 2m Boomer	103.95
10-4CD 4-element 10m	111.95
15-4CD 4-element 15m	125.95
40-2CD 2-element 40m	296.95
Other Cushcraft models available	CALL

KLM

KT34A 4-element 10-15-20m	Call
KT34XA 6-element 10-15-20m	Call
2m-11X 11-element 2m	Call
2m-16LBX 16-element 2m	Call
432-30LBX 30-ele 440 MHz	Call
Fiberglass mast 5'	Call
Fiberglass mast 7'	Call

MOSLEY

CL-33 3-element Triband Beam	Call
TA-33 3-element 10-15-20m	Call
Pro 37 7-element 10-15-20m	Call
Pro 57 10-12-15-17-20m	Call
Pro 67 10-12-15-17-20-40m	Call

HUSTLER

6-BTV 10-80m Vertical with 30m	128.95
5-BTV 10-80m Vertical	108.95
4-BTV 10-40m Vertical	87.95
G6-440 440 MHz Base Vertical	99.95
G7-144 2-meter Base Vertical	115.95
G6-144B 2m Base Vertical	87.95
MO-1/MO-2 Masts	21.50
BM-1 Bumper Mount	14.95

MOBILE RESONATORS	Standard	Super
10 and 15 meter	11.95	17.95
20 meters	15.50	21.85
30 and 40 meters	17.95	25.95
75 meters	19.95	36.95

HY-GAIN ANTENNAS

391S TH7DX 7-ele 10-15-20m	CALL
393S TH5DX 5-ele 10-15-20m	CALL
395S Explorer 14 10-15-20m	CALL
203S 3-element 2-meter Beam	CALL
208S 8-element 2-meter Beam	CALL
214S 14-element 2-meter Beam	CALL
BN86 Beam Balun	CALL
V2S 2-meter Vertical	CALL
V4S 440 MHz Vertical	CALL

MORE ANTENNAS

AVANTI HM 151.3G 2m On-glass	32.50
LARSEN LM-150 5/8 Mag Mount	39.95
BUTTERNUT HF6V 10-80m Vert	119.95
BUTTERNUT HF4B 2-ele Beam	189.95
BUTTERNUT 2MCV5 2m	42.75
VOCOM 5/8-wave 2m Handheld	15.95

ANTENNAS FOR OSCAR

Cushcraft 416TB Twist	59.95
Cushcraft A14410T 10-ele	53.30
Cushcraft A14420T 20-ele	76.95
Cushcraft AOP1 Package	149.95
KLM 2m-14C 2m 14-ele Circular	88.95
KLM 435-18C 18-ele Circ Polar	111.19
KLM 2m-22C 22-ele Circ 2m	109.00

Unarco-Rohn

Self-supporting towers:

HBX40 40-feet with Base	Call
HBX48 48-feet with Base	Call
HBX56 56-feet with Base	Call
HDBX40 Higher load with Base	Call
HDBX48 Higher load with Base	Call

Other BX, HBX, HDBX in stock

Guyed foldover towers:

FK2558 58-feet, 25G	940.00
FK4554 54-feet, 45G	1296.00

Other sizes at similar savings. Foldovers shipped freight paid. 10% higher west of the Rockies.

Straight Sections:

20G Straight Section	39.95
25G Straight Section	49.95
45G Straight Section	110.95

Complete Tower Packages:

	25G	45G
40'	Call	Call
50'	Call	Call
60'	Call	Call

Each package includes top section, mid section, base, rotor shelf, guy brackets, guy wire, turnbuckles, equilizer plates, guy anchors, cable clamps, thimbles. Ask about substitutions and custom designs. Tower packages are shipped freight collect FOB our warehouse.

HY-GAIN TOWERS

HG37SS 37-feet tall	CALL
HG52SS 52-feet tall	CALL
HG54HD 54-feet/higher load	CALL
HG70HD 60-feet/higher load	CALL

Order Hy-Gain tower, Hy-Gain antenna, and Hy-Gain rotor and receive free shipping on all.

Tri-Ex

W36 36-feet tall	549.00
WT51 51-feet tall	929.00
LM354 54-feet/higher load	1575.00

Shipping not included. Shipped direct from factory to save you money.

PHILLYSTRAN CALL

CABLE BY SAXTON

RB213 Mil Spec	29¢/ft
RG8/U Foam 95% Shield	25¢/ft
8-wire Rotator 2 #18, 6 #22	17¢/ft
Mini-8 95% Shield	13¢/ft

Cablewave Hardline CALL

ROTATORS

Diawa Rotators available	CALL
Alliance HD73	119.95
Hy-Gain Ham IV	CALL
Hy-Gain Tailtwister T²X	CALL
Hy-Gain Heavy-duty 300	CALL
Kenpro KR500 Elevation Rotator	199.95
Kenpro KR5400 azmth/elevat	329.95

MIRAGE

B23A 2m Amplifier 2-30	120.95
B1016 2m Amplifier 10-160	249.95
B3016 2m Amplifier 30-160	219.95
D1010 10-100 Amp for 430-50	299.95
D1010N UHF Amp/N connectors	299.95
B215 2m Amp: 2 in, 150 out	249.95
A1015 6m Amp: 10 in, 150 out	269.95

AMERITRON HF AMPS

ATR15 Ant Tuner 1500 watt	Call
ATR10 Ant Tuner 1 kW	Call
RCS8 Remote Coax Switch	Call
NEW AL1200 1.5 kW Amp	Call
NEW AL80A 1200 watt Amp	Call
AL84 HF Amp 160-15	Call

AMP SUPPLY

LA 1000A 160-15m Amp	Call
LK 500ZBNT HF Amp no tune	Call
AT 1200A 1200 PEP Tuner	Call
LK 500ZC 2.5 kW hipersil	Call

HAL

Call for Models and Price Quotes

DAIWA

LA-2065R 2m Amp, 5 in, 60 out	125.95
LA-2035R 2m Amp with preAmp	74.95

VOCOM AMPLIFIERS

2 watts in, 30 watts out 2m Amp	69.95
2 watts in, 60 watts out 2m Amp	107.95
2 watts in, 120 watts out 2m Amp	169.95
200mW in, 30 watts out 2m Amp	84.95

KENWOOD TL922 2kW CALL

RF CONCEPTS AMPS

RFC 2-317 2m 30 in/170 out	236.95
RFC 2-417 2m 45 in/170 out	236.95
RFC 2-117 2m 10 in/170 out	268.95
RFC 2-217 2m 2 in/170 out	268.95
RFC 2-23 2m 2 in/30 out	99.95
RFC 3-22 220 MHz 2 in/20 out	99.95

BENCHER PADDLES

Black/Chrome 51.95/61.95

B & W

375 6-position Coax Switch	25.95
376 5-position Coax Switch	25.95
425 1 kW Low Pass Filter	29.95
593 3-position Coax Switch	25.95
595 6-position Coax Switch	29.95
AP-10 5-band Apartment Antenna	39.95
370-15 All-band Dipole Antenna	129.95

—Other antennas in stock—

DAIWA

CN-520 Meter	69.95
NS-660A SWR/Watt Meter	134.95
CN-630 Meter	126.00
CN-720B 2kW HF Watt Meter	120.00
CNW-419 Antenna Tuner 500 W	174.95
CNW-518 Antenna Tuner 2.5 kW	279.95
CN410M SWR/wt mtr 3.5-150 MHz	64.95
CS201 2-position Switch	21.95
CS401 4-position Switch	64.95

TELEX HEADPHONES

Procom 350 ultra light set	58.95
Procom 250 soft phone/mike	72.90
Procom 450 padded phones	35.50
Procom 400 desk mike	49.95
Procom 460 padded phones	37.20
SWL-610 light headphone	8.75
C-610 light headphone	7.95
Others in stock	Please Call

BIG DISCOUNTS

MFJ PRODUCTS

989B 3 kW Antenna Tuner	299.95
962B 1.5 kW Tuner switch/meter	189.95
949C 300-watt Deluxe Tuner	129.95
941D 300-watt Tuner swch/meter	89.95
1020A Active Antenna	72.95
202B Noise Bridge	50.95
752B Dual Tunable SSB/CW Filter	79.95
Keyers—407, 422, 484	CALL
Other MFJ products in stock	CALL

AMPHENOL CONNECTORS

831SP PL259 silver	1.25
831SP 1050 Nickel PL259	0.95
8261 Type N RG8	2.50
2900 SO239-BNC	2.99
3112 BNC RG59	1.35
312 BNC RG58	1.25
83185 Reducer RG58	0.25
83168 Reducer RG59/mini 8	0.25
831R UHF panel	0.79

Special discounts on 100-piece purchases

ALINCO ELECTRONICS

ALINCO *RADIOS POWER SUPPLIES AMPLIFIERS*

For Orders and Quotes Call Toll Free: 800-336-4799
In New England (except NH) Call 800-237-0047 In Virginia Call 800-572-4201

ege, inc.

CIRCLE 133 ON READER SERVICE CARD

Dynamite Discovery

Communications Specialists' latest excavation brings to light yet another dynamite discovery—our new dip switch programmable SD-1000. No need to tunnel your way through Two-Tone Sequential decoding anymore. We've mined this amazing unit! Now, for the first time, you can stock one unit that will decode all calls in a 1000-call paging system with ±.2Hz crystal accuracy. The EEPROM onboard memory can even be programmed for custom tones, and every unit includes group call. Universal switched outputs control your call light, squelch gate and horn. The SD-1000 can also generate CTCSS and decode Two-Tone Sequential. Its miniature size of 2.0″ x 1.25″ x .4″ is no minor fact either, as it's a flawless companion for our PE-1000 Paging Encoder. We ensure one-day delivery and our one-year standard warranty. Tap the rich vein of Communications Specialists and unearth the SD-1000 or other fine gems.

$59.95 each

MasterCard VISA

COMMUNICATIONS SPECIALISTS, INC.
426 West Taft Avenue • Orange, CA 92665-4296
Local (714) 998-3021 • FAX (714) 974-3420
Entire U.S.A. 1-800-854-0547

CIRCLE 10 ON READER SERVICE CARD

should be enclosed in either an insulated plastic cabinet or a grounded metal one.

If you want to use your computer cassette relay for control, connect the relay to ground and point A. The pull-up resistor at A normally keeps Q1 ON so that point B is LOW and the relay stays in the normally closed condition. Pulling point A to ground by activating the computer relay (a MOTOR ON command with the Color Computer, for example) will turn Q1 OFF; B will go HIGH and the relay will pull in, activating the load—usually the tape recorder.

The diode across the relay coil can be virtually any silicon type (rectifier, etc.) and is used to suppress the voltage spike that develops when K1 is deactivated. If you would like to switch the system ON with an active TTL LOW, simply connect to point A. If you want to switch ON with a TTL HIGH, leave out Q1 and the resistor to A and connect to point B.

Multiple Events

If you have taken the big jump from having your computer print out on/off times to actually doing the job, you are well on your way to multi-event capability. Since the computer has already done the orbital predictions for a single day, there is no reason why, once recording for a specific day is complete, it can't jump to the next day and repeat the process.

The only limit to the number of passes you can record in this way is the capacity of your tape system. Add some I/O control to switch frequencies and the ability to keep track of more than one spacecraft at a time and suddenly you can be up to your elbows in satellite pictures at the end of a day, let alone a week!

That kind of capability can also be had with even less effort and without dedicating a computer to the task if you desire. Let's go back to the basic single-event timer and see what can be done to get additional pictures.

A single-event timing system can obviously be set to capture a range of pictures if you set it to go on at a time just prior to a sequence of images and off just after the end of a sequence. Although such an approach will produce good results with something like the block of 1800Z prime IR and visible-light images each day from GOES, fully half the tape or more would represent the dead carrier intervals between picture transmissions.

Date	01 June 1987	
Spacecraft	NOAA-9	NOAA-10
Orbit Number	12704	3645
Eq. Crossing Time (UTC)	0000.19	0039.27
Longitude Asc. Node (Deg. W.)	132.84	76.32
Nodal Period (Min.)	102.0638	101.2979
Frequency (MHz)	137.62	137.50

These orbital parameters are projected two months in advance due to deadline considerations. Accumulated errors due to uncompensated orbital decay and other anomalies result in expectation of errors up to two minutes and possibly as many degrees in terms of the crossing data and possible small changes in the indicated period. Users requiring precision tracking data should rely on more current sources.

Table 1. TIROS/NOAA orbital predict data.

These tape-wasting "gaps" can be eliminated by adding a tone-detector circuit to the system as shown in Fig. 2. The actual tone detector is a 567 PLL chip used in virtually all touchtone™ decoder circuits and also in timebase circuits.

The vco control is adjusted with a sample of the satellite subcarrier signal at point S. Set the control for the steadiest possible ON indication of the LED indicator—a point somewhere near midrange on the pot. The LOW at pin 8 of the 567 could be used to trigger the control circuit of Fig. 1 directly and thus cause the recorder system to come on whenever a satellite subcarrier was present, but this would present some practical problems.

Momentary interruptions in the subcarrier signals (such as typically occur right after the start tone in the case of WEFAX weather charts), extremes of subcarrier modulation, or temporary losses of signal due to a fade or interference in the case of polar orbit operation would cause unnecessary cycling of the recorder. To eliminate this problem, a 555 is wired as a missing pulse detector with a time delay determined by the value of RT.

For WEFAX, where loss of the subcarrier will be rare and of short duration, a time delay of about 5 seconds will suffice. Polar-orbit operations require a longer delay—about 30 seconds being useful in practice. Values for 5- and 30-second delays are shown in the schematic.

The 555 will trigger the recorder control relay whenever the tone detector line (pin 8) of the 567 goes LOW and will keep the recorder activated as long as the tone detector line does not stay HIGH for *longer* than the delay value established by RT. Simply connect point B of Fig. 2 to point B of Fig. 1 to control the relay circuit with the 555 output. Q1 and the resistor to point A can be left out of the Fig. 1 circuit for this application.

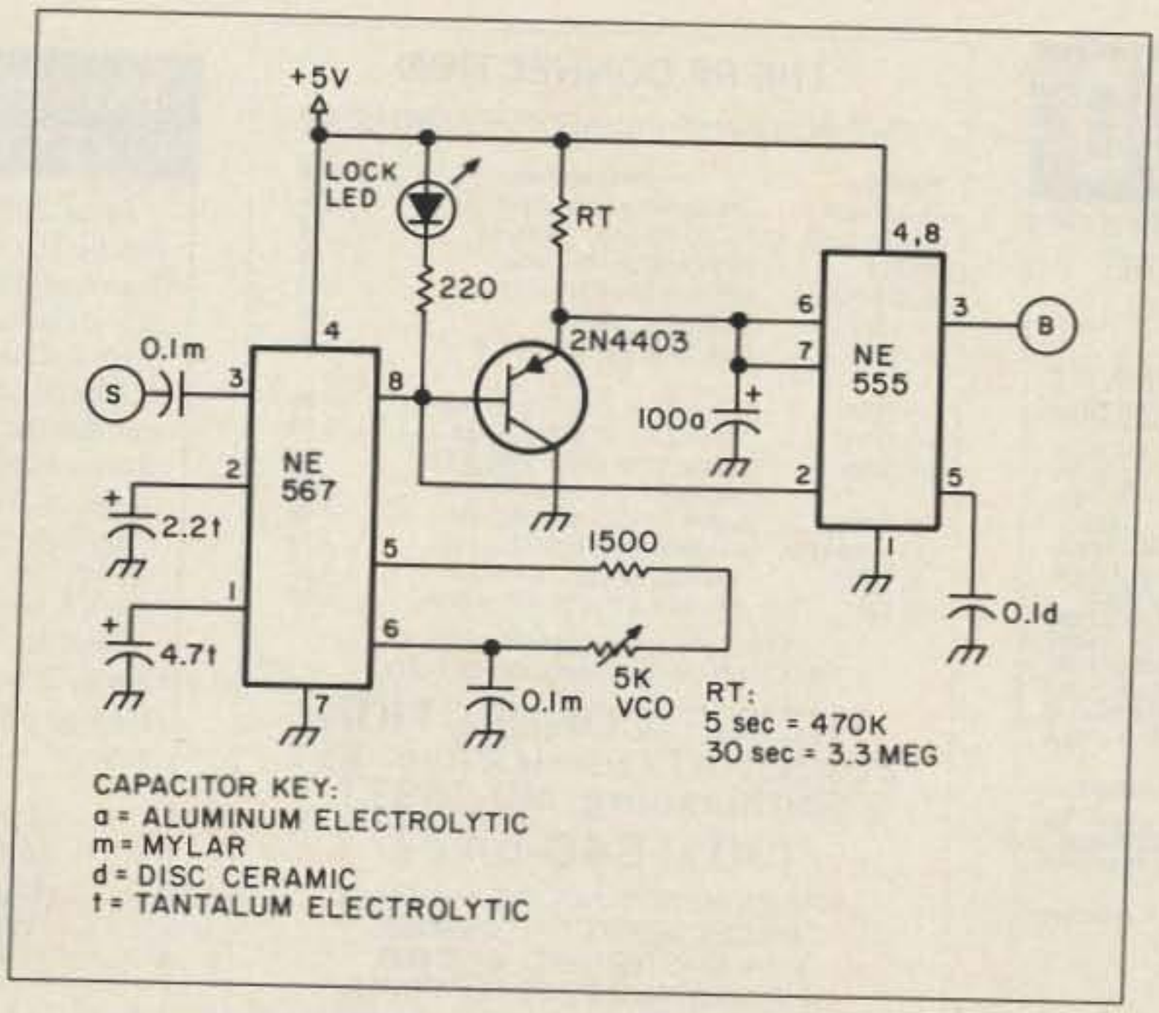


Fig. 2. Tone decoder/delay.

Loss of subcarrier lock shorter than 5 seconds for WEFAX or 30 seconds for polar orbiters will not cause the recorder to shut down. Your basic digital timer can be used to control power to the tone detector/delay circuit and, if set for a block of WEFAX frames, will enable all frames to be recorded. The only blank tape will be the 5-second delay following the end of each WEFAX transmission!

The use of the relay circuit with polar orbiters is equally flexible. If you have worked at all with tracking programs like the *WSH* PREDICT program, you realize that for any particular spacecraft there is a pair of "best pass windows" representing approximately one hour on either side of the time for a nominal overhead pass.

If NOAA 9 passes overhead at approximately 3 p.m. local time, the best pass "window" will extend from 2 p.m. until 4 p.m. If the digital timer is set to activate the relay circuit, the best pass of the afternoon will be recorded without your having to know exactly when it will occur!

If your receiver is a scanner, simply set it to cycle through all the potentially useful channels and widen the recording "window" to anything you want. Nothing will happen if a channel temporarily locks up with intermod or other interference, but should the system lock on a valid satellite signal, the tone relay circuit will cause it to be recorded. You will get bits and pieces of marginal passes with this approach, but you will also get the prime passes of any spacecraft your system can receive!

You will want to set the squelch control carefully so that it will not trigger too often in the absence of a signal, lest it latch up on an empty channel that happens to have a bit of rf garbage present, nor do you want it to close and start scanning when a signal *is* present. In any case, it is a simple approach that should net you lots of interesting daylight passes while you are away earning the money to pay for all of this!

For those of you with an adventurous spirit, you may want to use a tone decoder system like this to trigger the scanning on your system. With most scanners, the output of a noise amplifier is used to generate a control voltage such

that when the channel has minimal noise (outside of the audio passband), scanning will stop. If there is noise present (indicating an empty channel), the system will scan past that frequency.

There is no reason why the circuit in Fig. 2 cannot be modified to control the scanner based on the presence or absence of a 2,400-Hz tone! In this way, your system will seldom lock on intermod or other interference but will simply keep scanning until a valid satellite signal is present!

Although much of the previous discussion has focused on the operation of a tape-recording system, similar approaches can be used to control your imaging system directly. The *WSH* scan converter, for example, requires a valid 300-Hz start tone when in the automatic WEFAX mode.

If I want to display a particular frame in the daily schedule, I simply have to set up a timer to control the audio input to the system so that a signal is routed to the scan converter just prior to the frame of interest. The timer can then be used to break the audio connection when the frame is complete. The scan converter will hold the image until the input connection is either manually or automatically restored. A similar approach can be used for a FAX recorder that has provisions for automatic printing.

Picture of the Month

This month's image comes from a real live reader—in this case, Mr. Doyle Hauschulz N0AB of Sapello, New Mexico. Doyle has access to GOES TAP, a service where GOES products are distributed over high-grade landlines using 120-lpm FAX, and he printed this example of full disk IR imagery using the FAX circuit from the second edition of the *WSH* (essentially the same project is also in the current third edition).

Photo A. An example of full disk IR imagery using the FAX circuit from the second edition of the WSH.

My choice this month was based on three factors. First, Doyle did an excellent job in constructing the FAX recorder as evidenced by the quality of the reproduction. Secondly, most of us rarely get to see any of the formats used by GOES TAP, so take a gander at some full disk imagery! Finally, the image is educational, quite aside from the weather.

Note that the earth disc is stretched vertically. Doyle's drum is a bit too narrow to yield the correct aspect ratio with this service, so each line is a bit short, yielding the "stretched" appearance in the vertical axis.

This could be corrected by slowing the carriage drive motor or changing the threaded drive, but this would degrade vertical resolution due to overlapping lines unless a smaller stylus wire were used. The alternative is to use a drum with a larger diameter. That is the simplest alternative and the next item on Doyle's agenda!

As I noted with the opening column, I welcome such reader submissions, but I haven't been getting much from you folks. The pictures don't have to be perfect—just pretty or interesting. If they are both, I am almost certain to use them! I can't promise to use everything that I get, but it is certain I will never use what I don't get!

Note

References to the *WSH* refer to the third edition of the *Weather Satellite Handbook*, available from yours truly for $12.50 plus $1 shipping and handling in the U.S. and $2 elsewhere.■

HAMSATS

Andy MacAllister WA5ZIB
2310 Romayor Court
Pearland TX 77581

SOURCES OF INFORMATION

"Where can I find more information on the amateur satellite program?" In all the letters and phone calls I've received since starting this column in January, that question has been asked more times than any other.

Where *can* you find more information? In previous columns, I have mentioned *The Satellite Experimenter's Handbook* by Martin Davidoff K2UBC and the AMSAT nets on 75 and 20 meters. (See Table 1 for a current listing of AMSAT nets.) Now I'll tell you about various organizations, magazines, books, and computer bulletin board services, both on the air and via twisted pair, where you can find more in-depth information.

Organizations

AMSAT NA, the Radio Amateur Satellite Corporation of North America, is your best all-around organization for information on the satellite program. Membership is $24 per year here in the States and $26 overseas. You can write to AMSAT NA at PO Box 27, Washington DC 20044, or call (301)-589-6062 during business hours. Payment via MasterCard, VISA, or personal check is accepted. For those outside the U.S., drafts must be in American dollars drawn on a U.S. bank.

New members will receive the *Beginner's Guide*, a rather thick publication filled with data and information on setting up your station and how to find and communicate through the satellites. You will also receive a handout on Fuji-OSCAR 12, the latest trinket catalog, and a computer software availability listing from the AMSAT Software Exchange.

Members also receive the *Amateur Satellite Report* every two weeks. This newsletter incorporates material from the AMSAT nets, orbital predictions from NASA, and feature articles covering many topics of interest to both the newcomer and old hand alike. Overseas members can receive *ASR* via airmail if desired. Contact AMSAT NA for details.

While several membership services are available to anyone, members receive discounts on satellite-tracking software, can participate in achievement programs and receive AMSAT award certificates, and know that their membership fees help pay for new satellites.

Another stateside organization supporting the amateur satellite program is Project OSCAR of Los Altos, California. They publish the *JAS-1 Satellite Handbook* and the *Amateur Satellite Orbital Predictions* book. The first book is about 50 pages long and full of information on the Japanese hamsat program along with technical specifications on FO-12.

The orbital predictions book contains equator crossing data for UoSAT-OSCAR 9, UoSAT-OSCAR 11, Fuji-OSCAR 12, RS5, and RS7 for all of 1987. This data is quite useful if you are using manual satellite-tracking systems like the Oscarlocator package from the ARRL or the Satellipse from ZRO Technical Devices. Some of the older computer tracking programs also require this type of input.

The publications are $10 each from Project OSCAR, PO Box 1136, Los Altos CA 94023. They also carry a few software items by James Miller G3RUH that have been adapted for Commodore, Radio Shack, and IBM-PC computers.

Several organizations supporting the development of space satellites for amateur radio communication exist overseas. To simplify matters, I will not discuss those with publications written in languages other than English, though organizations like AMSAT-DL of West Germany provide much of the insight, funding, and drive behind hamsat activities.

A very prominent organization is AMSAT-UK. They are affiliated with the Radio Society of Great Britain and publish *OSCAR NEWS* bimonthly. It is the official journal of AMSAT-UK for all who use OSCAR satellites. To join AMSAT-UK, request a current application form from the Honorary Secretary, Ron J. C. Broadbent G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQW, England.

A minimum donation of £17.50 (about $29) is requested of overseas members. Getting a draft payable in foreign currency is usually quite easy from any major U.S. bank. Payments can also be accomplished by direct bank transfer. Ron can provide the details.

Net Description	Day	Time	Freq	Notes
International				
AMSAT International	Sunday	1900 UTC	14.282 MHZ	
AMSAT International	Sunday	1800 UTC	21.280	1
AMSAT South Pacific	Saturday	2200 UTC	14.282	2
National				
AMSAT UK	Sunday	1015 local	3.780	
AMSAT UK	Mon & Wed	1900 local	3.780	
SA AMSAT	Sunday	0900 UTC	14.280	
SA AMSAT	Sunday	0900 UTC	7.080	
AMSAT VK	Sunday	1000 UTC	3.685	3
Regional				
AMSAT NA East Coast 75 M	Wednesday	2000 EDT	3.840	
AMSAT NA Mid-America 75 M	Wednesday	2100 CDT	3.840	
AMSAT NA West Coast 75 M	Wednesday	2000 PDT	3.840	
Local				
USA				
Los Angeles 2 M	Wednesday	2000 local	144.144	
Los Angeles 2 M	Daily	0730 local	144.144	
AMSAT South Pacific/LA	Sunday	2200 UTC	144.144	4
Cent Cal OSCAR AMSAT Net	Tuesday	2000 local	147.150	5
East Coast 75 M/NYC	Tuesday	2000 local	144.280	6
Colorado AMSAT Net	Wednesday	0300 UTC	147.225	
Houston Area AMSAT Net	Tuesday	2200 local	145.450	7
Chicago Area AMSAT Net	Wednesday	1930 local	146.880	8
Miami Area AMSAT Net	Tuesday	2000 local	146.925	9
South Africa				
SA AMSAT	Sunday	0900 UTC	145.650	
UK				
England: Brighton Area	Sunday	1915 local	144.280	
Scotland: Paisley	Daily	0900 local	144.625	

Notes:
1. Net inactive. Reactivation when conditions improve.
2. This net may return to 21.280 MHZ as conditions dictate.
3. Back-up frequency is 7.064 MHZ.
4. Links to 443.525 MHZ, 146.655 MHZ and 223.720 MHZ.
5. Two-meter simulcast of HF net by W6SP.
6. Two-meter simulcast of HF net by WA2LQQ.
7. Back-up frequency is 146.700 MHZ.
8. PL 1B required for access.
9. Rebroadcast of East Coast 75 M net.

Table 1. AMSAT information services worldwide—voice nets.

AMSAT-UK has many items, computer programs, books, and circuit boards for various projects available to members. Prices on these items are 25 percent lower for members than for nonmembers.

From Down Under, AMSAT-Australia provides its members with a very informative newsletter, written by National AMSAT coordinator Graham Ratliff VK5AGR. Graham is also one of the ground control stations for AMSAT-OSCAR 10. Regular contributors to their publication include James G3RUH and Ian Ashley ZL1AOX, another prominent AO-10 ground-control station.

Subscription rates for us here in the States are $30 Australian (about $21.80) per year. Address all correspondence to AMSAT-Australia, GPO Box 1234, Adelaide 5001, Australia. One stateside ham who subscribes to *all* the overseas satellite-oriented publications places AMSAT-Australia at the top of his list.

One last organization that publishes an English newsletter is Southern Africa AMSAT. They have been instrumental in the development of some of the spacecraft antenna systems for Phase 3C. They have recently agreed to work on antenna designs for Housat 1, the first packet satellite under development in Houston, Texas, by the Packet Technology Satellite Experiment group.

Membership in SA AMSAT is 50 rands (about $25) per year for overseas members. Their address is SA AMSAT, PO Box 13273, Northmead 1511, Republic of South Africa. All exchange rates are approximate and subject to change.

Magazines

Obviously *73* gets top billing in this category. Satellite interest runs high among the editors and management of the magazine. I am hoping for an issue dedicated solely to the satellite program in the future. No further details are needed concerning *73* and the satellite program. Just keep on subscribing!

From the ARRL, we have four periodicals of interest to satellite fans. *QST* provides the column "Amateur Satellite Communications" by AMSAT NA President Vern "Rip" Riportella WA2LQQ.

The 1987 ARRL *Handbook* devotes an entire chapter to the amateur satellite program. This material is an improvement over

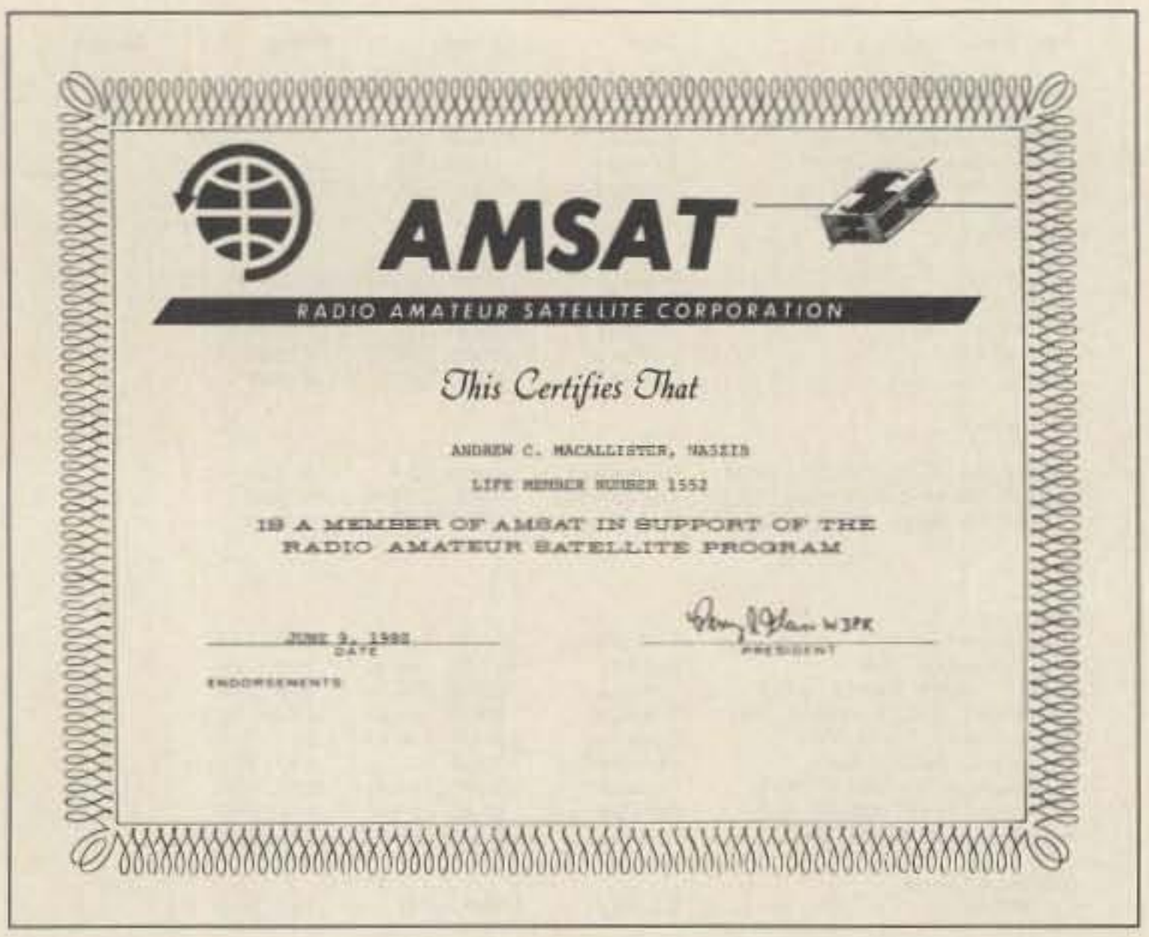


Fig. 1. AMSAT NA member certificate.

Fig. 2. AMSAT-UK member certificate.

the 1986 information. Much of the content is recent and includes pictures of some rigs that work well for satellite operation.

The ARRL also publishes *QEX*, which incorporates the ARRL Experimenters' Exchange and *AMSAT Satellite Journal*. Although the articles are rather technical, the material is thought-provoking and, at $8 per year for AMSAT or ARRL members, is not expensive.

The *ARRL Letter* is a biweekly publication that occasionally covers important hamsat news and events. It is available to ARRL members for $19.50 per year.

The Radio Society of Great Britain has a satellite column by Bob Phillips G4IQQ in its general-interest ham magazine, *Radio Communications*. Membership in the RSGB is $23 per year through the ARRL.

Another British publication with a lively satellite column is *Practical Wireless*. Pat Gowen G3IOR provides data on all facets of amateur satellite communications in his column. He also writes occasional feature articles to augment the column. Pat is a former Director of AMSAT NA and is active on every communications-type hamsat. Subscription rates are £15 (about $24) payable by bank draft to Practical Wireless. Mail to The Subscription Dept., Farndon Road, Market Harborough, Leics, England.

Other foreign magazines with regular amateur satellite contributors include *Amateur Radio* from the Wireless Institute of Australia, with VK5HI supplying the satellite information, and *Break-In* from New Zealand. Irving ZL1MO provides the input for them.

Virtually all ham radio magazines have carried articles on the amateur satellite program at one time or another. For those that do not support a regular column, it is easier and less expensive to check for good articles in library copies rather than trying to buy everything that hits the street.

Books

In addition to *Satellite Experimenter's Handbook*, published by the ARRL and available from AMSAT NA for $10, consider *The AMSAT-Phase III Satellite Operations Manual*. It was prepared by AMSAT NA and published by Project OSCAR. This document is loaded with figures, tables, tracking information, and even some computer program listings for Radio Shack and IBM-PC computers. As a "cookbook," it is a useful tool for the serious satellite enthusiast as well as for the newcomer. AMSAT NA has this volume for $15.

Two older books worth looking for include *OSCAR: The Ham Radio Satellites* by Dave Ingram K4TWJ and *OSCAR Amateur Radio Satellites* by Stratis Caramanolis. Although these two books were published before 1980, they provide excellent information on orbital mechanics and the basics of satellite communications for hams.

BBSs

Computer bulletin board systems provide AMSAT groups with a fast and accurate medium for information exchange. Dr. Bob Diersing N5AHD performed the duties of system operator on his hamsat-oriented system for some years. Today AMSAT Vice-President of Operations Ralph Wallio WØRPK keeps the information up-to-date from Iowa with an open BBS at (515)-961-3325. Its purpose is to inform AMSAT members of the latest news items concerning the amateur satellite program.

Another CBBS in Texas is run by Jeff N5ITU at (214)-340-5850. AMSAT NA is currently compiling a list of packet radio bulletin boards that regularly carry AMSAT News Service bulletins. Watch this column for the listing when it is completed.

The amateur radio satellite program is not a secret. The information is out there waiting for you. Pick up a few books and publications for those moments when the bands are quiet and watch this space in the months to come!■

WE STOCK:

AEA, ALINCO, AMP SUPPLY CO., ARRL PUBLICATIONS, ASTRON, B & W, BENCHER, BUTTERNUT, CONNECT SYSTEMS, DEHLI TOWERS, DIAWA, HEIL, HUSTLER, ICOM, KANTRONICS, KENPRO, KLM, LARSEN, MFJ, MINI PRODUCTS, MIRAGE, MOSLEY, NYE VIKING, SOMMER, SONY, SPIDER ANTENNAS, TEN-TEC, TELEX HY-GAIN, TRYLON, WSE DOCKING BOOSTER, YAESU.

UPS SERVICE TO THE US MARKET

COM-WEST RADIO SYSTEMS

8179 Main Street
Vancouver, BC Canada V5X 3L2

(604) 321-1833

Credit Allowed For Toll Calls

CIRCLE 149 ON READER SERVICE CARD

* * NEW * *

"I learned all of my code and theory while driving to and from work, it was easy."

If you don't have time to read books & take notes at home for the theory exams or spend hours copying code practice you can learn them by simply listening at your leisure. You will learn not only the exact questions and answers on your test but the **detailed theory** behind each one. You will thoroughly understand what you are being asked and why the answer is correct.

New Novice, New Technician/General, Advanced, Extra.

Theory courses on audio cassettes. $19.95 ea.

Learn code non stop all the way from scratch through Novice to Extra class speed (0 to 23 words per minute) with one course. Code is learned at a high rate with wide spacing between characters. A completely structured course which will take you in easy steps to your license class speed. Simply listen at your leisure.

Code course on audio cassettes. $19.95

VEC type code General or Extra Exam tape C90 $7.95 ea.

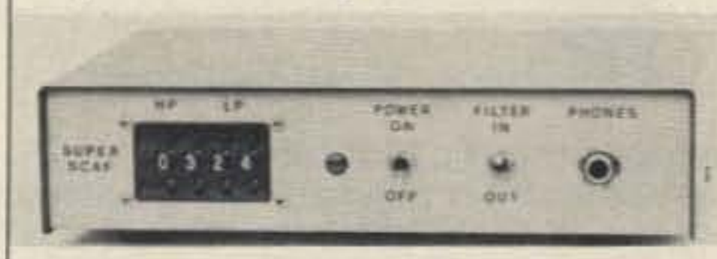
Shipping 3.00 per theory or code course, Exam tapes $1.00. Check, MO, Visa or MC. Courses shipped same day received.

AMATEUR RADIO SCHOOL KB6MT
Jerry Ziliak KB6MT (7 years instructing students)
2350 Rosalia Drive, Dept. B, Fullerton, CA 92635
(714) 990-8442

CIRCLE 288 ON READER SERVICE CARD

• SUPERSCAF •

(A Switched-Capacitor Audio Filter)



SuperSCAF is a versatile switched-capacitor filter for eliminating interference and noise on CW, SSB, RTTY, AMTOR, PACKET and other narrow band modes. Extremely steep filter skirts remove adjacent clutter and noise to enhance weak signal reception and greatly increase intelligibility and listening comfort.

SuperSCAF incorporates a switched-capacitor bandpass filter, an economical implementation of digital filter technology. Extreme sharpness, stability, accuracy and complete freedom from ringing characterize this design approach. Bandwidth is adjustable from a minimum of 30 Hz to a maximum of 3700 Hz, allowing optimum passband tailoring under widely varying conditions. Skirt slope is 150 dB per octave (about twice as steep as a good crystal filter), and stopband attenuation is at least 51 dB. SuperSCAF is connected via the receiver's speaker or headphone output and provides 1.5 Watts to drive a 3.2 to 8 Ohm speaker. SuperSCAF operates from 105 to 130 VAC.

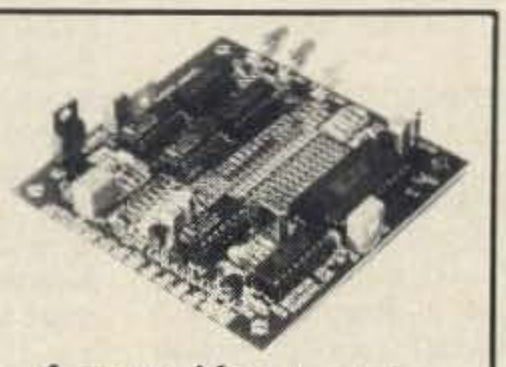
SuperSCAF is available as an easy to assemble kit. No adjustments, calibration, or test equipment are required. The kit can be completed by most builders in one or two evenings. SuperSCAF is available for $129.95 plus $7.00 shipping and handling. Order from AFtronics, Inc., PO Box 785, Longwood, FL 32752-0785. Florida residents should include state sales tax.

AFTRONICS, INC.
P.O. BOX 785
LONGWOOD, FLA 32752-0785

CIRCLE 251 ON READER SERVICE CARD

AUTO-KALL AK-4

THE ALL-IN-ONE DTMF DECODER



- SELECTIVE CALLING MODE: 2, 3 or 4 digit personal-call, group/all-call: call up all units and up to 15 groups, each AK-4 can respond to **any or all group calls** • Latched group call output • LED personal-call, group-call and power indicators • Variable timed output can be used with on-board relay to turn on a speaker.
- REMOTE CONTROL MODE: Locking/unlocking code can be programmed with different first digits, i.e. * 123 to unlock, #123 to lock • 2 independently setable/resetable latched outputs • 2 momentary outputs • **On-Board SPDT Relay** can be used with any output • High quality XTAL controlled decoder chip • Anti-falsing wrong number reset circuitry • Low power CMOS chips

AK-4W - Wired/Tested Boards - **$89.95** *(Plus $2.00 Shipping/Handling)*
AK-4K - PCB Kits **69.95** *(Plus $2.00 Shipping/Handling)*
AK-4H - Hardware Kit **29.95** *(Plus $2.00 Shipping/Handling)*
(Hardware: enclosure, speaker, spacers, switches, jacks, LED holders)

NET-KALL NK-1 THE ECONOMY DTMF DECODER

Call all units and up to 15 individual groups. When triggered, output turns on for .5 to 2.5 seconds to drive buzzer, horn, relay, etc., or can stay on until manually reset.

NK-1W - Wired/Tested Boards - **$49.95** *(Plus $2.00 Shipping/Handling)*
NK-1K - PCB Kits **39.95** *(Plus $2.00 Shipping/Handling)*

NEW! AUTO KALL AK-4

MOTRON ELECTRONICS
695 W. 21st Avenue
Eugene, Oregon 97405
Tel: (503) 687-2118
TLX: 650-3157002 MCI
VISA / Master Card / Check / COD

CIRCLE 127 ON READER SERVICE CARD

CIE Cleveland Institute of Electronics

Accredited Member National Home Study Council

CIE is the world's largest independent study electronics school. We offer ten courses covering basic electronics to advanced digital and microprocessor technology. An Associate in Applied Science in Electronics Engineering Technology is also offered.

Study at home — no classes. Programs accredited and eligible for VA benefits.

CIE Cleveland Institute of Electronics
1776 East 17th St., Cleveland, Ohio 44114

YES! I want to get started. Send me my CIE school catalog including details about the Associate Degree program.

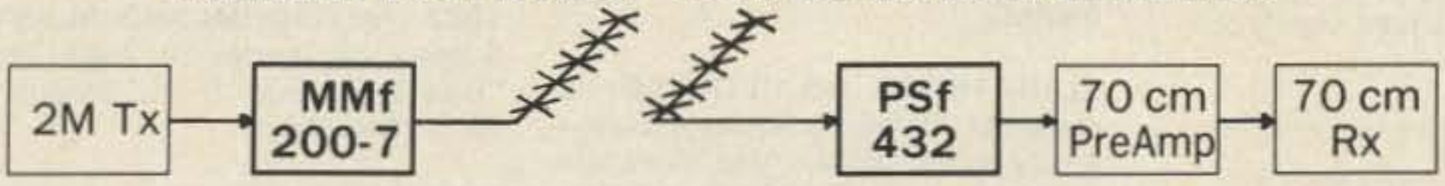
Print Name _____
Address _____ Apt. _____
City _____ State _____ Zip _____
Age _____ Area Code/Phone No. _____
Check box for G.I. Bulletin on Educational Benefits
☐ Veteran ☐ Active Duty MAIL TODAY!

AAR78

CIRCLE 157 ON READER SERVICE CARD

OSCAR MODE-J FILTERS

PREVENT DESENSE OF YOUR DOWN-LINK RECEIVER



MMf200-7 (usually sufficient)	$50.00	PSf432 (for extra protection)	$90.00
I.L. @ 145 MHz	0.5dB	I.L. @ 435 MHz	0.1 dB
Loss @ 435 MHz	40 dB min	Loss @ 145 MHz	70 dB typ

Send 66 ¢ (3 stamps) for detailed specs on all VHF & UHF products. Shipping FOB Concord, MA

SI SPECTRUM INTERNATIONAL INC. **(617) 263-2145**
P.O. Box 1084S, Concord, MA 01742, USA

CIRCLE 183 ON READER SERVICE CARD

BARTER 'N' BUY

MILITARY TECHNICAL MANUALS for old and obsolete equipment. 80-page catalog, $5. Military Technical Manual Service, 2266 Senasac Ave., Long Beach CA 90815. BNB045

MARINE RADIO: Marconi Canada CH-125 synthesized AM/SSB transceiver, 22 channels on 4, 8, and 12 MHz, 125 Watts, 12 V dc. Never used, list $1,995, asking $1,495. Stu Norwood, 70 Rte. 202 North, Peterborough NH 03458. BNB047

QSLs to order. Variety of styles, colors, card stock. W4BPD QSLs, PO Drawer DX, Cordova SC 29039. BNB260

THE DX'ERS MAGAZINE. Up-to-date, informative, interesting. Compiled and edited by Gus Browning W4BPD, DXCC Honor Roll Certificate 2–4. Send for *free* sample and subscription information today. PO Drawer DX, Cordova SC 29039. BNB261

RADIO TRANSCRIPTION DISCS WANTED. Any size, speed. W7FIZ—WG, Box 724, Redmond WA 98073-0724. BNB347

XEROX MEMORYWRITER—parts, assemblies, boards, manuals. Free help with service problems. W6NTH, Box 250, Benton AR 72015; (501)-776-0920. BNB404

HAM TRADER YELLOW SHEETS, in our 24th year. Buy, swap, sell ham-radio gear. Published twice a month. Ads quickly circulate—no long wait for results. SASE for sample copy. $12 for one year (24 issues). PO Box 2057, Glen Ellyn IL 60138-2057. BNB412

QSL CARDS—Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSLs, Dept. A, 310 Commercial, Emporia KS 66801. BNB434

YAESU OWNERS—Hundreds of modifications and improvements for your rig. Select the best from 14 years of genuine top-rated Fox-Tango Newsletters by using our new 32-page Cumulative Index. Only $5 postpaid (cash or check) with $4 rebate certificate creditable toward newsletter purchases. Includes famous Fox-Tango Filter and Accessories Lists. Milt Lowens N4ML (Editor), Box 15944, W. Palm Beach FL 33416; (305)-683-9587. BNB448

TOWER CLIMBING SAFETY BELTS and accessories. Free specs. Avatar Magnets W9JVF, 1147 N. Emerson #7, Indianapolis IN 46219-2929. BNB458

FIND OUT what else you can hear on your general-coverage transceiver or receiver. Join a shortwave radio listening club. Complete information on major North American clubs and sample newsletter $1. Association of North American Radio Clubs, PO Box 462, Northfield MN 55057. BNB464

WANTED: Old Western Electric, RCA, Telefunken, McIntosh, Marantz, Dynaco, Tannoy, Altec—tubes, amplifiers, speakers. Maury Corb, 11122 Atwell, Houston TX 77096; (713)-728-4343. BNB479

LEARN CODE on your IBM PC (or compatible), Commodore C-64/128, or Macintosh. CODE-PRO takes you from no knowledge to proficient copy. Specify computer. $10 plus $2 s&h. Trio Technology, Dept. 861, PO Box 402, Palm Bay FL 32906. BNB490

SIGNAL GENERATORS: HP606A, 50 kHz through 65 MHz $375; HP608C, 10 MHz through 480 MHz $345; TS-510A/U, 10 MHz through 420 MHz, military version of HP608D $295; URM-25D, 10 kHz through 50 MHz $245; URM-26A, 4 MHz through 405 MHz $245; HP616B, 1.8 GHz through 4.2 GHz $375; HP618B, 3.8 GHz through 7.6 GHz $375; SG-13/U aircraft VOR/ILS, range 108 MHz through 135.9 MHz and 329.9 MHz through 335 MHz, operates from 28 V dc at 3-1/2 Amps bench power supply or aircraft battery, ideal for aircraft radio repair $285. All lab calibrated, satisfaction guaranteed, have quantity. VISA, M/C, or check. Add shipping. Phone Bill Slep (704)-524-7519, Slep Electronics Company, Highway 441, Otto NC 28763. BNB494

POST CARD QSL KIT—Converts post cards, photos to QSLs! Stamp brings circular. K-K Labels, PO Box 412, Troy NY 12181-0412. BNB498

CODE PROGRAMS. APPLE/C-64. 37 modes, graphics, menus, wrdprcsr, etc. Write: LARESCO, POB 2018, 1200 Ring Road, Calumet City IL 60409; (312)-891-3279. BNB507

HOME-BREW PROJECTS LIST. SASE WB2EUF, PO Box 708, East Hampton NY 11937. BNB509

VIDEOCIPHER DESCRAMBLING MANUAL—115 pp.—$27.45 ppd. Oak Orion—77 pp.—$22.45 ppd. Satellite catalog $2. Microtronics, PO Box 2517-L, Covina CA 91722. BNB513

SUPERFAST MORSE CODE SUPEREASY. Subliminal cassette. $10. Amazing mnemonics: Learn Morse code in 1 hour; Q signals supereasy; Novice written exam supereasy! $5 each. Money-back guarantee. Bahr, Dept. 73-2, 2549 Temple, Palm Bay FL 32905. BNB517

DX AWARDS. Need info on any DX awards, especially lesser known ones. Check incoming cards for stickers or award notices. Directory planned for mid-1987. Ted Melinosky K2BV, 525 Foster Street, South Windsor CT 06074-2936. BNB526

COMMODORE CUSTOM/PROPRIETARY CHIPS for the Commodore 64/128 etc., etc. Low prices: 6526/6510—$9.95, 6581—$12.85, 6567—$14.75, 82S100/PLA—$12.85, 8701—$7.25, and many, many others. Ask about user group/quantity pricing . . . Just released from Australia, "The Commodore Diagnostician," a laminated chart for diagnosing faulty ICs. $6.95 p.p. . . . . HD Power Supply for the C-64 $29.95 . . . Want us to fix your computer? We will send Federal Express the same day you call, pay for return postage, fix your computer within 72 hours for a low flat rate of $59.95 . . . Call toll free (800)-642-7634 (outside NY) or (914)-356-3131; Kasara Microsystems, Inc., 33 Murray Hill Drive, Spring Valley NY 10977. BNB529

QSLs, QSLs, RUSPRINT QSLs. Quantities of 100, 200, 300, or more. Full color Old Glory and cartoon. Also Parchment, Golden Eagle, and others. SASE appreciated. Rusprint, Rte. 1, Box 363-73, Spring Hill KS 66083. BNB532

YOUR TICKET OR UPGRADE via computer. Complete Novice course—theory, code, QSOs, more. Complete code course—Novice, General, Extra. For IBM, Radio Shack, Commodore. Also great for examiners. SASE for details: JERLS, Incorporated, PO Box 1193S, Bedford VA 24523. BNB541

SAVE $1.50 SHIPPING on 87–88 ARRL *Repeater Directory*. Send $5 total. All ARRL titles available for book price plus $1 shipping. Marshall Hill Enterprises, Inc., Marshall Hill, Bradford NH 03221. BNB548

FACTORY FRESH NiCds. Rebuild your old packs. AA/$1.45 each. AAA/$1.45 each. 2N 270AA w/tabs (replaces 2N 250AA in ICOM 2AT/4AT BP3 packs) $1.85 each. Pack of 7 2N 270AA wired for your BP3 case $14.95 each. 2N 450A w/tabs (used in ICOM BP2/BP5, Tempo S4, Yaesu FT-207R/208R) $2.40 each. Sub C w/tabs $2.60 each. Add $2 S&H/order. Cunard Associates, R.D. 6, Box 104, Bedford PA 15522. BNB557

HAM RADIO REPAIR, all makes, all models. Robert Hall Electronics, PO Box 8363, San Francisco CA 94128; (408)-729-8200. BNB558

NEW, UNIQUE LOGGING AND CONTEST PROGRAMS for the Commodore C-128. Fast, generalized sort and print. SASE for description; $24.95 for the package. Dave Kirk KY3J, 1914 Yardley Road, Yardley PA 19067. BNB559

NJ—NJ—NJ—NJ—NJ—NJ—NJ—NJ—FINALLY!! A ham—SWL—CB—scanner store in N.J. Discount grand opening prices. Top performing radio systems for every budget. New 10-meter and VHF/UHF rigs. Antenna Specialists, ARRL, Astatic, Azden, B&W, Belden, Bilal, Butternut, Clear Channel, Daiwa, Diamond, Kenpro, Kenwood, KLM, Larsen, Mirage, Nye, Santec, Sanyo, THL, Yaesu, Welz, much more. Open M—F 10 a.m. –9 p.m., Sat. 10 a.m.–7 p.m. Have qualified repair facility. Abaris Systems, 276 Oriental Pl., Lyndhurst NJ 07071; (201)-939-0015. BNB560

HEATH 10-MHZ SCOPE, all xistor, fact. assembled, IO-4530, $150; Motorola TU-576 rf generator for two-way FM, $100; Heath IG-57 TV sweep/marker gen. w/all cables, manual, etc. All transistor, xtal markers, $100; Motorola Motrac U41LHT-3400A w/extender, all cables, mike, head, etc. on 49 MHz, $50; Regency synthesized scanner, K-500, 40-ch. memory, like new, $125; aircraft scanner, $20; Ramsey D-1200 VOM, new in box, $15. All working in exc. cond. Add UPS. SASE for info. T. E. McLaughlin, PO Box 411, Mango FL 34262; (813)-681-9709 eve. only. BNB563

***73* MAGAZINE COMPLETE SET**, most in binders. Make offer for complete set or complete year. No individual months. K8WLP Estate. Stu Stephens K8SJ, 1407 Hollyrood, Sandusky OH 44870. BNB564

THE DX BULLETIN provides you with comprehensive, up-to-date DX information and much more. SASE or call for samples. Box 4233W, Santa Rosa CA 95402; (707)-523-1001. BNB565

1987 "BLOSSOMLAND BLAST" Sunday, September 20, 1987. Write "Blast," PO Box 175, St. Joseph MI 49085. BNB569

WANTED: Equipment and related items. The Radio Club of Junior High School 22 NYC, Inc., is a nonprofit organization, granted 501(c)(3) status by the IRS, incorporated under the laws of the state of New York with the goal of using the theme of ham radio to further and enhance the education of young people. Your property donation would be greatly appreciated and acknowledged with a receipt for your tax-deductible donation. Please con-

Barter 'N' Buy advertising must pertain to ham radio products or services.

☐ **Individual (noncommercial)** ..... **25¢ per word**

☐ **Commercial** ..... **60¢ per word**

Prepayment required. *Count only the words in the text. Your address is free. 73* cannot verify advertising claims and cannot be held responsible for claims made by the advertiser. Liability will be limited to making any necessary corrections in the next available issue. Please print clearly or type (double-spaced).

No discounts or commissions are available. Copy must be received in Peterborough by the fifth of the second month preceding the cover date. Make checks payable to *73* Magazine and send to: **Hope Currier, *73* Magazine, WGE Center, Peterborough NH 03458.**

tact WB2JKJ through the *Callbook* or telephone (516)-674-4072, 24 hours, seven days a week. Thank you! BNB571

SELL: Kenwood TS-930S w/AT and extra SSB filters $1,000, Alpha-76 $700, ICOM 701 $450. Call Paul W2JGQ (212)-564-6683. BNB572

WANTED: SSB/CW adapter for an ICOM IC-245, any condition; also, a TU-1 touchtone adapter for a Kenwood TR-2500; and finally, a PB-2062 tone-squelch unit for a Yaesu FT-207R. Rick NY7H, 3123 W. Marshall, Phoenix AZ 85017; (602)-973-8086. BNB573

QSL CARDS. Free samples. Cards printed on glossy white stock. Ken WA9HGE, 1075 W. 11th Street, Hobart IN 46342. BNB574

AZDEN PCS 5000 OWNERS: Let me convert your rig to cover 140.000–159.995. $35 complete. Money order or cashiers check. Ken Walker KA4WBR, Route 3 Box 97, Rocky Mount NC 27804. BNB575

LOOP ANTENNAS: Portable active RX loop antenna. Unique high performance design comes as a kit. Capable from 200 kHz to 28 MHz. For quick reply, specs, and order information, send $1 to Technikit, 69 Sutherland Road, Armadale VIC 3143, Australia. BNB576

CUSTOM LEATHER RADIO CASES for all makes of HTs/scanners. Free info. Alexander, Box 1556, Kitchener Ontario N2G 4P2 Canada. BNB577

WANTED: Collins 75-S1 T4 transformer part #662-0301-00. F. Burgess, 15318 Deerfield, East Detroit MI 48021. BNB578

WANTED—ICOM 2-A two-meter HT and accessories. Randy Grimes, PO Box 2101, Seffner FL 33584. BNB579

SPECIAL EVENTS

SEAWALL FESTIVAL
JUN 5–7

The Portsmouth ARC will operate W4POX from the *Lightship Portsmouth* at the Portsmouth Seawall Festival on June 5–7, from 1500–0200 UTC. Frequencies will be around 3.890, 7.230, and 14.290. For a special commemorative QSL, send your card and an SASE to W4POX, 2800 Greenwood Road, Chesapeake VA 23321. For a QSL and a large commemorative certificate, send your card and a 9" x 12" envelope with two units of first-class postage.

KITCHENER ONT
JUN 6

The Guelph and Kitchener-Waterloo ARCs will sponsor the 13th annual Central Ontario Amateur Radio Flea Market on June 6, from 8 a.m. to 2 p.m., at Bingeman Park, 1380 Victoria Street North, Kitchener, Ontario. General admission $3. Children 12 and under free. Tables $5 per 8-foot space. No outside vendors. For further information, call Ray Jennings VE3CZE at (519)-822-8342, Paul Modray VE3CHM at (519)-579-3057, or Eric Enns VE3BB at (519)-885-5216, or write to Guelph ARC, PO Box 1305, Guleph Ontario N1H 6N9 Canada or to Kitchener-Waterloo ARC, PO Box 812, Kitchener Ontario N2J 4C2 Canada.

PITTSBURG KS
JUN 6

The Pittsburg Repeater Organization, Inc., will hold its 1987 hamfest on June 6, from 10 a.m. to 5 p.m., in the Lincoln Park Pavilion, in Pittsburg, Kansas. Admission $5 for the first adult and $1 for each immediate family member over age 15. Free tables. Examinations 8–10 a.m. Talk-in on 146.34/.94. For further information, contact Ken Johnston KC0VZ, PO Box 1303, Pittsburg KS 66762.

GRAND RAPIDS MI
JUN 6

The Independent Repeater Association will sponsor its annual Hamfest on June 6, from 8 a.m. to 4 p.m., at the National Guard Armory, 44th Street, one half mile west of U.S. 131. Free tables for dealers and sellers. Talk-in on 147.165/.765. For table reservations, contact Independent Repeater Association, 562 92nd Street S.E., Bryon Center MI 49315; (616)-455-3915.

WENATCHEE WA
JUN 6–7

The Apple City Radio Club will hold a "Come Have a Picnic With Us Hamfest" on June 6 and 7 at Rocky Beach Dam, 7 miles north of Wenatchee on U.S. Highway 97. License exams given. For further information, contact Apple City RC, 1002 No. Surry Road, Wenatchee WA 98801.

OHIO WINE MONTH
JUN 6–7

The Wireless Institute of Northern Ohio (WINO), an organization sponsored by the Lake County ARA, will be on the air with a special-event station on June 6 and 7 to commemorate Ohio Wine Month. On Saturday evening, operation will be between 7 and 11 p.m. EDT (2300 to 0300 UTC) on 3.860 and 7.235. On Sunday, operation will be between 11 a.m. and 3 p.m. EDT (1500 to 1900 UTC) on 7.235 and 14.235. The station will be located at a winery in Madison, Ohio, and will use the call KO8O. A special 8-1/2 by 11 QSL certificate will be available from KO8O—WINO Weekend, 7126 Andover Drive, Mentor OH 44060. Send a legal-sized SASE.

ST. PAUL MN
JUN 6–7

The North Area Repeater Association will sponsor the upper midwest's largest swapfest and exposition for amateur radio operators on June 6 and 7 at the Minnesota State Fairgrounds in St. Paul, Minnesota. Call wide area repeaters .25/.85 or .16/.76 for directions. Admission $4 in advance, $5 at the fair. Amateur license exams will be given. For more information, dealer inquiries, or ticket order, contact Amateur Fair, PO Box 857, Hopkins MN 55343; (612)-566-4000.

BSA CAMP-O-RAMA
JUN 6–7

The Los Angeles Area Council of the Boy Scouts of America will host a Council-wide Camp-O-Rama on the campus of the California State University at Dominguez Hills on June 6–7. Commemorative station N6BSA will be manned by amateur radio clubs of the Los Angeles Council of Amateur Radio Clubs. Hours of operation will be from 1500 UTC on June 6 through 0200 UTC on June 7. Operation: HF phone—3.915, 7.255, 14.255, 21.350, 28.450; VHF phone—145.690, 223.500, 146.235/.835, 224.600; VHF packet—145.090, 146.745/.145. Special QSL cards will be available. QSL with an SASE to N6BSA, Boy Scout Camp-O-Rama, PO Box 5082, Torrance CA 90503; DO NOT use the *Callbook* address.

LOVELAND CO
JUN 6–7

The Northern Colorado ARC will present its 9th annual Superfest on June 6 and 7, at the Larimer County Fairgrounds in Loveland, Colorado. The event will be located in the McMillen Building, which is wheelchair-accessible. General admission is $3. Tables are $7.50 each in advance, $9 at the door, and include two chairs and an admission. License exams given. For hamfest reservations, contact Duff McRoberts NF0U, 1308 Ellen Place, Loveland CO 80537; (303)-669-3708.

PITTSBURGH PA
JUN 7

The 33rd annual Breeze Shooters Hamfest will be held on June 7, from 9 a.m. to 4 p.m., at the White Swan Amusement Park, PA Rte. 60 (Parkway West), near the Greater Pittsburgh International Airport. Free admission and flea market. 10-meter check-in on 29.000, 2-meter check-in on 146.52. Directions on 146.28/.88. Registration $2 each, 3 for $5, and 7 for $10. For further information and table reservations, please contact Bud Faulhaber N3DOS, 1059 Balmoral Drive, Pittsburgh PA 15237; (412)-366-5097.

AKRON OH
JUN 7

The 20th annual Goodyear Hamfest will be held on June 7, from 10 a.m. until 5 p.m., at Wingfoot Lake Park near Akron, Ohio. Family admission is $3 in advance and $4 at the gate. The outside flea market will be $2 per vehicle. A sheltered inside dealer area will be available at $5 per table (advance reservations suggested). Talk-in on 146.04/.64 until 1:30 p.m. For tickets and information, contact Don W. Rodgers WA8SXJ, 161 Hawkins Avenue, Akron OH 44313; (216)-864-3665.

MANASSAS VA
JUN 7

The Ole Virginia Hams will present the annual Manassas Hamfest on June 7, from 8 a.m. until 4 p.m., at the Prince William County Fairgrounds. General admission $4, children under 12 admitted free. Tailgating $5 per space in addition to general admission. Talk-in on 146.37/.97, 146.52. For exhibit space, call Joe Schatter K4FPT at (703)-368-8599 or Bob Zaepfel K4HJF at (703)-368-3763. For more information, write to Ole Virginia Hams ARC, PO Box 1255, Manassas VA 22110, or call John Gunsett KI4VP at (703)-361-5255 or Gene Roberts N4HFW at (703)-361-3983.

CHELSEA MI
JUN 7

The Chelsea Communication Club will sponsor the 10th annual Chelsea Swap 'N' Shop on June 7, from 8 a.m. until 1 p.m., at the Chelsea Fairgrounds in Chelsea, Michigan. Donation: $2.50 in advance, $3 at the gate. Table space: $8 per 8 feet. Trunk sale: $2 per space. Special handicap parking. Talk-in on 146.980. For more information, contact Robert Schantz, 416 Wilkinson Street, Chelsea MI 48118; (313)-475-1795.

HUMBOLDT TN
JUN 7

The Humboldt ARC will sponsor its annual hamfest on June 7, from 8 a.m. to 4 p.m., at Bailey Park, 22nd Avenue, Humboldt, Tennessee. Admission $1. Talk-in on .37/.97. For further information, contact Ed Holmes W4IGW, 501 N. 18th Avenue, Humboldt TN 38343; (901)-784-3490.

ERLANGER KY
JUN 7

The Northern Kentucky ARC announces "Ham-O-Rama '87" to be held on June 7, beginning at 8 a.m., at the Erlanger, Kentucky, Lions Park. Directions: I-75 to Exit 184B (Rte. 236 East). Go two miles to Dixie Highway (State Rtes. 25 and 42). Go south one mile to Sunset Avenue. Turn right on Sunset to end of street. Admission is $5, with children under 13 free. Extensive outside flea market area. Flea market spaces are $3 each (tables not provided). Major vendor space indoors is $10, with tables provided. Talk-in on 147.855/.255 or 147.975/.375. Contact WA4WNF, c/o NKARC, PO Box 281, Florence KY 41042; (606)-371-2255 for further information.

WASHINGTON DC
JUN 10–13

The Antique Radio Club of America (ARCA) will hold its 15th annual National Convention on June 10–13 at the Sheraton Hotel and Exhibition Center on Rte. 450 in New Carrollton, Maryland, 10 miles northeast of Washington, DC, off Exit 20B of the I-495 Capital Beltway. Organizers of this year's ARCA Convention are the Mid-Atlantic Antique Radio Club officers in Laurel, Maryland.

CUMBERLAND 200TH
JUN 12–14

The Mountain ARC will operate station W3YMW at the Western Maryland Railway station on June 12–14 as part of the annual Heritage Days Festival of Cumberland, Maryland, in celebration of the city's 200th anniversary. Operation will be in the lower end of the 75-, 40-, 20-, 15-, and 10-meter General phone bands. For a special steam train certificate, send QSL and SASE to Mountain ARC, PO Box 234, Cumberland MD 21502.

BROOKFIELD ZOO
JUN 13

The Chicago Suburban RA will operate its fourth annual special-event station, N9BAT, from the Brookfield Zoo in Brookfield, Illinois, on June 13, from 1500–2300 UTC, as part of the West Suburban Council BSA annual Scout-O-Rama. SSB—7.250 and 14.250. A 2-meter FM station will be operated on 146.55. CW operation is planned on the hour on 14.050 and on the half hour on 7.120. A special, full-color QSL card will be available from the Brookfield Zoo for a QSL and #10 business-sized SASE to N9BAT, Special Event, PO Box 88, Lyons IL 60534.

COEUR D'ALENE ID
JUN 13

The Kootenai ARS will present the N.W. 1st Fly-in Hamfest '87 on June 13, from 7 a.m. to 4 p.m., in the Avionics Building at the Coeur d'Alene, Idaho, Airport. Free admission. Table reservations by June 5 at no charge; walk-ins $5. Novice exams at 11 a.m. Talk-in on 146.38/.98 or 146.52. For table reservations, write to KARS, PO Box 5222, Coeur d'Alene ID 83814.

PARK RIDGE NJ
JUN 13

The Gilfer SWL Fest/Flea Market will be held on June 13 rain or shine. Shortwave only. Free admission to all visitors. Sellers: $3 (tailgating only, bring your own table). Reservation deadline: June 1. Location: Gilfer Shortwave, 52 Park Avenue, Park Ridge NJ 07656. For further information, please call (201)-391-7887.

GRANITE CITY IL
JUN 14

The Egyptian RC's "Egyptianfest" will be held on June 14 at the Egyptian Radio Club's Clubhouse and grounds. Tickets: $1 in advance, $2 each or three for $5 at the hamfest. Flea market space available on a first-come basis. $2 for a 10' wide space. VE testing from 10 a.m to 2 p.m.; walk-ins accepted. Talk-in on 146.16/.76 and .52. For advance tickets, write to Egyptian Radio Club, PO Box 562, Granite City IL 62040.

WILLOW SPRINGS IL
JUN 14

The Six Meter Club of Chicago, Inc., will hold its 30th annual Hamfest on June 14, beginning at 6 a.m., at Santa Fe Park, 91st and Wolf Road, Willow Springs, Illinois (southwest of downtown Chicago). Advance registration $3, $4 at the gate. Write to Mike Corbett K9ENZ, 606 South Fenton Avenue, Romeoville IL 60441 for advance tickets. Talk-in on 146.52 or .37/.97.

QUEENS NY
JUN 14

The Hall of Science ARC Hamfest will be held on June 14, from 9 a.m. to 3 p.m., at the New York Hall of Science parking lot in Flushing Meadow Park, 47-01-111 Street, Queens, New York. Donation: buyers $4, sellers $6 per space. Talk-in on 144.300, 223.600, and 445.225. For further information, call at night Steve Greenbaum WB2KDG at (718)-898-5599 or Arnie Schiffman WB2YXB at (718)-343-0172.

MONROE MI
JUN 14

The Monroe County Radio Communications Association Swap and Shop will be held on June 14, from 8 a.m. to 3 p.m., in Monroe, Michigan. Advanced sale tickets: $2.50, $3 at the gate. Trunk sales, $2 per space. Table space, 50¢ per foot. For tickets or space reservations, contact Elaine Wessel KA8RNK, PO Box 237, Monroe MI 48161; (313)-279-1571.

TERRE HAUTE IN
JUN 14

The 41st annual Wabash Valley ARA Hamfest will be held on June 14, beginning at 8 a.m., at the Vigo County Fairgrounds, in Terre Haute, Indiana, located on U.S. 41, 1/2 mile south of I-70. Advance tickets $2 or three for $5, or $3 at the gate. Children under 12 free. Free outdoor flea market; covered flea market, $3 for 12 x 12 space, some with ac; tables available on first-come basis. FCC exams at the Red Cross Building in Terre Haute; pre-registration only. Talk-in on 147.69/.09 or 146.52. For tickets and more information, send an SASE to WVARA Hamfest, PO Box 81, Terre Haute IN 47808.

DUNELLEN NJ
JUN 20

The Raritan Valley RC will hold its 16th annual hamfest on June 20, beginning at 8 a.m., at Columbia Park, in Dunellen, New Jersey. Sellers' spots are $5 for one space or $10 for multiple spaces; no tables supplied. Lookers pay $3 donation; spouse and children free. Talk-in on 146.025/.625 or 146.52. Advance tickets may be purchased from any club member. For further information, contact any club member or call Dave KA2TSM at (201)-763-4849 or Bill KD2XK at (201)-467-7342 (8 a.m. to 5 p.m.).

GRAND JUNCTION CO
JUN 20

The Grand Mesa Repeater Society will hold the eighth annual Western Slope Amateur Radio and Computer Swapfest on June 20, from 9 a.m. to 4 p.m., at the National Guard Armory, 482-28 Road, Grand Junction, Colorado. Admission is free and swap tables are $5 each. Amateur radio exams given. Talk-in on 146.22/.82 and 449.20. To reserve a swap table and for further information, send an SASE to Les Scott NV0F, 2105 Yellowstone Road, Grand Junction CO 81503 or call (303)-242-5296.

MANCHESTER NH
JUN 20

Fly in to New Hampshire's second largest amateur radio/electronics flea market to be held at the Manchester Municipal Airport on June 20, sponsored by the New Hampshire FM Association. Rain date: June 21. Starting time is 9 a.m. General admission is $1 per person; sellers, $5. Sellers should bring table or tailgate. Talk-in on 146.52. For further information about the flea market, contact Steve Morin WB1BXB at (603)-663-4019 or Dick Desrosiers W1KGZ, 173 Maplehurst Avenue, Manchester NH 03103; (603)-668-6868. All classes of amateur radio exams will be held at the main building of the airport—Ammon Terminal. Walk-ins accepted, but pre-registration is urged. Send Form 610 and check for $4.35 payable to ARRL/VEC to Tom AC1J, Pulpit Road, Bedford NH 03102.

BIG BRUTUS
JUN 20–21

The Wichita ARC will operate W0SOE on June 20 and 21 at the site of Big Brutus, the second largest coal shovel in the world, in Cherokee County, Kansas. Suggested frequencies: 3.875, 7.250, 14.250, and 21.325. Send QSL and SASE via Wichita ARC W0SOE, 707 N. Main, Wichita KS 67203.

FREDERICK MD
JUN 21

The Frederick ARC will hold its 10th annual Hamfest on June 21, from 8 a.m. to 4 p.m., at the Frederick Fairgrounds. Admission $3, tailgaters $2 extra. YLs and children free. Exhibitor tables: 1st table $10, each extra table $5 each. For additional information, write to Clyde C. Wachter, Jr. WB3KQV, 7317 Ridge Road, Frederick MD 21701.

STEVENS POINT WI
JUN 21

The Central Wisconsin Radio Amateurs, Ltd., will hold its 10th annual Swapfest/Family Picnic on June 21 at Bukolt Park in Stevens Point, Wisconsin. Tables and tailgate spaces will be $2.50, but admission will be free. FCC exams will be given at 9 a.m. at the Blue Top Supper Club. Pre-registrations will be greatly appreciated, but walk-ins will be accepted on a first-come, first-served basis. Talk-in on 146.385/.985, .07/.67. and .22/.82. For further information, contact Jim Benak KA9ACE, 1775 Strongs Avenue, Stevens Point WI 54481; (715)-344-5943. To pre-register, contact Joe Larson N9JW, 644 Portage Street, Stevens Point WI 54481; (715)-344-1182.

SANTA MARIA CA
JUN 21

The Satellite ARC will hold its annual Father's Day Swap-Fest on Father's Day, June 21, at Union Oil Company Newlove Picnic Ground, south of Santa Maria on U.S. 101. General admission is at 9 a.m. Admission is free. Tables are available. Talk-in on 145.14/144.54, 146.52, or 146.55. For tickets and information, write to Santa Maria Swap Fest, PO 5117, Vandenberg AFB CA 93437.

CROWN POINT IN
JUN 21

The Lake County, Indiana, ARC will hold its 15th annual Dad's Day Hamfest on June 21, beginning at 8 a.m., at the Lake County Fairgrounds in Crown Point, Indiana. All tickets $3. Talk-in on 147.60/.00 and 146.52. For further information, contact Ken Brown WD9HYF, 918 Chippewa Drive, Crown Point IN 46307.

WEST COAST JAMBOREE
JUN 22–26

The Inland Empire ARC of Rancho Cucamonga, California, will operate a special-event station on June 22–26 from 1700–0800 UTC in honor of the annual West Coast Jamboree, which hosts 18,000 members of the Girl Scouts of America in their campout at Glen Helen Regional Park in Devore, California. Operating frequencies will be in the General-class phone sections of the 75-, 40-, 20-, and 15-meter bands. The station will also operate in the new Novice and Technician portion of the 10-meter phone band. A commemorative certificate with the Girl Scout Official Emblem will be issued via WA6ZEF when accompanied by a QSL card and a size 10 SASE.

COBOURG 150TH
JUN 22–JUL 5

The Heritage ARC will use the special prefix VX3 from June 22 to July 5 to commemorate Cobourg's Sesquicentennial. Operation will take place in a section of the art gallery in historical Victoria Hall in Cobourg, Ontario. CW operation will be on 3.550, 14.050, and 21.025. SSB operation will be on 3.800, 14.143, 14.200, and 21.250. RTTY operation will be on 14.180. Two-meter operation will be on 146.550. Special QSL cards have been printed, and it is planned to exchange greetings with Coburg, Australia; Coburg, W. Germany; and Coburg, Oregon.

FORT 175TH
JUN 26–28

The Ottowa ARC will operate W8MCB from 1700 UTC on June 26 until 2300 UTC on June 28 to celebrate the 175th anniversary of the establishment of the Fort during the War of 1812. Operation will be in the General portion of 80, 40, and 20 meters. For a commemorative certificate, send QSL and SASE to Paul Baumgarte WD8RJR, RR #3, Box 341, Delphos OH 45833.

CORNELIA 100TH
JUL 4

The Southern Piedmont ARC will operate WD4NHW on July 4 in celebration of the centennial year of Cornelia, Georgia, Home of the Big Red Apple. Listen for operation in the 20-, 40-, and 80-meter bands. For a certificate, send your QSL card and a 9" x 12" SASE to SPARC, PO Box 52, Cornelia GA 30531.

RIVERBOAT DAYS
JUL 4

The Clinton ARC will operate station W0CS on July 4 to commemorate the Clinton, Iowa, Riverboat Days. Suggested frequencies: CW—3.720, 7.120, 21.120, and 28.120; phone—3.875, 7.275, 14.275, 21.375, and 28.400; 2-meter FM—146.460; 2-meter SSB—144.210. To receive a certificate, please send a #10 SASE to Darryl Petersen KD0PY, RR #1, Box 84, Bryant IA 52727.

FESTIVAL OF NATIONS
JUL 4

The Chatham Kent ARC will operate VE3CRC on July 4, from 1200–2200 UTC, to celebrate Chatham Ontario's Festival of Nations. Phone and CW on 80–10 meters, packet and phone on 2 meters. Certificates for a QSL card to Cliff Russell VE3NGG, R.R. #1, Chatham Ontario N7M 5J1.

ABOVE AND BEYOND

Peter H. Putman KT2B
3353 Fieldstone Drive
Doylestown PA 18901

NOVICE VHF/UHF

This month, I'll touch on some of the new privileges in the VHF and UHF spectrum for Novices. Of main concern are the subbands at 23 cm, where Novices will really find themselves above, beyond, and perhaps "way out" unless the current ARRL Band Plan for 23 cm is modified to take them into account.

At present, the Novice 23-cm allocation stretches from 1270 to 1295 MHz, stopping just short of where the majority of weak-signal work is to be heard. As far as the ARRL band plan goes, most of this segment is allocated for repeater inputs, wideband experimental modes, amateur television (ATV), and narrowband FM simplex work. Presently, 1294.50 is designated as the national FM simplex calling frequency.

According to this plan, narrow-bandwidth, weak-signal communications are to be found in the 1295–1297-MHz segment, just out of the Novice allocation. At present, the national CW and SSB calling frequency is 1296.100 MHz—again, out of the Novice allocation. This situation would seem to present a bit of a problem for the newly licensed Novice with a 1296 multimode radio or transverter. Who will he/she work to gain that valuable experience in weak-signal operation?

Now, let's look at it from the view of established 23-cm operators. Most weak-signal enthusiasts employ linear transverters, upconverting from either 144 MHz (most common) or 28 MHz (not as common). In the former, the local oscillator (LO) frequency is typically 96.000 MHz. This is multiplied 12 times to 1152 MHz, then combined with the intermediate frequency (i-f) of 144 MHz to result in a 1296-MHz signal. In receive, the process is reversed.

That means that an operator with a 2-meter multimode driving a transverter will be unable to transmit out-of-band (i.e., below 144 MHz) to gain the desired conversion frequency of 1294 MHz or so to work the new Novices. But the problem is easily solved, as simple math will show. Changing the LO to 95.8333 MHz will now result in a frequency conversion of 144 to 1294 MHz (95.8333 x 12 = 1150 + 144 = 1294 MHz)!

Now we've picked up the new subband and can still operate weak signals at 1296 MHz (down-converting to 146 MHz). A side benefit is that strong local 144-MHz signals won't "leak through" the transverter as images and be confused with 1296-MHz signals (this happens quite often during contests, especially in a multi-operator station).

The other benefits are obvious: Any 1296-MHz gear will easily cover 1294 to 1295 MHz, as it is a shift of less than .0025% in frequency. That means all existing equipment and antennas can readily be employed by the new Novice as well as the seasoned 23-cm operator. And that's a lot of stuff—loop yagis, conventional beams, power dividers, receive converters, and preamplifiers, just to name a few items.

Band Segment	Activity
1260.00–1288.00 MHz	As specified in the ARRL band plan
1288.00–1293.00 MHz	Wideband experimental, simplex ATV
1293.00–1294.00 MHz	Narrowband FM simplex, 25-kHz channels
1293.50 MHz	National simplex calling frequency
1294.00–1295.00 MHz	Weak-signal modes (SSB, CW—No FM)
1294.200 MHz	Novice weak-signal calling frequency
1295.00–1300 MHz	As specified in the ARRL band plan

Table 1. Suggested amendments to the 1985 ARRL band plan.

"I believe the framers of the ARRL 1.2-GHz band plan did not imagine a Novice allocation at 23 cm anytime in the near future."

Band Plan Needed

Okay, now we have a way to work those Novices during contests and activity nights. The next step is to change the band plan accordingly! The original ARRL band plan was drawn up long before Novice Enhancement became reality, and I believe the framers of that plan did not imagine a Novice allocation at 23 cm anytime in the near future. Guess what, folks—the future is now. And now is the best time to change the plan before the band becomes too congested to do otherwise.

Why all this emphasis on a band plan? Put yourself in the position of a Novice looking to purchase a 23-cm radio. Would you know where to look in all of your 25-MHz subband to find FM simplex? Repeaters? ATV operators? SSB? OSCAR inputs?

Think of the band plan as a road map. Having to scan through 600 possible FM channels on 2 meters to find a repeater near you or an active simplex channel is bad enough. Having to scan through over a thousand possible channels to find FM, SSB, or CW activity would take forever—especially considering the localized, point-to-point nature of most 23-cm communications.

So our new Novice will most likely turn to the band plan and operate the prescribed modes, as it seems the best way to contact somebody who is also likely to be on the same frequency in the same mode! Most band plans on lower VHF frequencies have come about largely by default. By that I mean that these plans merely recognized the operating standards and mode subbands already in place and made them official. But 23 cm is a different situation; it's still relatively unoccupied so that the flexibility is there.

All folks with a stake in 23 cm have a stake in the band plan as well. This includes manufacturers of transverters, transceivers, preamps, and antennas. It also includes the contesters who'd like to work a few more grid squares and prefixes during contests and those folks who sit on 1296.100 MHz every Thursday night calling CQ for hours on end.

With all of this in mind, I'd like to suggest the amendments to the 1985 ARRL band plan shown in Table 1. What is actually proposed here is to take away 1 MHz from the wideband experimental/ATV simplex allocation at 1288–1294 MHz and designate it for weak-signal work. This way, users of 144-MHz multimodes can select the 95.8333-MHz crystal option and extend their coverage to take in the newly created weak-signal subband. It would also allow Novices to use equipment and antennas currently on the market with no modifications or retuning.

I've been discussing this idea with some equipment manufacturers, and they agree that the idea makes sense. Those wanting to work the simplex activity on 1293 MHz could either add a separate FM transceiver (an approach used by 220-MHz weak-signal operators) or use a different conversion scheme in their transverters. Those with multimodes on 23 cm will, of course, have no difficulty at all in dialing around to find the activity.

Most importantly, such a plan will give Novices a taste of what it's like to make weak-signal UHF contacts—opportunities that do not exist for the Novice on 220 MHz. (The subband there all but precludes SSB and CW modes.) Such experience might be an incentive for the Novice to upgrade and explore such modes on 50, 144, 220, 432, and 902 MHz. Remember, with 5 Watts, good low-loss feedline, and 20–30-element yagis, contacts of more than 25–50 miles are indeed possible (and quite entertaining if multipath or enhanced propagation is present).

CONTESTS, CONTESTS

Yes, it's June again. Time for

Photo A. It's time to head for the hills again as summer VHF/UHF propagation arrives.

Photo B. The dog days of summer are not far away. "Crescent," the most famous quadruped in the VHF/UHF bands, prepares for the contest season.

the summer contest season! For those of you who can't see the appeal of a low-band contest, try your hand in one of these for a change: ARRL VHF QSO Party (June 12–13), *CQ* Worldwide VHF WPX Contest (July 17–18), ARRL August UHF Contest, and the ARRL September VHF QSO Party (September 12–13). Why should you? For one, it's an easy way to pick up a bunch of rare grid squares. Sporadic-E on 6 and 2 meters is nice. It's even better when it happens during a contest! With all of the strong Es openings the first few months of 1987, it looks as if 6 and 2 meters will be hopping in May, June, and July.

With the advent of the QRP class in the ARRL contests, all of the events now recognize the efforts of "the little guy"—the mountaintop operator or portable/mobile station who treks to a rare grid to make a few contacts with a 10- or 25-Watt multimode. (In the ARRL rules, QRP is 10 Watts or less. Under the *CQ* WW rules, QRP is 25 Watts or less.) Not only that, in the *CQ* contest, you can actually qualify under any of four categories on low power and if you win, get a nice trophy for your efforts.

I am one of the co-chairmen of the *CQ* VHF WPX committee. Recently we completed scoring and compiling the logs from last year. You'd be surprised to see how competitive some of the QRP stations can be. How about 286 contacts and 120 prefixes on 50, 144, 220, and 432 from Chicago? Or 329 contacts and 50 prefixes portable in Washington state? The fifth highest score from the 1 call area was a QRP operation! Other QRP stations were fifth in the 2 call area, first in the 3 call area, and second in the 6 call area. Not bad for under 25 Watts!

Of course, QRP operation is very popular in Europe, and we received many logs from Italy and Hungary where the average power used was between 10 and 25 Watts on 2 meters and/or 70 cm. Logs from Romania indicate an interest in QRP there as well, with virtually all of the equipment there being home-brew. Think about that as you spin the dial on your IC-271. On the higher bands, most gear is home-brew on 902, 1296, and 2304, with power levels in the .1-to-5-Watt range.

Admittedly, the range of equipment available for portable operation here in the U.S. is limited. You could take a mobile multimode out in your car or with a storage battery for a fair number of contacts. You could also decide to work FM only and use a hand-held with lots of spare batteries. Indeed, the *CQ* contest has an FM-only category, with this year's winner working 137 stations and 36 prefixes on three bands—144, 220, and 440 MHz. The equipment used consisted of three hand-helds and one mobile radio, powered by batteries from a nearby drive-up mountaintop.

Look for a review soon of a typical portable 2-meter mountaintop station, employing the Yaesu FT-290R MKII and Tonna 9-element portable 2-meter beam. The latter is a slick product in that NO tools are needed to assemble it, and only one wrench (8mm) is needed to attach it to a mast of some sort. I'll have used this combination from a nearby mountain during the ARRL 144-MHz Sprint in April, and you'll find out just how well the combination worked out. I'll also be trucking up another hill for the ARRL 50-MHz Sprint in May with a similar combination of Yaesu FT-690R MKII and Tonna 5-element 6-meter beam, and you'll see the results of that trip in a later issue.

In the meantime, I expect you'll be out there somewhere making contacts on at least one of these contest weekends. The contest periods are long enough so that you can take some time off as needed and mow the lawn, make a shopping trip, go swimming, or have a nice barbecue between operating periods. If you have a particularly interesting scheme for a portable setup, drop me a line and some pictures. We'll print them here and let others know about it! (The best one I've heard so far: an FM expedition up the World Trade Center for the *CQ* VHF WPX. That would be quite an interesting trip—might set the all-time FM-ONLY record!)

On The Road Again

By the way, our SCORE group (Society of Contest Operators and Radio Experimenters) has decided to activate a six-band station from Chincoteague Island, Virginia, in grid FM 27 for the June VHF QSO Party. We'll be active on 50, 144, 220, 432, 902, and 1296 MHz with about 100 Watts per band and single yagis. The entire setup will run from a van, and all antennas will be perched atop a custom-made tower trailer, using a TriEx W51 crank-up. We had decided that the grid was too quiet during contests, and conversations with other VHF/UHF types indicate that they would welcome the operation.

Look for us on the bands you need from 1400 EDT Saturday until 2300 EDT Sunday!

Addendum

Here are a couple more contests that might tickle your fancy. On June 19–21, the SMIRK 50-MHz Party will come alive. It starts at 1900 CDT Friday June 19 and runs until 1900 CDT Sunday June 21. Points are scored for contacts and grid squares (2 points per SMIRK member contact, 1 per non-SMIRK member). Certificates will be awarded in ARRL sections and foreign state, province, prefecture, or U.K. shire/county/region. For more information, contact Lisa Lowell KAØNNO, PO Box 547, Hugo CO 80821.

If 2 meters is your bag, how about the SWOT (Sidewinders On Two) Contest, which is being held the same weekend as the ARRL UHF Contest (August 1–3). This way, you can work two contests at once! It starts at 1900 UTC August 1 and ends 0400 UTC August 3, and only SSB or CW contacts are permitted. The exchange consists of callsigns, grids, and SWOT numbers. As in the SMIRK contest, contacts with SWOT members are worth 2 points each and with non-members 1 point each. Certificates are awarded for high score in each ARRL section. For more information, contact Jerome Doerrie K5IS, Rte. 2 Box 72, Booker TX 79005.

I've received some other mailings on contests, but the details were too sketchy to reprint here. If your club or organization is sponsoring such an event, be sure and drop me a line so I can get it into print quickly. Until then, see you Above and Beyond!■

NK6K > PACKET

Harold Price NK6K
1211 Ford Avenue
Redondo Beach CA 90278

CODED TRANSMISSIONS

So there I am, standing in line with my wife, waiting to have our "eight items or less" death-rayed by the monochromatic eye of the scanner at Ralphs, the local supermarket. We had all the makings of nachos: a bag of tortilla chips, a can of mild cheddar cheese dip, and a jar of Jalapeno peppers. The deal is, you put the chips in a bowl, heat the cheese and pour it over the chips, and then top it off with the peppers. Then you eat this amalgam until you break out in a sweat. This is also a good way to burn holes in your stomach, useful for people who are too lazy to earn their ulcers the old-fashioned way.

Anyway, the bar codes got scanned, the prices computed, the bill totaled; and then came the indication that Big Brother was alive and well and living in a PC in the basement of Ralphs. At the end of the receipt was this: "Ralphs offers you the coupons personalized for the people who use them: Save 20 cents on one pound of Velveeta Mexican Cheese, Hot or Mild."

Some Artificial Intelligence algorithm in a chunk of impure silicon had made an educated guess at what I could be enticed to purchase on my next trip. It's scary enough if the choice was made based on a single item, probably the nacho chips. It's even scarier if the deduction was based on matching two items, the regular cheese and the Jalapeno peppers. Velveeta Mexican is a combination of the two.

Because we paid by check (Californians never use cash; you can't tell where it's been), the computer now knows who we are, where we live, our phone number, and my wife's driver's license number. I have not been back to Ralphs for fear that I'll get a message on the next check saying, "Hey, you forgot your cheese."

Just as technology is taking over the supermarket, so it goes with packet radio. For some reason, packet strikes fear into the hearts of the FCC monitors up at the Belfast, Maine, monitoring station. Just before I started on this column, I got a copy of the NEPRA *PacketEar*, the newsletter of the New England Packet Radio Association. These guys have got the snazziest four-page monthly newsletter I've seen—nice layout, photos, lots of flash. Dave W1TMO is the editor. In the April issue was an article by Steve W1GOH about the citing of the WA1OJB BBS by the FCC for transmitting encrypted information via packet radio.

It seems that the WA1OJB BBS contained binary files that were encoded in such a way as to make them transferable through BBSs. When typed out, these files look like trash and are certainly not clear-text English. Part 97 has some unfriendly things to say about that sort of thing. There are several items worth discussing here.

Codes and Ciphers

First, I'll look at the parts of the rules that are causing the problems in Maine:

"97.117 Codes and Ciphers prohibited. The transmission by radio of messages in codes or ciphers in domestic and international communications to or between amateur stations is prohibited. All communications regardless of the type of emission employed shall be in plain language except that generally recognized abbreviations established by regulation or custom and usage are permissible as are any other abbreviations or signals where the intent is not to obscure the meaning but only to facilitate communications.

"97.69 Digital Communications. Subject to the special conditions contained [below], an amateur radio communication may include digital codes which represent alphanumeric characters, analogue measurements, or other information. These digital codes may be used for such communications as (but not limited to)...transference of computer programs or direct computer-to-computer communications ...provided that such digital codes are not intended to obscure the meaning of, but are only to facilitate, the communications."

What that all says is that you can't send anything where the intent is to keep other people from finding out what you're sending. Note that there is no requirement that a message, even in its original form, be plain-text English. Computer programs are allowed, as is any form of raw data. Other than that, you can encode the information in any manner you want to facilitate communications.

Unfortunately, there is little difference between "encrypting" a string of data and "facilitating" a string of data. The only difference is that in encryption the hope is that only the intended recipient can reverse the process; in a facilitated file, anyone should be able to do it. The requirement laid out by Part 97, then, is that facilitated data must be able to be converted back into its original form by anyone, and that the data in its original form must be legal for transmission over amateur radio.

"There are two reasons why amateurs need to encode data: to send binary files through forwarding BBSs and to compress data to send it faster."

Why Some Files Need To Be Facilitated

There are two basic reasons why data needs to be modified from its original form. One is when the data won't go through the network in an unaltered form (the transparency problem), the other is when you want to compress the data to make it pass through the network faster.

A problem that has been with us since there were computers is something called transparency. You usually want a transparent data path (i.e., the data is unmodified as it passes through the medium). Clear glass is transparent to visible light; light is unmodified as it passes though. Glazed glass, or the type of glass in bathroom shower doors, is not transparent, it is translucent; light passes, but the rays are bent or scattered.

In the world of computer networks, data paths are seldom transparent at their lowest level. Steps are taken to make the path appear to be transparent. This usually requires that the data be modified in some way. One of the least transparent data paths is the Baudot-based telex network. This network passes only about 64 different character codes, and all messages must be converted to uppercase characters.

On the other end of the scale is AX.25, which promises that user data will be transparent: You don't have to modify your data to send it through AX.25. The AX.25 protocol offers complete transparency to its users, but only at the expense of modifying the data as it is sent, behind the scenes. In the AX.25 protocol, this process is called bit-stuffing.

AX.25 sends user data in eight-bit bytes, allowing 256 user codes. AX.25 has a requirement, however, to identify the start of a frame of data. It could steal one of the 256 user codes as a start-of-frame flag, but then one code could not appear in the user data. This would make the protocol nontransparent, like a piece of stained glass that cuts out some frequencies of light.

AX.25 solves this problem by modifying the user's data; any time there are five consecutive one-bits in the user's data stream, a zero-bit is inserted. Once this is done, AX.25 can make unique characters by defining a string that has more than five one-bits. On the receiving side, if five one-bits are seen followed by a zero, the zero is removed.

This can be done because a zero is always added after five ones by the transmitter. Anything with more than five ones is a special AX.25 character. There are many other ways of doing this, but all of them involve defining a special sequence of bits or bytes and then modifying the user's data so that the special sequence is never present.

Using bit-stuffing, AX.25 looks to the user as if it is transparent, so theoretically, you could send transparent data through the network. In 1987, though, the majority of our "network" is built with a series of devices called "forwarding BBSs." These systems, described in earlier columns, are not transparent.

The W0RLI-style BBSs define

certain special characters that perform various functions. For example, the end of a message is marked with a hex 1A (a control-Z). A computer program could be sent encapsulated inside a W0RLI message as long as it didn't contain a control-Z other than the one that marked the end of a file.

The W0RLI BBS also uses a mode of the TNC which by definition is nontransparent. Only the bottom seven bits in each byte are valid; the top bit is ignored. While this is fine for text messages, it won't do for binary computer programs, which are notorious for wanting to use all eight bits.

Therefore, to send a computer program through the auto-forwarding BBS network, you must modify the program from its original form to a form that will pass through the network. It must be encoded to facilitate its transmission.

The easiest way to modify an eight-bit file to pass through a seven-bit transmission medium is to split each eight-bit character into two four-bit characters, setting the high four bits of each to 0. Thus, 11010011 would become 00001101 00000011. Then, to avoid using special characters normally found in the 0–16 range, you could always set the seventh bit. For example, a control-Z in the original user data (00011010) would become 01000001 01001010. On the receive end, you would throw away the high four bits and combine the bottom four of each pair to get back the original data.

Unfortunately, the above algorithm has exactly doubled the size of the message. A program that was originally 800 bits long is now 1,600 bits. The high-order bit (the one on the left) has to be zero because only seven bits are sent. The next bit has to be one to avoid using special characters. The next two bits, however, are wasted. They could be used for data but aren't. A more efficient scheme would use those bits for user data.

You've seen why a program must be modified to be passed through the forwarding BBS network. There are many ways of performing the modification. The one WA1OJB was using is called BSQ, and it has been well documented and distributed in the BBS community. Anyone can use BSQ to convert the modified program back to its original form.

Compression

There is another reason to modify data, even (and especially) plain text. In a plain-text message, most people use only a small subset of the total of 256 possible characters. With upper- and lowercase, punctuation, and numbers, most people use fewer than 80 characters. In addition, some messages contain repeated characters, such as spaces, dashes, etc.

There are many (many) ways to compress messages based on the above attributes of text messages. Anyone who has watched "Wheel of Fortune" has caught on to the fact that some characters appear in words more often than others. E is very popular, X is not.

Imagine that you scanned a long message and sorted each character by the number of times it appeared in the message. Just seven characters might make up more than half of the message. Take those seven characters and encode them in three bits. Half of your message can now be sent three bits per character instead of eight.

With a smart program, you can compress almost any message and gain some transmission time. For example, using a standard compression program, last month's column (before editing) of 16,000 characters compressed down to 9,146, or 43 percent. A file like the AMSAT orbital elements, which contains mostly numbers, compressed 60 percent. I suspect we'll see more data compression in the future as the packet frequencies continue to fill up.

To review, you've seen two reasons why amateurs need to encode data: to send binary files through forwarding BBSs and to compress data to send it faster. Our responsibility to the FCC and to our fellow hams who must carry the burden of the self-policing aspects of the amateur radio service is that the encoding scheme must be able to be applied by anyone with suitable equipment. The algorithm should be readily available; the best way to do this is to get it published. The ARRL computer networking conference proceedings are a good place. In lieu of that, algorithms must be available on request from a fellow ham or on demand from the FCC.

We also need to carry out an education plan, both internally in the amateur service and in the FCC. The latter is particularly obvious in the case documented in the NEPRA *PacketEar*. Everything went right, almost. The FCC engineer questioned the encoded data and asked the originating station for the clear text. WA1OJB complied, sending a copy of the original program and an explanation of what it did.

Unfortunately, things fell apart when the FCC engineer complained that the encoded file and the original file were different lengths. His conclusion was that there were, therefore, two different files. As we've seen from the above discussions, encoding to avoid a transparency problem is almost guaranteed to make the size different; usually the encoded file will be bigger. To make up for this expansion, the BSQ program also goes through a compression pass, which in this case made the encoded file smaller than the original.

The ARRL has been called in to assist in the WA1OJB case; hopefully it will have been resolved by the time this comes out. Encoding will become more common as higher level protocols become more common. And the sooner the enforcement glitches are worked out, the sooner we can take the next quantum leap in networking. The W9ZRX list of interlinked forwarding BBSs in North America stood at 404 in late March. There is no count of total BBSs. The numbers will only get bigger in the months ahead, and the problems will grow more complex.

"The W9ZRX list of inter-linked forwarding BBSs in North America stood at 404 in late March."

SHORT SUBJECTS

Ralph KB0LO writes asking about small TNCs. He says, "Harold, I'd be interested in hearing about some of the new packet applications you hinted at in your May *73* article—in particular, anything involving improvements in portable (meaning REALLY portable) stations. I'm involved in sailplane racing and could see some pretty awesome possibilities for a unit about twice the size and weight of a handie. It could do without a lot of bells and whistles—thumbwheel frequency selection and a 40-column display would be fine—but it would have to be an excellent performer at hitting repeaters from way out (the point here is after-landing, not in-air performance). Have you seen anything smaller than the briefcase installations?" Anyone have news on a small, integrated unit?

A report from Nob JA1KSO via Hank W0RLI says that there are 30,000 JA stations on packet and that the 70-cm band is now almost totally devoted to packet operation. There are 100 packet BBSs in the Tokyo area and more than 500 in all of Japan. There is no indication of whether these BBSs are inter-linked.

Activity on the UoSAT-OSCAR 11 Digital Communications Experiment is picking up. See the August, 1986, *73* for details on the UO-11 DCE.

Graham VK5AGR in South Australia is now on the air, and message transfers between WESTNET and VK have already occurred. A station tied to EASTNET should be up in the next two days. The only step remaining is for the station to receive software I mailed yesterday.

Two amateur radio DCE stations have been set up in Pakistan as part of a joint project between the Pakistan space agency and the UoSAT group at the University of Surrey. Jeff Ward K8KA, past and perhaps future editor of the ARRL *Gateway* newsletter, is a research fellow at the University of Surrey and is currently in Pakistan helping to train the hams there in DCE procedures.

Hopefully we're in a position to demonstrate store-and-forward satellite communications on a regular basis. Traffic to VK may be routed through the network to NK6K for retransmission via UO-11.

That's it for this month. I promise this is the last month where "Wheel of Fortune" will be mentioned.■

ATV

Mike Stone WBØQCD
PO Box H
Lowden IA 52255

Q & A

This month is devoted to questions and answers. Pat, my secretary, and I have assembled many of the questions you have asked of us. Let's get started with the most common ones:

Q: What is the difference between fast- and slow-scan TV?
A: Basically, fast-scan TV is "live" standard television just as you see from ABC, CBS, NBC, and PBS. It is NTSC 525-line color or black-and-white TV pictures with 4.5-MHz offset audio subcarrier sound. The range on FSTV is limited on an average night (dependent upon terrain) to about 50–100 miles. On UHF band openings, you can work distances of 200 to 1,000 miles (but it happens only a few times per year).

Slow-scan TV, on the other hand, is a "still-frame," slide-show type of video communications medium. Today's SSTV offers both color and black-and-white images and high-resolution pictures. You'll hear some slow-scanners say that the picture they just received looks as good as commercial TV pictures and, indeed, they might to the naked eye. But, in reality, slow-scan has a long way to go to achieve the number of dots per inch and 525 lines that FSTV offers.

SSTV pictures are mostly sent at 8-, 12-, 16-, 24-, 32-, 36-, and 72-second frame rates. The neat pictures can travel as far as your HF gear and propagation can take you. Africa, England, Germany, Australia, Japan—there is no limitation to sent and received SSTV signals.

Cost to get started? Fast-scan TV is much cheaper if you look at basic transmitters, receivers, and antennas. Surplus and home consumer VCR-type cameras can be used on both modes.

Which mode is right for you must be determined by what is going on in your area. If there is no fast-scan TV, start with SSTV, then develop a FSTV group of your own. To find out what UHF FSTV is going on near you, send me an SASE.

Q: We are a new group of fast-scan TVers and would like to put up an ATV repeater. What do you recommend for equipment?
A: I don't advise brand new ATV groups to take on a complicated ATV repeater project right off. Even if you get one built and working (and that is saying a lot!), you will discourage the natural building progression of individual stations by "making it easier" for everyone to see each other's signals.

Now that may sound improper since our amateur fraternity is structured so heavily on the use of repeaters these days, but it is true. Think about it. Many will get on 2 meters with a hand-held and a rubber ducky, and for some that is as far as they will ever get.

Take away the repeating device and they are forced to put up beams, higher power amplifiers, preamps, better coaxial cable feedlines, etc. The same is true for UHF fast-scan TV. Force and encourage your aspiring new ATV group to work simplex for a couple years. Have fun working distant DX and getting P4–P5 pictures 30–50 miles away!

After a couple of years, when you have 10–15 active members, then and only then should your group go after a repeater project! When you get to that point, write to me and I'll send you a "How to Build an ATV Repeater Kit."

Q: What antennas do you recommend for fast-scan?
A: That's a tough question. Are you a builder or a buyer? If you are a builder, K2RIW-constructed antennas—cut for the ATV portion of the band—are a good way to go. You can obtain the critical parts and elements, etc., but you must construct your own booms. Write to Gerald Cromer K4NHN in Cayce, South Carolina, or Dave Williams WBØZJP in St. Louis, Missouri, for more details and comments.

Of course, you can always home-brew an array. Back issues of *The USATVS Journal* give a number of designs, facts, and figures.

Buyers can order the popular 6-, 16-, or 27-element KLM. Spectrum International in Concord, Massachusetts, distributes the most popular ATV antenna—the incredible Jaybeams, made in England and imported into the U.S. by G3BVU/1. There are three models for ATVers: the 28-, 48-, and 88-element versions. See Spectrum's ads in leading amateur journals.

Q: How much attention do I really need to pay to my feedline on UHF ATV frequencies?
A: A lot. Even the once popular Belden 8214 tight braid and shielded RG-8/U-type coaxial cable will show a 50% loss factor on just a 100-foot run! Put 100 Watts in one end and see about 40–50 (if you are lucky) come out the other.

Today's standard requirement is Belden 9913 or an equivalent. With that kind of good line, you'll lose only about 1/4 of your power on transmit and receive. Hardline is the ultimate way to go, but it can also be the most expensive. The most popular type of cable used by today's ATVers is 1/2-, 3/4-, or 5/8-inch Andrews 50-Ohm line (according to studies conducted by the USATVS in 1985).

"I am confident that I will make it into New York someday from here in Iowa on UHF ATV."

You can get by with some cheap or many times free CATV 75-Ohm stuff, but you suffer your intended gain when you start home-brewing connectors or not using a matching device to get down to a 50-Ohm antenna and rig load. You are better off going with Belden 9913 than with free CATV cable. The bottom line for serious ATVers is to "think with your pocketbook."

Q: Do outdoor preamps placed near the antenna really make that much difference, even if one were using low-loss hardline?
A: Yes, they certainly do! Any time you add 15–20 dB of gain near the antenna and ahead of the receiver, it is going to make a dramatic difference in the signal strength level you will see on your TV set! It's like adding a stacked set of 12 antennas.

One of my local ATV buffs who reads this column razzed me the other day about a statement I had made in the April issue about getting P4 to P5 pictures 40–50 miles out from the N9CAI ATV/R system. He is 25 miles out (pretty near "line of sight"), but he receives only P2 to P3 pictures at best. I told him that I am the same distance (actually farther out, in a valley and under some pretty heavy rolling terrain) and I receive P4 to P5 pictures all the time from our repeater.

When we get into this argument, I point out that his insufficient cable run and his lack of a preamp at the antenna (he likes to keep his ARR GaAsFET literally in the ATV box in the shack) are his big limiting factors. To his credit, he does run a dual-stacked 88-element Jaybeam array at good height.

If I were to move my shack to his location with the same equipment I am running here, I guarantee my entire ham station that I would have absolutely P5 color pictures ALL THE TIME, day or night! The other day, I went horizontal mobile in preparation for our group's local 2nd annual BRATS Transmitter Hunt. With a measly 6-element KLM yagi, six feet of 8214 coax, and an average (not hot) MRF-901 PC downconverter, I saw P5 closed-circuit pictures in my car at the back end of an interstate McDonald's parking lot just ten miles from his base QTH (at ground level!).

Hopefully, someday my good friend, who has been with me from the start, will get with it, spend a few more bucks on a mast-mounted preamplifier and coax, and do things right so he, too, can read the fine-print messages on "low power" from our repeater. He will then be real competition when the DX rolls in!

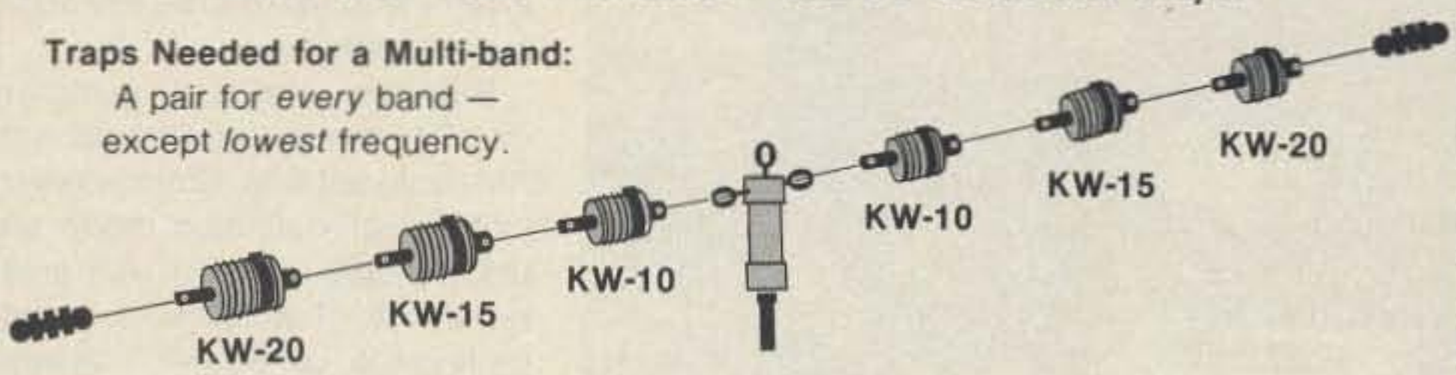
Mast-mounted preamps on receive can be inexpensive. The ones that allow the ATVer to "transmit" through them are indeed more expensive, but you get what you pay for. Write to Advanced Receiver Research for brochures or contact the good people at TNT Radio Sales in Minneapolis, Minnesota.

Q: I have an older black/white SSTV converter. The color SSTV gang hardly ever sends B/W picture transmissions. How can they forget those with B/W setups?
A: Don't let them forget! Don't be intimidated by the color giants! Let them know you are there and that you *do not* have color SSTV equipment!

Turn Your Antenna Into Several Antennas!

With the "Old Reliable" W2VS antenna traps

Traps Needed for a Multi-band:
A pair for *every* band —
except *lowest* frequency.



Special wire length data is shipped with your trap order. Get rid of the "antenna farm" and put all your favorite bands on one antenna.

Exclusive! Straps for user fine tuning

Model		Resonant Meters	at MHz
KW-10		10	28.675
KW-12	**NEW**	12	24.950
KW-15		15	21.275
KW-20		20	14.175
KW-30	**NEW**	30	10.125
KW-40		40	7.250
KW-80CW		80CW	3.625
KW-80F		80F	3.875

"One River"

Need customized traps for a special frequency? Now you can get them! Add 30% to standard price.

FREE catalog PC/84 describes a complete line of **baluns, remote antenna relays,** and **antenna traps** in the 10–60 meter band.

At your local dealer if not order direct
Only $36.00/pair, $18.00 each
&UPS Shipping
How many? (1 = a trap, 2 = a pair, etc.)
_ KW-10 _ KW-12 _ KW-15 _ KW-20
_ KW-30 _ KW-40 _ KW-80CW _ KW-80F
Order Total $ _____
☐ Send free catalog PC/84
Name _____
Address _____
City _____ State ____ Zip ____
Phone ( ) _____
☐VISA ☐Mastercard
Card # _____
Expires _____
☐Check ☐Money Order

To ORDER or request free full line catalog of baluns, antenna relays and antenna traps call

617-475-7831

or write to:

Unadilla/Antenna's Etc.
PO Box 215 BV, Andover, MA 01810-0814
1 week delivery for credit card
2 weeks for personal check.

60 DAY MONEY BACK GUARANTEE

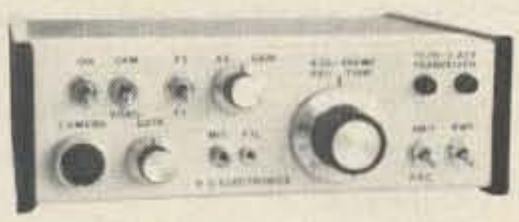
Unadilla/Reyco/Inline
Division of Unadilla/Antenna's Etc.
PO Box 215 BV, Andover,MA 01810-0814

CIRCLE 136 ON READER SERVICE CARD

AMATEUR TELEVISION

NEW 70 CM ATV TRANSCEIVER

ALL YOU NEED IN ONE BOX



$299 delivered
TC70-1

- **FULL COLOR, SOUND, & LIVE ACTION** just like broadcast TV. Get on this exciting amateur video mode at our affordable ready to go price.
- **WHAT IS REQUIRED FOR A COMPLETE OPERATING SYSTEM?** The TC70-1s downconverter outputs to any TV on ch 3 for receiving. Connect a good 70 cm antenna and low loss coax. Plug in any composite video source you want to transmit: Camera, VCR, computer, etc. Plug in any low Z dynamic mic or use color camera mic for Standard 4.5 mHz TV sound. Connect to 13.8 vdc for base, mobile, or portable. See chapt. 20 1985 ARRL Handbook. That's it!
- **WHAT CAN YOU DO WITH THE TC70-1 ATV TRANCEIVER?** Show the shack, projects, computer program listings, home video tapes, repeat Space Shuttle audio and video if you have a TVRO, repeat SSTV or RTTY, Weather Radar, do public service events such as parades, marathons, races, CAP searches and rescues...the list goes on. DX depends on antennas and terrain, typically 1 to 40 miles. We have video compensated RF linear amps for 20 ($119) or 50 ($189) watts pep for greater DX.
- **FEATURES:** Small 7x7x2.5". Push to Look (PTL) T/R switching. GaAsfet downconverter tunes whole 420-450 mHz band. Two switch selected video & audio inputs...RCA phone jacks and 10 pin color camera jack. Xmit video monitor output. Over 1 watt pep RF output on one or two (add $15) selected crystal controlled frequencies. 439.25, 434.0, or 426.25 mHz.

CALL OR WRITE FOR OUR CATALOG for more info or who is on in your area. We stock antennas, modules, and everything you need on ATV.

TERMS: Visa, MC, or cash only UPS CODs by phone or mail. Checks must clear bank before shipment. Price includes UPS surface shipping in cont. USA, others add 3%. Transmitting equipment sold only to licensed Tech class or higher amateurs, verifiable in 1985 call book or copy of new license.

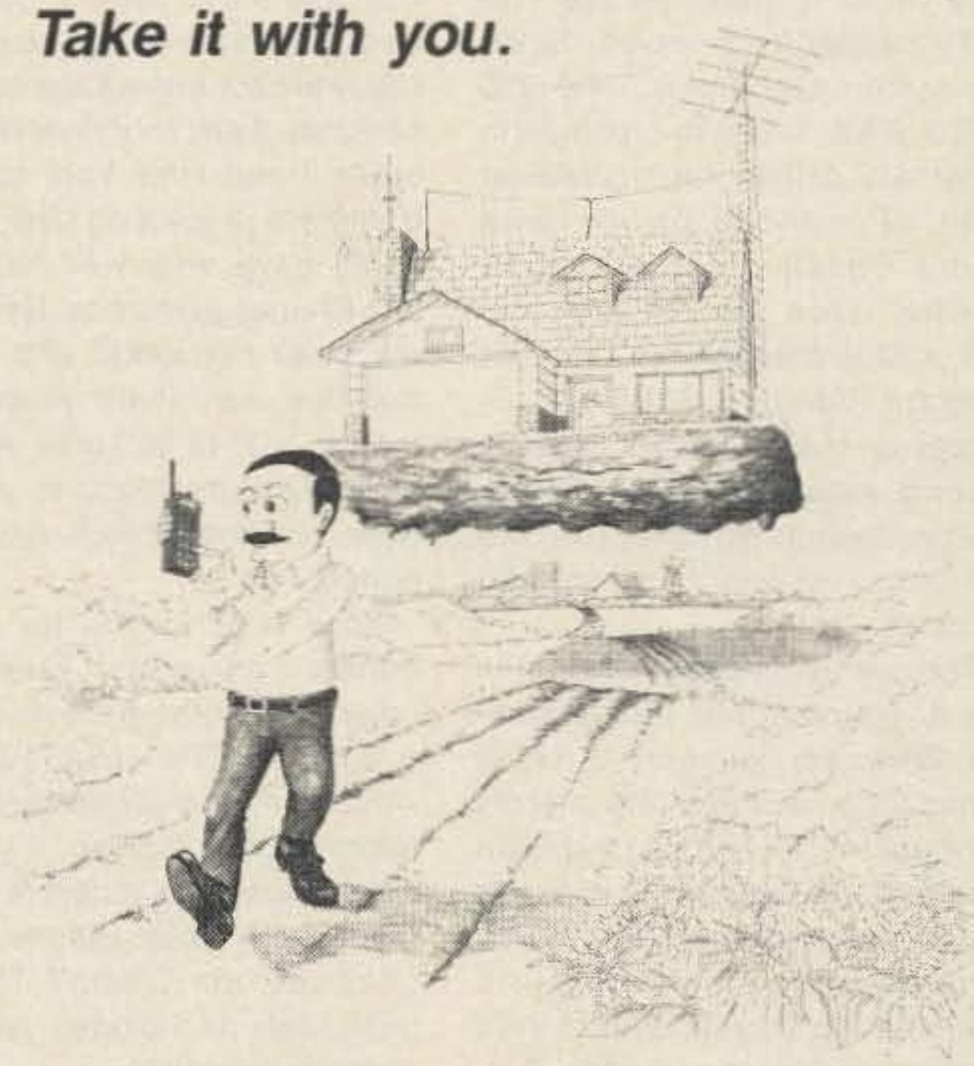
(818) 447-4565 m-f 8am-6pm pst.

P.C. ELECTRONICS
Tom W60RG Maryann WB6YSS

2522 Paxson Lane
Arcadia CA 91006

CIRCLE 28 ON READER SERVICE CARD

Take it with you.



ShackMaster™ puts your home station in the palm of your hand. Whether portable, mobile, around the yard or around town you'll be linked through your handheld to your high performance equipment at home. Even call home from any Touch-Tone phone and operate.

Scan the bands, change modes, select antennas, turn gear on and off – all from your Touch-Tone keypad. Check into nets, work skeds, tagchew and DX without being tied down to the shack.

Exchange electronic mailbox messages with your family – like "I'll be late", or "All is OK". Or talk with your family directly through ShackPatch™ with you in remote control of your home station. Report traffic accidents or disabled motorists through your home phone while mobile or portable with PersonalPatch™.

All the power of your home station (and more) really can follow you anywhere... to find out more about ShackMaster™ just write, send us your QSL, or call and talk with us at 408-727-3330.

acc advanced computer controls, inc.

2706 Walsh Avenue • Santa Clara, CA 95051 (408) 727-3330

CIRCLE 1 ON READER SERVICE CARD

The Saturday afternoon W1JKF/W9NTP SSTV net (1800 UTC) on 14.230 MHz does indeed retransmit most of the pictures in B/W formats. Some have wanted to see color and B/W separated into different frequencies. I think that would be a mistake. Slow-scanners have always had a difficult time just to maintain the known calling frequencies that they have established. To split them up even more would be disastrous!

Load in your best contrasted picture and let it fly over the airwaves. State proudly that you are sending and receiving in "living black and white." Get in there and tell 'em you're a first-class citizen, too! (Then start saving your money for a Robot 1200C while you are battling.)

Q: Why is it that FAX just doesn't seem to be catching on here in the United States? In Japan and elsewhere, quality, higher resolution facsimile signals are transmitted and received by radio amateurs daily.

A: Good question. There has been a limited number of FAX transmission contacts sent from the U.S. over the past couple of years. You'll find it happening mostly on weekends on 14.240 MHz, just above the SSTV calling frequencies. Since the Martin Goodman TRS-80C CoCo FAX Transmit program came out, activity has increased a bit. (For those of you with Radio Shack older gray 64K CoCos, write me for information on Goodman's FAX Transmit program. Send an SASE.) It still remains transmitted largely among local VHF ATV mode groups, though. Weather pictures are captured and retransmitted primarily.

There is tremendous interest in this as-yet-untapped visual medium. When the commercial HF rig manufacturers realize the interest out there in FAX and add a special mode switch position for reduced power and when the SSTV manufacturers add in the slower FAX transmission clock speeds to their dual converters (as has the German Volker Wraase DL2RZ with his SC-1), or when surplus FAX "transmitting" equipment becomes readily available at an affordable price, then and only then will you see commonly heard activity for the U.S.

We still need a few brave souls who will take this medium on with a vengeance and get people going with a real sleeper of nifty capability. The FCC okayed its use. Why not develop it? Ralph Taggart, Clay Abrams, Fred Sharp, Rual Alvarez, Martin Goodman, and others have done a good job of creating the amateur revolution on "receive," but we need these and other leaders to get in there and "transmit" it!

Photo A. Fred Sharp W8ASF of Cleveland, Ohio, and his elaborate SSTV station.

Q: What if your local area has no fast-scan activity? What antenna polarization should a beginning group then go with?

A: In nearly every area of the U.S., FSTV DX is reachable and obtainable for extremely long distance contacts if the band is just right and your station is aware and ready to take advantage of the opportunity. I am confident that I will make it into New York someday from here in Iowa on UHF ATV. It could have very well happened last Thanksgiving had New Yorkers been horizontal and looking out this way (with power). Although 200-to-600-mile ATV DX may seem unrealistic to you right now, stranger things have happened.

Look around you for several hundred miles and "see" what polarization others are using. (Get a copy of *The USATVS North American ATV Directory* for this information.) Analyze, if you can, when there are different groups using both polarizations. Which ones are the DXers? They will most likely be the ones using horizontal polarization.

Most UHF repeaters are very limited in coverage range (10–30-mile radius at best). Repeaters can be built in either antenna polarization mode. Wide-range (40–100-mile radius coverage) H-plane ATV repeaters are growing in popularity due to recent new thinking.

Properly phased beams or multi-slots can show as much gain (if not more) than a good ground-plane setup. You can work mobile or portable ATV in either mode. Some vertical proponents claim 1950 studies by the U.S. Navy that "it just doesn't make any difference technically," but there are a lot of 1980 active VHF/UHFers out there who will tell you differently (that horizontal is best just for the fact of getting away from man-made noises).

If you are in a crowded metropolitan area where 440–450 FM is active, there might be something to say for operating ATV at 20-dB rejection when going horizontal (and being able to work 432-MHz SSB as well), but then again, maybe you would like to be part of the 440–450 crowd, too, and thus keep your antennas vertical for double duty.

In other words, it is really up to you and your group. You are in the driver's seat! If you are the first in your area, YOU must make the decision. Do it wisely and intelligently—not based on one person's initial decision. After a dozen or so get on ATV with you, it is very hard to get them to change polarizations later on. If it is absolutely a tossup question, go with the trend of the rest of the country and go horizontal.

Q: Will FM TV replace and outdate our present AM-modulated TV transceivers? Where can we get more information about it? Everyone seems to have different opinions on its legality on the 70-cm band. Is it legal to operate FM ATV on 439?

A: Most likely FM TV will not overtake the popularity of AM TV, at least not until well after your lifetime subscription to *73* or *Spec-Com* runs out! There are many pros and cons about FM versus AM on the TV communications mode. This is to be the subject of great debate this year at the Dayton ATV forum (this column was written in early April). Bruce Brown WA9GVK, a proponent to FM TV experimentation, will be one of the guest speakers.

Basically, the U.S. commercial TV market is infiltrated with AM-designed sets. Changes even into a high-definition mode are unfortunately meeting with great resistance. It would take an unbelievable consumer "sweeping rage" to successfully mass-market FM TV receivers. Its time will slowly come, however, to the hi-fi/stereo buff crowd who likes to be part of the edge of technology.

TVRO systems employ FM TV. Some are using satellite receivers and monitors for FM ATV experimentation. Some simply "slope detect" FM-transmitted pictures on a standard AM TV set at reduced quality.

As for radio amateurs, experimentation with FM ATV is just beginning here in the U.S. FM fast-scan has been a reality in England for quite some time now on higher bands. You can find more technical information about ATV and commercial FM TV in the 1987 ARRL *Handbook*.

It is good for AM ATVers to begin experimenting with the mode. There is nothing written in any text that ATV must be limited to the current standards determined by the broadcast industry. It never has. It has just been convenient to follow in the technically accepted footsteps.

As for being legal or not, I see nothing in the Part 97 FCC Rules and Regulations that prohibits the transmission or reception of FM wideband TV signals in the 420–450-MHz band. Under 97.61 Authorized Emissions, it lists no restrictions about wideband FM on 70 cm. In the ARRL *Guide to FCC Regulations* (6th edition, p. 4-13), the comment is made that "no special bandwidth limits apply above 420 MHz." There are stations in the country now experimenting with FM TV transmissions within the 420–450-MHz band. It is agreed, though, that specific clarification on this matter should be brought to the attention of the FCC (the USATVS has already done this).

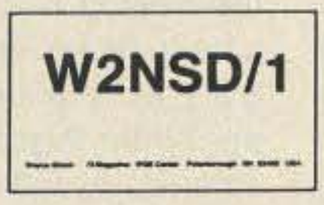
Well, gang, that is about it for this month's column. Keep the mail coming, and I'll see you next month with my special Dayton ATV report.■

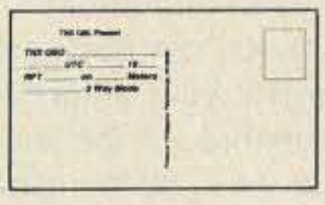
UNCLE WAYNE'S BOOK SHELVES

Style W

Style X

Style Y





Reverse

QSLs

Now you can get the highest quality QSL cards without spending a fortune! We put these cards on our press as filler between jobs; it gives the pressmen something to do and lets us print QSLs for you at an absurdly low price.

Not that we skimp: All three styles are produced on heavy, glossy stock, in two colors (blue globe or satellite with black type). At these prices, you can start the new year out right by QSLing all those disappointed hams who've been waiting for your card. Tell 'em the card was printed by Wayne!

The World Is Your's For Only $5.00

Yes, places you've never even heard of! Nearly 400 DX countries gleaned from the Awards Lists of dozens of IARU members—more countries than any other map available anywhere! ARRL's DXCC map doesn't even come close!

73 Magazine offers readers our DX Map of the World for the absurdly low price of only $5.00, shipping and handling included.

Your ham shack will be incomplete without this giant, 950-square-inch, up-to-date map. It's printed in classic black and white, permitting you to color the countries in after you've QSL'd them.

Save yourself the humiliation of never having heard of McDonald Island (what's the prefix?), Jan Mayen (prefix?) or Kure Island (prefix?).

Order now....

Code Tapes

We've had so many phone calls from people wanting our famous 73 code tapes that we've decided to bring them back!

"Genesis"

5 wpm-This is the beginning tape, taking you through the 26 letters, 10 numbers and necessary punctuation, complete with practice every step of the way. The ease of learning gives confidence even to the faint of heart.

"The Stickler"

6+ wpm-This is the practice tape for those who survived the 5 wpm tape, and it's also the tape for the Novice and Technician licenses. It is comprised of one solid hour of code. Characters are sent at 13 wpm and spaced at 5 wpm. Code groups are entirely random characters sent in groups of five—definitely not memorizable!

"Back Breaker"

13+ wpm-Code groups again, at a brisk 13+ wpm so you'll be really at ease when you sit down in front of a steely-eyed volunteer examiner who starts sending you plain language at only 13 per. You'll need this extra margin to overcome the sheer panic universal in most test situations. You've come this far, so don't get code shy now!

"Courageous"

20+ wpm-Congratulations! Okay, the challenge of code is what's gotten you this far, so don't quit now. Go for the Extra class license. We send the code faster than 20 per. It's like wearing lead weights on your feet when you run; you'll wonder why the examiner is sending so slowly!

Classics From 73's Library

•***The Magic of Ham Radio***, by Jerold Swank W8HXR, begins with a brief history of amateur radio and Jerry's involvement in it. Part 2 details many of ham radio's heroic moments. Hamdon's close ties with the continent of Antarctica are the subject of Part 3. In Part 4 the strange and humorous sides of ham life get their due. And what of the future? Part 5 peers into the crystal ball. Only $4.95.

•***The Contest Cookbook***, by Bill Zachary N6OP. One of ham radio's winningest contesters lets you in on the tips and techniques of the Big Guns. You'll learn which duping method to use, find out what equipment you'll need, and discover the secret of building a pileup. Includes separate chapters on DX and domestic contests. $5.95 while they last!

QSL Cards Style: ☐ W ☐ X ☐ Y

Quantity: ☐ 100	@ $8.97	_____
☐ 250	@ $19.97	_____
☐ 500	@ $39.97	_____
Postage and Handling		$1.00

Books

The Magic of Ham Radio	$4.95	_____
The Contest Cookbook	$5.95	_____
Postage and Handling		$1.00

Code Tapes

Genesis	$6.95	_____
The Stickler	$6.95	_____
Back Breaker	$6.95	_____
Courageous	$6.95	_____
Postage and Handling		$1.00

Giant DX Map of the World $5.00 _____

Total Enclosed _____

Please print!

Name _____ **Call** _____

Address _____

City _____ **State** _____ **Zip** _____

☐ **AE** ☐ **MC** ☐ **VISA** ☐ **Check/MO**

Card # _____ **Exp. Date** _____

ORDER FORM

Mail your order to *73* Magazine, WGE Center, Peterborough NH 03458, Attn: Uncle Wayne.

"QSL orders: Allow 4–6 weeks for delivery."

QRP

Michael Bryce WB8VGE
2225 Mayflower NW
Massillon OH 44646

FIELD DAY TIPS

The last weekend of June is Field Day. Without a doubt, THE weekend for QRPers. I can't think of anything else I would rather be doing, except being in a romantic embrace with Vanna White on a small deserted island while monkeys played from the tops of palm trees. But, alas, she's a member of the "Hate Mike Bryce Club," and I've only been out of Ohio once, so dream on, Mike.

Field Day entices many QRP operators into the field for 24 hours of operating simulated emergency conditions. Field Day is a natural for the QRPer because his/her equipment operates quite easily from batteries and/or solar power.

Packing up the equipment and heading off into the wilderness of a state park or the woods behind your house and still being able to communicate with civilization may sound a bit romantic, and it is. Just one or two operators, no need to haul out the gas generator, and no antenna crews to feed. Just you, the radio, some batteries, and a couple of wire antennas are all you need. No matter if you make 5 or 500 contacts, operating QRP Field Day will make you feel young again.

The following tips have been sent in by some of the readers of this column. I have not been able to test all of them out, although I will at some point this year.

Site Selection

Some type of planning should go into Field Day. The first thing you should do is plan the site. Of course, two categories should be applied:

1. Does the site offer a good antenna location?

2. Does the site make for a good camping experience? Even if the site is a top-notch antenna location, do you really want to camp out on top of a hazardous waste dump? Think on that one a bit.

Aside from antenna-supporting trees, site selection should follow criteria ordinarily used in selecting a camping spot. Don't set up shop near TV or commercial radio transmitters. By all means, you don't want to install antennas near high overhead power lines. Besides the noise that the lines generate, you could be killed if one of the antenna wires touches the power lines.

If you're taking the family along, does your site have sanitary facilities? How about a lake for fishing and boating. When bringing along the family, plan for them also, unless your wife likes to run high-speed CW on the low end of 20. If that is so, tie her down in front of the radio.

If you explain the reason for all this craziness to either a private property owner or a state park ranger, you should not have trouble getting permission to raise up the antennas. Don't set up a station without permission!

"Even if the site is a top-notch antenna location, do you really want to camp out on top of a hazardous waste dump?"

Antennas

Without a doubt, antennas are the key to ANY Field Day operation. They can, and do, make the difference. The best antenna for Field Day use? I can't say. Depends on where your site is and what kind of score you're after. (Everyone wants to be in first place.)

For a general rule, use a dipole up as high as you can. Use a slingshot, rocks, a bow and arrow, magic, or even tree climbing. One very high pine tree will hold up a G5RV antenna at 80 feet and will be a real rock crusher.

When selecting a tree to support your wire, remember that heavy tree cover may suck away 2 dB of signal if your antenna is allowed to run through the leaves or branches. Use 30-lb. fishing line or bricklayer's cord to raise up the wire.

I have tried to use a longwire antenna. Photo A shows Dave WD8PTU and me working Field Day a few years ago. We used a longwire that was over 700 feet long. We were planning to rape the 40- and 80-meter bands with that wire. Well, don't you know, we did awful. No more longwires for me.

At first glance, some type of rotatable array would seem the best way to go. There is so much activity on the air that a beam may not make much of a difference. Now don't get me wrong, running low power into less than perfect antennas is not my idea of a good time. However, the work required to install the beam or quad may not be worth all the trouble.

With such intense activity during Field Day, depending on where you're located, it may be best to use a vertical with a good ground system. The reason behind all this, you ask? The very large number of hams in Ohio and the nearby states. I don't really care to beam into Utah. Let those guys work putting up the tower and beam. A good dipole will have some gain, and if it's in the inverted-vee configuration, the legs of the antenna can be moved to favor the best direction.

Some of the guys write that the best "death ray" antennas are the wire beams. Here again, most of these letters come from the W6ers. The Zuni-Loopers have been running a Six Shooter antenna, which is really a broadside array using six dipoles—three in a line and another three above them with half-wave separation. The secret of the array is the twist in the half-wave open-wire transmission line which couples upper and lower elements. The antenna has a gain of about 7.5 dB. This antenna is for only one band; in last year's effort, the Zuni-Loopers Mountain Expeditionary Field Day Force built the antenna for 20 meters.

There are many gain antennas that can be made from wire. Delta loop, lazy quagi, two-element wire yagi, and, of course, the 8JK and Lazy H. Don't worry, I'll be running an antenna column soon to describe these and more.

Photo A. Dave WD8PTU and I trying to work Field Day with a rather poor antenna.

Station Setup

Many a letter writer asked how to operate Field Day. So for what 's worth, here is Field Day in assillon.

It's best to have a friend along to hare in the work, so I take along my long-haired, hippy friend, Steve WD8MIJ, who is noted for not quite having all his tubes plugged in. So it's Steve and me holed up for our annual weekend of emergency radio lunacy.

For us, a Field Day station should be simple and compact. Why take the complete home station out in the middle of nowhere? Having the Argonaut, with its built-in swr meter, all you need is an antenna tuner, a memory keyer, logs, and goodies.

Field Day is not the time to test out a new rig. That should be done long before. I prefer the Ten-Tec

Argonaut models 509–515. The Argosy is also a super radio for Field Day. Just promise me you'll leave the power switch in low position. Both radios have QSK for the CW operator and SSB for those who don't talk with their fingers (Steve). They also have enough power to rack up points, yet low power drain for battery use. To top off the station, we throw in a battery-powered memory keyer to call CQ FD and give the exchange info while we fill in the log.

I always take a "Y" adapter or patch box so that two operators can listen simultaneously. With twin headphones, the second operator can help copy and log. That sure beats having to stare into the canvas tent top while the other guy is having all the fun.

We run our station from batteries, which are being charged via solar panels. I use a Genesis panel from ARCO Solar. We don't bother with wind or hydro power; they're too much work to set up.

Our choice of antennas is quite simple. We use a centerfed zepp in an inverted-vee configuration. My number one rule: "Don't use a beam." Living in the middle of the largest ham population outside W6-land, with New York, New Jersey, Pennsylvania, and Michigan just one high-angle hop away, we would win the contest by just working all of them. Let that guy in Utah waste HIS time with the beam to work us.

After we get to the site, we install the antenna. We use a cheap roll of 300-Ohm twinlead from Radio Shack, 50 feet for less than two bucks. Dig up three different-sized pieces of scrap circuit board from the junk box. Peel the copper off with a knife. Take the largest piece and drill holes for the antenna wire and the twinlead. Place two holes in the other pieces, one for the antenna wire and the other for the support rope. Our support rope is old nylon sash cord or heavy-duty kite cord. While at the store buying the cord, get a roll of duct tape and a ten foot 2-by-4. On the table saw, rip it in half and take it along to the site to make the mast.

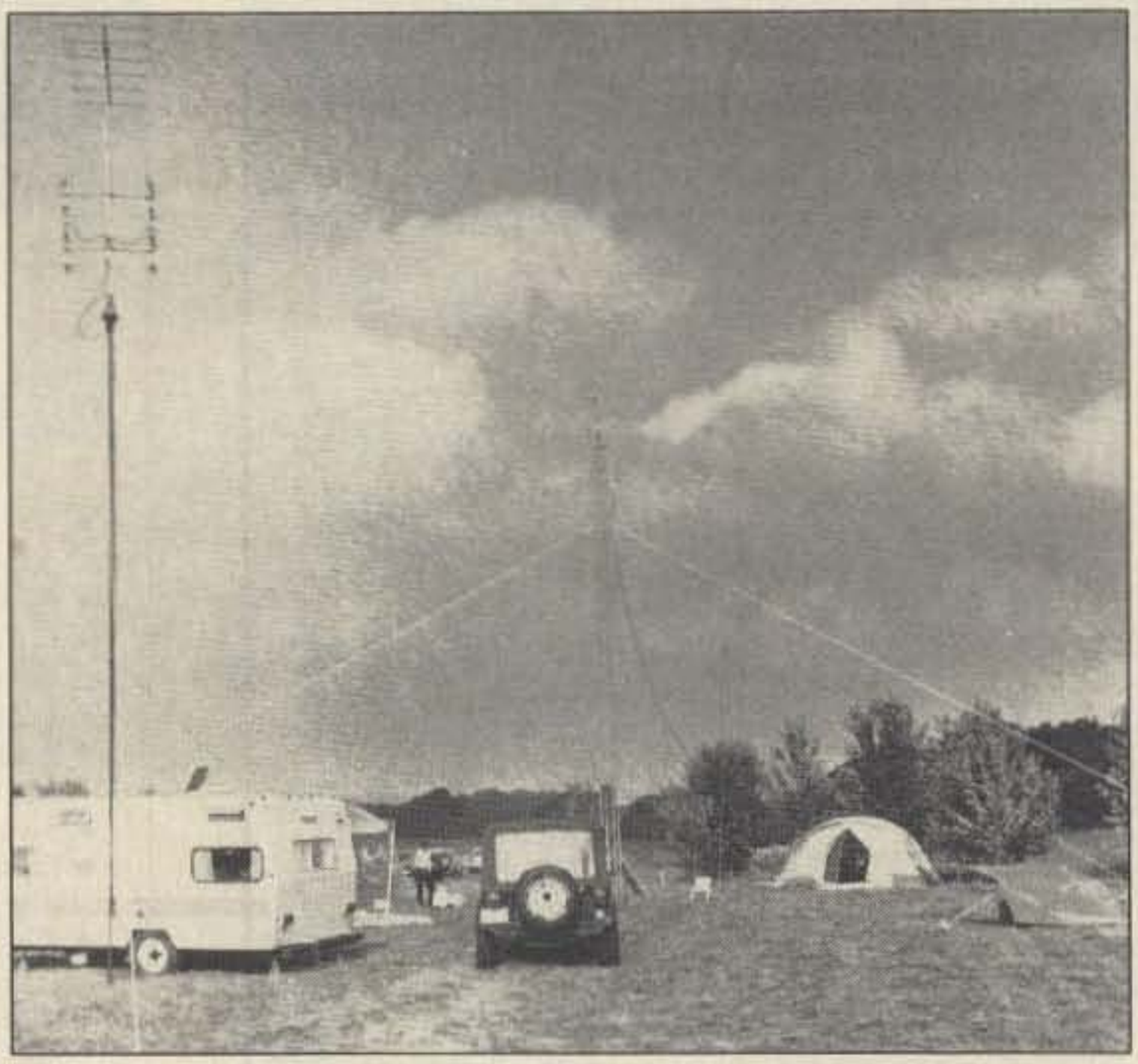


Photo B. Overview of last year's W8NP Field Day.

Use whatever comes from the junk box for antenna wire, but not magnet wire—it's too thin to guy the mast. With a hammer and nails, nail the two ripped 2-by-4 pieces together. Now, with the help of a friendly tree, raise the mast into place with the center insulator attached to the top. Tape the mast to the tree with the duct tape. Don't laugh, this has worked for years.

The antenna ends are now moved out into place and tied down as high as we can get them. The antenna wire becomes the guys for the mast. If you're still laughing, remember this thing has to stay up for only 24 hours. After Field Day is over, we pull down the whole mess, roll it up with the duct tape, and pitch it in the trash. The mast joins the Christmas yule log by the fireplace.

Some odds and ends. Bring along a crash kit of connectors, clip leads, a battery-powered soldering iron, a voltmeter (and test leads!), extra CW paddles, flashlights, food, diet Coke, rope for antennas, and, finally, bug spray.

Operating

Before the contest starts, connect the feedline to the antenna tuner and fire up the rig. Tune the antenna for all the bands you might work. Tape an index card on the transceiver with the station callsign and the tuner setting for each band. Listen around and make a few calls to see in which direction it works the best and the worst. If the antenna is weak toward the W3s, then don't waste time calling them when the contest gets rolling. Propagation does change from time to time, so keep checking those W3s.

I like to use the hunt-and-jump method, starting at the high end and working down, calling every station that I think will hear me. If I run out of new stations, I do a couple of CQs. In a contest like Field Day, I don't bother calling "QRL—frequency in use?" I listen a few seconds and run with it. If you wait too long, the frequency WILL be in use.

We keep a running log, but no dupe sheet because with QRP power, we average only 200–350 contacts per year. The computer can easily dupe that size log after everything is over. During the contest, I let the big stations dupe me and I save time and hassle.

Don't overlook the Novices; they are as eager for contacts as we are. Also, check out the lower ends of the bands for the slower CW ops. They are a gold mine of points too easily overlooked.

Whenever there's a lull, I check out the other bands without retuning the antenna. If the band is open, I can hear stations without the antenna matched. If things sound good, I'll tune the antenna to the band and start calling.

Ninety percent of our operating is CW. Steve likes to scream a bit now and then. We work SSB on 40 meters during the day because foreign night broadcast and contest QRM overpower our low-power station. Sometimes at night, 20-meter SSB has given us a few stations in the log; 75-meter phone has never been very good for us.

If you can stay awake all night, the big club stations will be yours for the picking, since you'll be the only new station on frequency and an extra 2 points for them. Don't forget to call CQ a bit at that time, because a lot of the club stations are listening for a new station.

As in any contest, you have to decide either to have fun or win. Up to now, we've opted for having fun. In fact, in ten years of never missing Field Day, we have never gotten around to sending in a log. But maybe we'll change our minds and go for it one of these times, and if we do, watch out, because we can compete! This year, I'll be helping W8NP. Watch for us.

Finally

When the contest is all over, we clean up the site, pack up the gear, and make plans for next year.

Be careful at Field Day. Ham radio lost a member last year when an antenna wire connected to an overhead power line. At W8NP last year, Carl got hit in the face with an axe. (He's all fixed up and just as mean as ever.) We're out to have fun, not get killed.

Take some good photographs this year and send them to me. I'll print what I can in the QRP column.■

LOOKING WEST

Bill Pasternak WA6ITF
28197 Robin Avenue
Saugus CA 91350

HAS THE FCC GONE NUTS?

Guys and gals, have I got a deal for you. How would you each like your very own frequency on any band. That's right . . . you can own 146.52 MHz, or maybe you would prefer a 20-meter "channel" like 14.235 MHz.

How can this be? Simple. Just declare yourself to be a bona fide frequency coordinator and lay claim to anything you want! At least that's what our wonderous FCC seems to be saying now in their decision to backtrack on their decision to back a regional coordinator over a state coordinator or a state coordinator over a local one.

This is related to a Midwest inter-council dispute that I wrote about before. But now a new twist has been added by the commission, suddenly declaring that it's not within the legal purview of the FCC to determine who is and who is not a legal frequency coordinator. And, in essence, this latest action by the commission opens Pandora's box to every kook with an ego problem, at the expense of the rest of us. Let me digress.

Go over to your bookshelf and take out your March issue of *73*. Now, turn to page 72 where you will find the Looking West column subtitled "Pirate Coordination Vs. the FCC." In it, FCC Special Services Division Chief Raymond A. Kowalski states in part, "We are not going to put up with fly-by-night pirate coordinators!"

Now, keep this and one other thing in mind as you read the following. That is, the FCC cannot make or interpret their own rules to suit a given situation in one part of the country without directly having the same effect on similar situations elsewhere. More simply, federal regulations cannot be selective in their nature or application. Whether you live in Los Angeles, Chicago, Miami, or Bartlesville, Oklahoma, the same FCC rules and their interpretations apply.

A Lack of Backbone

Let's take it right from the top. Simply said, the FCC now says it does not have the legal authority to determine who is and who is not a legitimate amateur radio frequency coordinator. In a letter to a midwest council of amateur radio clubs, FCC Special Services Division Chief Raymond A. Kowalski dropped what may become a major bombshell in thwarting attempts by hams to obtain government recognition of the work of their voluntary repeater coordinators and councils.

"The rules do not provide for FCC determination of the legitimacy of each amateur frequency coordinator," [emphasis mine] wrote Kowalski. He continued: "We expect the parties to such disputes to behave honorably, taking account of the tradition of the amateur service and the potential exposure of uninvolved repeater owners and users to rules violations."

The foregoing letter from Kowalski was to the MOKAN Council of Amateur Radio Clubs. It came in answer to the MOKAN questioning of earlier correspondence from the Division Chief to former ARRL VHF Repeater Advisory Committee Chairman Joe Eisenberg WAØWRI.

It was the answer to Eisenberg's request for clarification of the rules regarding who is and who is not a valid coordinator that sparked a further escalation in the controversy between the MOKAN Council and the statewide coordinators of Kansas and Missouri. Neither the Kansas nor the Missouri state repeater councils recognize the MOKAN Council of Radio Clubs as the Kansas City coordinator even though MOKAN has been providing this service since the mid-1970s. That's long before either of the two statewide councils existed.

When the latter came into being, they decided to unilaterally oust the MOKAN-backed coordinator and replace him with one of their own choosing. Unfair? Probably so, but forgetting the moral rights and wrongs or fairness of what was taking place and judging only by what the FCC Special Services Division Chief said back a few months ago, the two statewide councils had every right to do as they pleased and were acting in direct accordance with the policy interpretation provided by the FCC.

But guess what? Presto-chango-positiono, as you have just read. But that was not all!

In his letter, Kowalski reiterated that as far as the commission was concerned, "it would rely upon state and regional (repeater) councils to recognize legitimate local coordinators." But he did not direct the Kansas or Missouri councils to recognize the MOKAN coordinator. Again, the situation was left hanging in midair.

"Any one of you reading this column could unilaterally lay claim to being the single national frequency coordinator."

Rather, Kowalski continued by restating a warning that repeater owners and users would be the ones held legally responsible for the inappropriate actions of feuding frequency coordinators: "Similarly, a regional or state council's refusal to recognize a local coordinator is prima facie evidence that that coordinator does not have the support of a majority of those eligible to establish repeaters in the area it claims to coordinate."

An Unrealistic Solution

The bureau chief also noted in his letter to the MOKAN Council of Radio Clubs something that he had stated in an FCC Forum at last September's ARRL National Convention in San Diego—that all of the hams of a given area had the right to select their own frequency coordinator:

"Other evidence that a frequency coordinator is recognized as such by local or regional amateur operators whose stations are eligible to engage in repeater or auxiliary operation (see Section 97.3 [aa] of the FCC rules) may be just as pertinent. The development of such evidence may be especially appropriate where the local coordinator believes that the regional or state council has acted on inaccurate or biased information. Whatever the process, it is the amateurs themselves who must pick their coordinator."

During his talk in San Diego, Kowalski suggested that elections might be held to determine who is and who is not the recognized frequency coordinator for a given locality.

At that time, not much thought was given to such a plan due to the overwhelming costs involved. However, this latest determination from the FCC may leave the amateurs of regions where there are inter-coordination or inter-coordinator disputes little option on the matter. That is, either spend several thousand dollars holding a properly supervised election to determine who is their coordinator or spend even thousands more in legal fees and court costs determining it there.

Coordinate With Whom?

Since the middle of last year, the commission has been advising that hams with repeaters coordinate them through bona fide and recognized frequency coordinators. They also said that in cases where one repeater is coordinated and the other is not, that it will become the responsibility of the uncoordinated repeater to totally eliminate any interference caused to the coordinated system.

But, with all of this, the commission now absolutely refuses to help us to determine who is and who is not a legal frequency coordinator. Rather, they offer solutions such as elections that are financially unrealistic for the amateur community.

In several geographic areas, there are already threats of litigation and court action between feuding coordinators and especially between new made-to-order coordinators and established councils. Suits between coordination bodies could be class action in nature, thereby involving an entire amateur community, whether or not they sponsor, support, or even operate through repeaters as users.

Unless the FCC is willing to change its determination and give legal recognition to those who have by virtue of longevity proven themselves to be valid

frequency coordination bodies, this issue will very likely soon wind up being solved at your expense at a ballot box or in a jury box with all of the cost coming from your pocket.

Two final questions were raised by Kowalski's letter to the MOKAN Council. One regards the new rash of so-called "made-to-order" coordinators and councils that have appeared to give pseudo-coordination to what existing councils consider "pirate repeaters." If, as Kowalski says, the FCC has no authority to determine who is and who is not a legitimate frequency coordinator, how can the commission pretend to enforce what he said earlier in his statement that "We are not going to put up with fly-by-night coordinators."

Right now, there appears to be no way to determine who is and who is not a legal frequency coordinator in the amateur radio service. And, for that matter, how can the FCC "continue to rely upon state and regional councils to recognize legitimate local coordinators" when the commission itself now says it does not possess the authority to recognize anyone?

This in turn leads me right back to the utterly absurd concept I started off with. That of anyone, anyplace, deciding that he or she is a bona fide amateur radio frequency coordinator. It's not so absurd after all, is it? The way things stand right now, any one of you reading this column could unilaterally lay claim to being the single "national frequency coordinator," and if you happen to have the bucks necessary to back your claim if challenged in court, you might just make it stick!

How does that old expression go? Oh yes... "That's another fine mess you've gotten us into, Ollie!" Something sobering to dwell on from those of us who write the late shift in Los Angeles.■

Dx

Chod Harris VP2ML
PO Box 4881
Santa Rosa CA 95402

IARU REGION II CONFERENCE

The Radio Club of Argentina hosted delegates representing 24 amateur radio societies from North and South America at the IARU Region II Conference in October. (Members of IARU are national ham radio societies, such as the ARRL.) Conference recommendations ranged from standardizing right-hand circular polarization on 2.3 GHz EME to enlarging the DX window on 160 meters. Many of the decisions made at the conference concerned DX and DXing. Among the most notable of these were the following:

10-MHz Band

The conference voted to prohibit SSB from this band, at least until secondary status of amateur radio operators (in some countries) is changed. The conference also endorsed a proposal by the ARRL to prohibit contests and award credits on 10 MHz. The delegate from Montserrat (your editor, VP2ML) argued unsuccessfully against this prohibition, pointing out that many radio societies presently offer award credit for contacts on 10 MHz, and some even sponsor specific awards for the band, without causing undue interference to the fixed services that still have primary access to the band. Although the Region II Conference endorsed the League's proposal to ban such awards, the idea will probably not be accepted by IARU Regions I and III.

DXCC Cards

The conference asked the League's board of directors to investigate whether other IARU member societies could have the privilege of checking DXCC cards from amateurs in their countries. This would greatly reduce the risk of loss of these valuable cards. Whether the ARRL board or the DXCC desk will go along with this suggestion is another matter, of course, but perhaps the idea can be considered under the board-mandated study of DXCC.

Dates on QSL Cards

One of the most lengthy debates at the conference was over the recommended form of the date on QSLs. Experienced DX-ers recognize the confusion caused by the U.S. system of dates (month, day, year), while the rest of the world primarily uses day, month, year. In anticipation of greater use of computers to produce and handle QSLs, and in accordance with the SSI (metric) system, the conference agreed that dates on QSLs should be in the form of YY/MM/DD, with two-digit numbers used for each portion of the date. Thus, October 26, 1986 would be written 86/10/26.

Portable Callsigns

Another controversial decision concerned the form of portable callsigns when you're operating from another country. The conference finally agreed, after a lengthy debate, to go along with ITU regulations, which specify that the country of portable operation should be given first, followed by the home call: VP2M/WB2CHO.

The ARRL has already acted on this recommendation. The League asked the Federal Communications Commission to change the amateur rules for portable callsigns to put the country first: W2/VP2ML. The holdup has been the exact wording of our paperless reciprocal privileges with Canada. U.S. and Canadian amateurs can operate in each others' countries without any paperwork; they simply add the portable country designator: WB2CHO/VE7.

"Conference recommendations ranged from standardizing right-hand circular polarization on 2.3 GHz EME to enlarging the DX window on 160 meters."

The International Amateur Radio Union was founded in Paris in 1925 to provide support and coordination to national amateur radio societies, such as the ARRL. The IARU was the organization that won the new bands at the 1979 World Administrative Radio Conference. And the IARU is already preparing for the *next* WARC, some time in the 1990s. More than 100 national societies belong to the IARU.

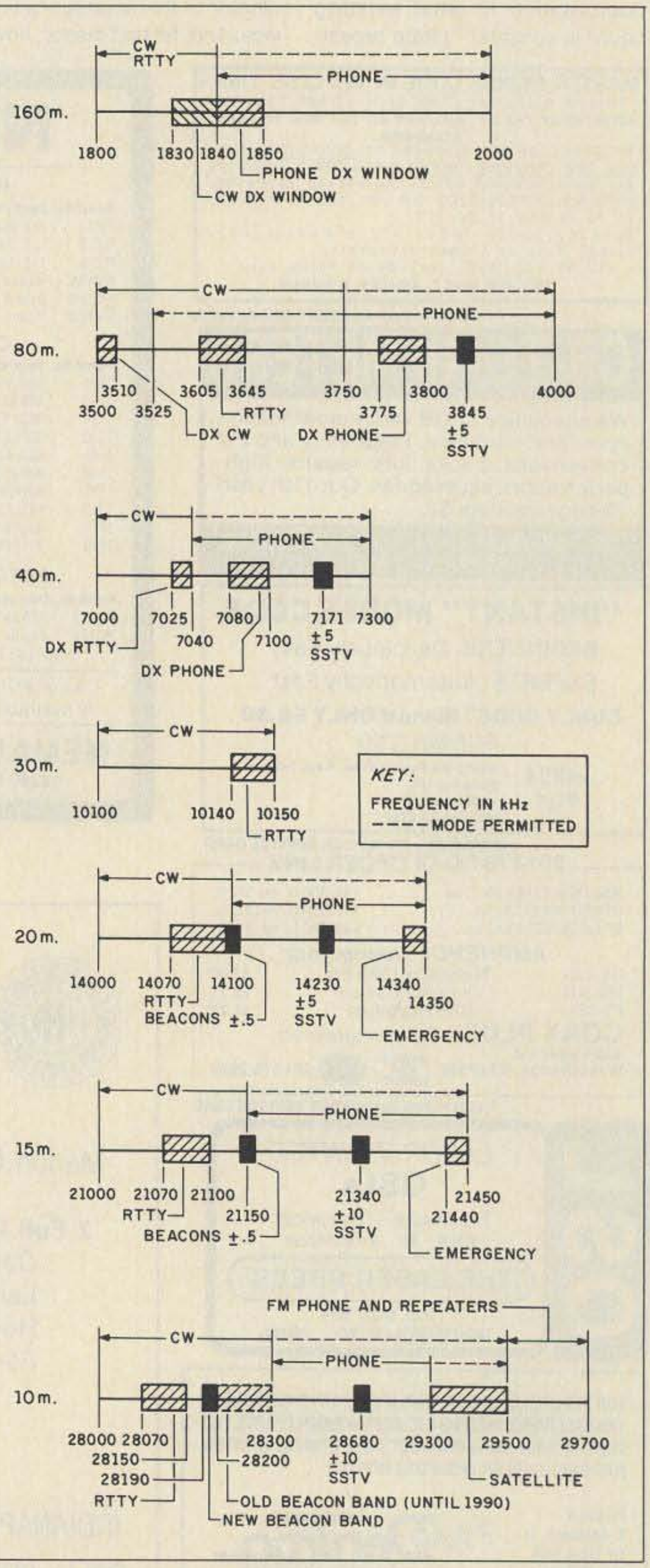


Fig. 1. The IARU Region II recommended HF band plans from the IARU Region II Conference (Buenos Aires, Argentina, October, 1986).

Photo A. VP2ML/LU at the club station of the Radio Club of Argentina during the IARU Region II Conference in October.

Photo B. The delegations from Montserrat and the United States (EE UU) at the IARU Region II Conference in Buenos Aires. The headphones are for simultaneous translations between English and Spanish.

The Canadians have said they won't go after hams using the IARU-recommended system: VE7/WB2CHO. So even though this callsign form is technically against the reciprocal rules, amateurs will be able to comply with the IARU recommendation in the near future.

Ten-Meter Beacons

The conference recognized the value and efficiency of the Northern California DX Foundation's system of 20-meter beacons, and recommended a similar system be established on 10 meters by 1990. Beacons would operate on frequencies between 28.190 and 28.200 MHz, freeing the present 28.200–28.300 segment for normal contacts.

Band Plans

DXers will be pleased to hear that the very first items considered in recommending HF band plans for Region II were the DX windows! (Could the influence of the delegate from Montserrat have had anything to do with this priority?) On 160 meters, the IARU Region II band plan has CW and RTTY below 1.840 MHz, and phone above 1.840; 1.830–1.840 is the designated CW DX window, and 1.840–1.850 the SSB DX window. These segments should be reserved for intercontinental QSOs.

On 80 meters, 3.500–3.510 MHz is the CW DX window, while 3.775–3.800 is the SSB DX window. DX windows for 40 meters include 7.035–7.040 MHz for RTTY and 7.080–7.100 for SSB. Other details of the recommended band plans are shown in Fig. 1.

Other Matters

The new format of the IARU HF Championship (formerly Radiosport) was endorsed. Member societies were encouraged to activate their own headquarters stations as additional multipliers. June 17 was selected as World QRP Day.

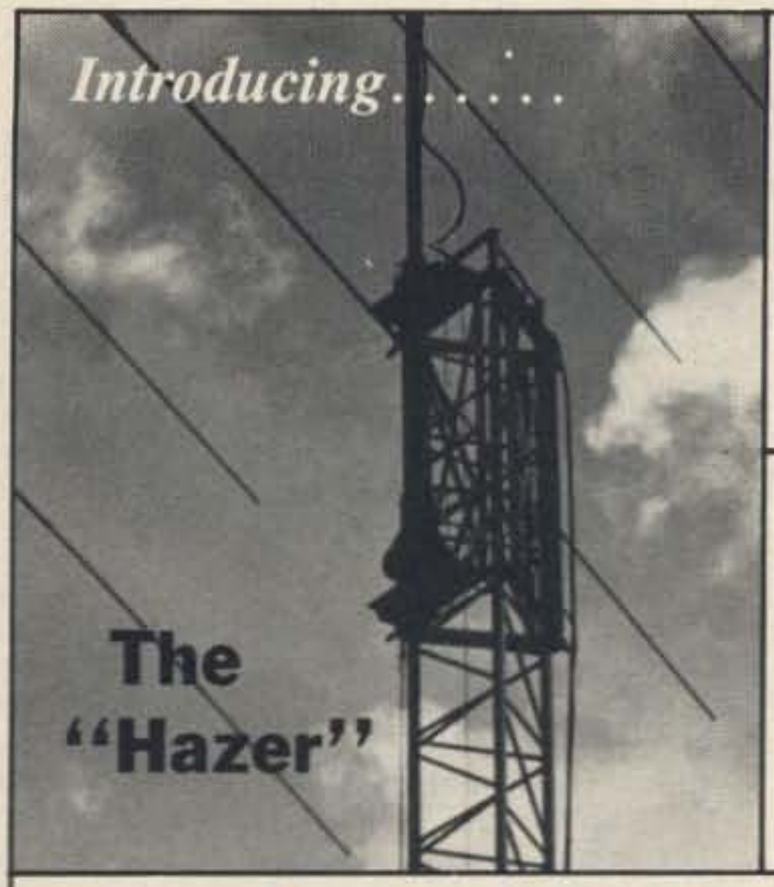
The Amateur Code was endorsed (see any edition of the ARRL *Handbook*). A worldwide HF packet network was endorsed in principle, although packet operation is considered to be third-party traffic in many countries, and is therefore banned in those countries. Certain RTTY and ASCII formats were endorsed as standards.

The problem of RFI-susceptibility of other electronic equipment (such as microwave ovens, electronic organs, and furnace controls) was discussed, with particular reference to the case of VE3SR. The conference endorsed the concept that the manufacturers of such equipment (not the ham) should be responsible for RFI-proofing their products.

And the conference urged the expansion of the 160-meter band above 1.850 in southern South America, and the expansion of the 80-meter band above 3.750 in the same region. The delegate from Montserrat made absolutely sure that the conference did NOT endorse the position of Region III, that "recognized the problems caused by DX and DXpeditions."

None of the decisions made at the Buenos Aires conference carry the force of law, nor can an individual member society be compelled to go along with the conference recommendations. However, many societies will use these ideas as the basis of their presentations to their telecommunications authorities. Thus, many of these suggestions will find their way into regulation and general use in the future, as with the proposal on portable callsign format.

Special thanks to the Argentine Radio Club for a super job as host society.■



The HAZER bringing the rotor and antenna down the tower.

At last a convenient and safe way to install and maintain your beam.

Never Climb Your Tower Again!

Are you uncomfortable with heights? Has your doctor advised you not to climb? Do you want to be able to install or maintain your beam in several hours instead of several days?

If you answered **YES** to any of these questions then the **HAZER is for YOU.**

Question: "How are rotor and coax wires installed?"

Answer: They can be attached to an anchor line running from one corner of the HAZER to some convenient point below.

GLEN MARTIN ENGINEERING INC.
P.O. Box 253, Dept. 7 , Boonville, Mo. 65233
816-882-2734

CIRCLE 72 ON READER SERVICE CARD

RF TRANSISTORS

P/N		Rating	Net Ea.	Match Pr.
		2-30 MHz 12V (= 28V)*		
MRF421	Q	100W	$24.00	$53.00
MRF422*		150W	38.00	80.00
MRF433		12.5W	11.00	26.00
MRF449,/A	Q	30W	12.50	30.00
MRF450,/A	Q	50W	14.00	31.00
MRF453,/A	Q	60W	15.00	35.00
MRF454,/A	Q	80W	15.00	34.00
MRF455,/A	Q	60W	12.00	28.00
MRF475		12W	3.00	9.00
MRF476		3W	2.75	8.00
MRF477		40W	12.00	26.00
MRF479		15W	10.00	23.00
MRF485*		15W	6.00	15.00
MRF492	Q	90W	16.75	37.50
MRF492A	Q	90W	19.75	43.50
SRF2072	Q	65W	13.50	31.00
SRF3662	Q	110W	25.00	54.00
SRF3775	Q	75W	13.50	31.00
SRF3795	Q	90W	16.00	37.00
3800	Q	100W	18.75	41.00
2SC2290	Q	80W	19.75	45.50
2SC2879	Q	100W	25.00	54.00

Q — Selected High Gain Matched Quads Available

VHF/UHF TRANSISTORS

	Rating	MHz	Net Ea.	Match Pr.
MRF224	40W	136-174	13.50	32.00
MRF237	4W	136-174	2.70	—
MRF238	30W	136-174	13.00	30.00
MRF239	30W	136-174	15.00	35.00
MRF240,/A	40W	136-174	15.00	35.00
MRF245	80W	136-174	28.00	65.00
MRF247	75W	136-174	27.00	63.00
MRF248	80W	136-174	33.00	71.00
MRF641	15W	407-512	22.00	49.00
MRF644	25W	407-512	24.00	54.00
MRF646	40W	407-512	26.50	59.00
MRF648	60W	407-512	33.00	69.00
SD1441	150W	136-174	74.50	170.00
SD1447	100W	136-174	32.50	78.00
2N6080	4W	136-174	6.25	—
2N6081	15W	136-174	8.00	—
2N6082	25W	136-174	9.50	—
2N6083	30W	136-174	9.75	24.00
2N6084	40W	136-174	13.00	31.00

PARTIAL LISTING OF MISC. TRANSISTORS

JO3020	$15.00	2N1522	$11.95
JO3055	31.00	2N3866	1.25
MRF134	16.00	2N4048	11.95
MRF136	21.00	2N4427	1.25
MRF137	37.00	2N5590	8.00
MRF138	35.00	2N5591	11.00
MRF140	89.00	2N5642	11.00
MRF148	35.00	2N5643	13.75
MRF150	89.00	2N5646	13.00
MRF172	62.00	2N5945	10.00
MRF174	80.00	2N5946	10.25
MRF208	11.50	2N6255	2.50
MRF406	12.00	2SC1307	2.50
MRF458	20.00	2SC1946	16.50
MRF497	10.00	2SC2097	29.50
MRF515	2.50	2SC2312	4.75
MRF607	2.50	2SC2630	24.75
MRF630	3.50	*25W VHF MODULES*	
MRF843	22.50	SAV6	34.50
MRF846	43.50	SAV7	34.50
MRF873	24.50	M57733	(use SAV7)
NE41137	3.50	SC1019	(use SAV7)

We stock RF Power transistors for Atlas, KLM, Collins, Yaesu, Kenwood, Cubic, Mirage, Motorola, Regency, etc. Cross-reference on CD, PT, SD, SRF, JO, and 2SC P/Ns.

Orders received by 1 PM are shipped UPS same day. Minimum order twenty dollars. COD/VISA/MC Foreign Orders Accepted

Call: (619) 744-0728

FAX: (619) 744-1943

RF PARTS
1320 Grand Avenue
San Marcos. CA 92069

Model #TE144 $75.95

Features: Deluxe CMOS Electronic Keyer

- *State-of-the-art CMOS circuitry*
- *Self completing dots and dashes*
- *Both dot and dash memory*
- *IAMBIC keying with any squeeze paddle 5-50 wpm*
- *Speed, weight, tone, volume tune controls & sidetone and speaker*
- *Semi-automatic "bug" operation & straight keying—rear panel switch*
- *Low current drain CMOS battery operation—portable*
- *Deluxe quarter inch jacks for keying and output*
- *Keys grid block and solid state rigs*
- *Wired and tested—fully guaranteed—less battery*

Send For FREE Brochure on Full Product Line

At Your Dealer or Send Check or Money Order
Plus $3.00 S/H NY Residents add tax

TRAC
ELECTRONICS, INC.
1306 RAND BLDG.
BUFFALO, NEW YORK 14203

CIRCLE 146 ON READER SERVICE CARD

QEP's
LAST CHANCE SALE

GENUINE

BELDEN 9913

500 ft Roll $175.00
cut lengths @ 37¢/ft.

"THE" Cable for 144 & up
LOW LOSS +plus+ LOW COST
LIMITED SUPPLY - ORDER NOW

AMPHENOL SPECIALS

PL-259 silver - $1.00 ea.
PL-259 nickel - $ .75 ea.
UG-21D reg. - $2.50 ea.
UG-21D fitted - $3.25 ea.

VISA & MASTER CARD ACCEPTED
SHIPPING IS ADDITIONAL
***** NO COD's PLEASE *****
CALL TOLL FREE

1-800-USA-9913

in NJ 201-887-6424

110-4 Route 10
East Hanover
N.J. 07936

QEP's

**** SAME DAY SHIPPING ****
TNX JIM N2GKW & BILL KA2QEP

CIRCLE 30 ON READER SERVICE CARD

ADVERTISERS

R.S.#		page
279	ACE Communications	73
65	AEA	91
1	Advanced Computer Controls, Inc.	6
251	Aftronics	53
253	Alden Electronics	85
194	All Electronics	67
*	Amateur Electronic Supply	21
288	Amateur Radio School	53
*	ARRL	8
*	Associated Radio	73
16	Astron Corp.	31
*	Atlanta Hamfest	27
*	Austin Amateur Radio Supply	2
53	Barker & Williamson	61
41	Barry Electronics Corp.	39
42	Bilal Co.	68
156	Buckmaster Publishing	68
259	California Packet Concepts	17
267	Cable Distributors	73
212	CAE, Inc.	15
*	CBC International	71
157	Cleveland Institute	53
285	Coax Plus	71
174	Colorado Comm. Center	79
149	Com West Radio Systems	53
283	Commerce Tours	83
10	Communications Specialists SPECIAL INSERT	48
99	Computer Supplies of Peterborough	69
11	Computer Trader	82
12	Connect Systems, Inc.	1
264	Daiwa Electronic Corporation SPECIAL INSERT	45
263	Dentron	71
161	Diamond Systems	50
106	Digitrex	30
15	Doppler Systems	17
133	EGE, Inc. SPECIAL INSERT	46, 47
209	E.L. Jones Co.	15
*	Engineering Consulting	33
58	Fox-Tango	38
17	GLB Electronics	61
72	Glen Martin Engineering	75
282	H. Stewart Designs	67
*	Hamtronics, Inc.	23
269	Hustler, Inc.	8
*	ICOM America, Inc.	Cov. II, 14
*	Indianapolis Hamfest	71
202	Jan Crystals	14
272	Jun's Electronics	26
207	Kantronics	15
*	Kenwood	5, 6, 9, 11, Cov. IV
126	The Lanz Company	74
*	The Laser Press	71
47	Maggiore Electronics	76
101	Maxcom, Inc.	61
24	MFJ Enterprises, Inc.	3
162	Michigan Radio	56
26	Micro Control Specialties	79
252	Midland Technologies	74
148	Mind's Eye	71
120	Miracle Rod	50
91	Mirage/KLM	77
80	Missouri Radio Center	92
71	Monitoring Times	61
127	Motron Electronics	53
289	NCN	42
50	Nemal Electronics	71
139	Northeast Electronics	67
210	Ohm Electronics, Inc.	15
167	Orion Hi-Tech	74
28	P.C. Electronics	63
29	The PX Shack	87
152	Pac-Comm	22
*	Palomar Engineers	42
30	QEP's	75
150	The Radio Works	90
34	Ramsey Electronics	43
206	Regency Electronics, Inc.	14
115	RF Connection	50
142	RF Enterprises	13
*	RF Parts/Westcom Engineering	67, 75
254	Ross Distributing	68
205	Rotating Tower Systems, Inc.	14
73	Golden Gigahertz Contest	27
	Moving	52
	Subscriptions	17
	Uncle Wayne's Bookshelves	65
192	Shojiki Electronics	42
69	*Spec-Com Journal*	30
51	Spectrum Communications Corp.	16
183	Spectrum International	53
*	Spider Antenna	42
77	Technical Systems Group	71
211	Telecomms	15
189	Texas Comm Center	87
146	Trac Electronics	75
181	Trans-Com	42
199	Transleteronic	73
*	Tri-H Communications	87
136	Unadilla/Antennas Etc.	63
201	Universal Electronics, Inc.	15
*	University Microfilms	52
290	Valor Enterprises	10
79	Vanguard Labs	38
*	Western Electronics	38
*	W5YI VEC	50
38	W9INN Antennas	42
165	Yaesu Electronics	Cov. III

* Please correspond with this company directly.

MIRAGE/KLM

Expanding Our Horizons

Introducing

Mirage/KLM 1.2–44 LBX

The first 1240 MHz to 1300 MHz
Made in the U.S.A.

- Factory Tested
- Completely Assembled
- Completely Weatherized Balun
- Also Available Soon . . .
  Power Dividers

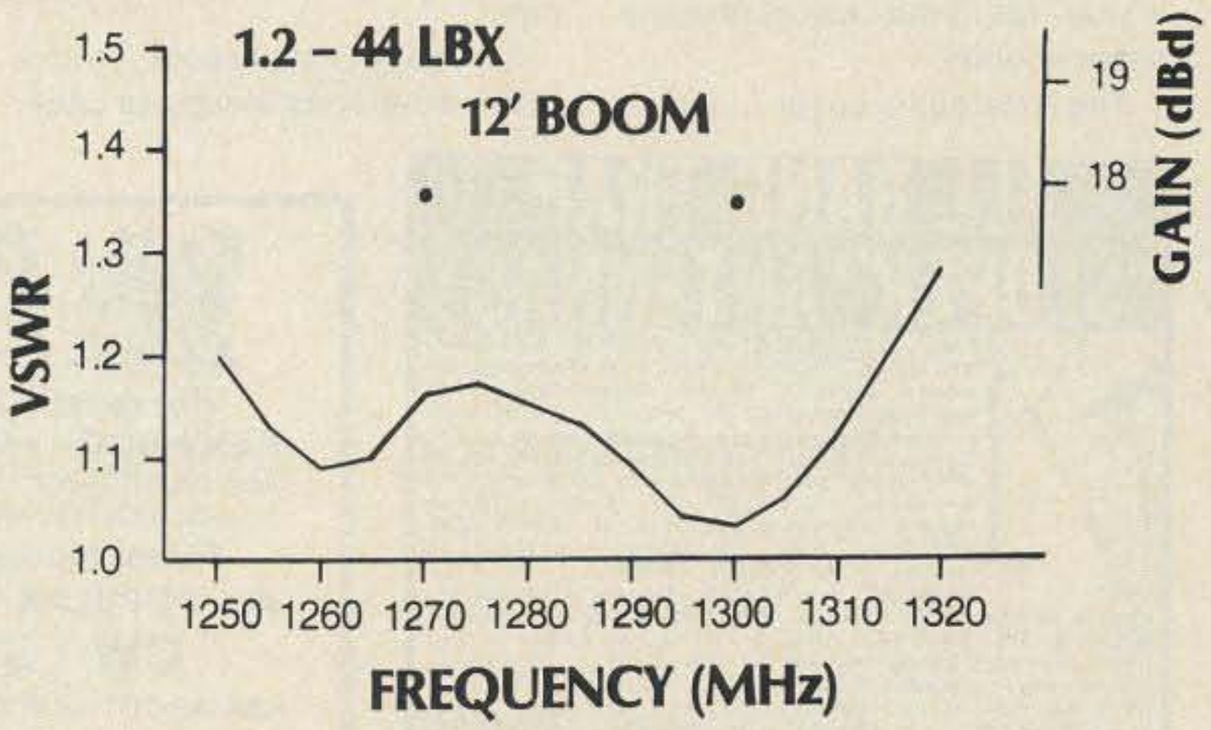
SPECIFICATIONS

Electrical

- Band Width ..... 1240–1300 MHz
- Gain 18.2
- VSWR ..... Better than 1.5 to 1
- Feed Imp ..... 50 Ohms
- Balun ..... 4:1 Rigid Coax

Mechanical

- Beam Length ..... 12′ 4″
- Element Length ..... 4.5″
- Mast ..... 2″ O.D.
- Windload ..... 1 sq. ft.



Mirage Communications Equipment, Inc.
P.O. Box 1000
Morgan Hill, CA 95037
(408) 779-7363

CIRCLE 91 ON READER SERVICE CARD

FUN!

John Edwards KI2U
PO Box 73
Middle Village NY 11379

QRM—THE NEWSLETTER

A few issues back I told you about the Uncle Floyd Radio Club (WA2DCS), perhaps the only ham club to be officially defrocked by the ARRL. I also told you about *QRM*, the newsletter that caused said defrocking.

Since then, a number of readers have written in to ask what on earth could have made the League so angry. Could mere printed words alone have driven the League's officials to so harsh an action? "Tell us more, please; tell us more," enquiring minds begged.

Well, I don't have room to print the entire newsletter here. But, in the best tradition of *USA Today* and *Readers' Digest*, I can provide you with some highlights from the Fall, 1980, *QRM* issue, the very edition that caused the ARRL to throw KI2U out of the hallowed gates of 225 Main Street. Ouch.

QRM—Devoted Entirely to Itself

The official bulletin of the Uncle Floyd Radio Club, WA2DCS-WR2APG:

The UFRC Amateur's Code

The Amateur is Gentlemanly . . . He never purposely interrupts a QSO unless the situation is vital—as in the case of needing a new country.

The Amateur is Loyal . . . Like a lemming, he will follow the lead of the American Radio Relay League, no matter how stupid or dangerous the course.

The Amateur is Progressive . . . He progresses from rig to rig as manufacturers introduce increasingly fancier, higher-priced models.

The Amateur is Friendly . . . Be his coax cut, his repeater jammed, or his subscription to *QST* screwed up, the Amateur always maintains a happy countenance.

The Amateur is Balanced . . . Or his SSB signal will sound funny.

The Amateur is Patriotic . . . His knowledge and his station are always ready for the service of his country and his community—even if he lives in Moscow, USSR.

—Hiram Percy Sanka

UFRC Safety Code

1. Power circuits completely before touching behind the panel or inside the chassis or the enclosure.

2. Ask a brain-damaged friend to switch power on and off for you while you're working on the equipment.

3. Always troubleshoot a transmitter when tired, sleepy, or under the influence of drugs or alcohol.

4. Use non-insulated screwdrivers or even your fingers to do any work in the final cage of a transmitter.

5. While you're swimming or bathing is always a good time to do repair work on high-voltage electronic equipment.

6. Soothing music sent through headphones can make hours pass quickly while you're working on gear.

7. Follow the rule of keeping one hand in a friend's pocket.

8 Instruct members of your household how to notify *QST* so that you can be listed as a "Silent Key."

"The Amateur is Gentlemanly . . . He never purposely interrupts a QSO unless the situation is vital—as in the case of needing a new country."

9. Take time to be careless. DEATH IS PERMANENT!

Results: 1980 CW Joke Contest

There were a record-breaking number of participants this year. The winner this year was none other than JY1. While we can't reprint his winning joke here, the punch line was "and that's what she said last night!"

The three runner-up punch lines were:

"Because he could get stuck in a bottle."

"And erecting an antenna can be fun, too!"

"I think your sign fell down."

I Would Like To Get In Touch With . . .

Any ham who can tell me how to convert my HW-8 to SSB. I have just received my General ticket and am anxious to get on SSB. John Q. Amateur KA8XYZ/TL, 123 Main Street, West Underarm OH 87656.

Novices under 10 to form a traffic net. Neill "Rusty" Hitt KA0ZTT, 87 Central Avenue, East Armpitt NE 98765.

Any good-looking YL, 20 or younger. Must be rich, easy, and own a nice car. Please contact John Edwards WB2IBE.

UFRC Announcements

Flash! The Federal Communications Commission just announced a proposal to channelize the 20-meter band. Also, a power limit of 5 Watts input has been proposed. This proposal is likely to go into effect sometime next year.

THE UFRC SSTV beauty contest will be held during the last weekend of October 1980. An award will be given to the best-looking ham on SSTV. All applicants will be judged by their appearance on SSTV. There will be awards in three categories: YL, OM, and Novice.

The "What the Uncle Floyd Radio Club Means To Me" contest is on once again. All entrants must state what the UFRC means to them in 73 words or less. The judges will be looking for the most sincere and convincing entry.

That's It

So there you have it—minus illustrations and some stuff I couldn't possibly run in a family-oriented magazine—the UFRC's infamous *QRM* newsletter.

Incidentally, if your club is looking to get booted out of the League, I do operate a ham club newsletter consulting service. Drop me a line for details.■

RTTY LOOP

Marc I. Leavey, M.D. WA3AJR
6 Jenny Lane
Pikesville MD 21208

RTTY.BIN

Wait a minute, let me double-check the cover. Yep, this is the June, 1987, issue of *73*. That means we are starting the eleventh year of RTTY Loop with this issue. All I can say is "Thanks!" Thanks to each and every one of you who has been following this column these years and whose letters and calls have made this column the popular *73* feature it is.

One of the patterns I set a few years ago was to highlight a computer program in the June or July issue. With the proliferation of commercial programs for many systems and dedicated hardware, many of you expressed an interest in seeing more of these items. However, interest in software solutions to getting on RTTY remains, and with the help of some of our friends, some creative solutions can yet be found.

In the world of the TRS-80 Color Computer, be it the CoCo 1, the CoCo 2, or the new CoCo 3, the name of Marty Goodman, M.D., certainly stands out. Marty has been an outspoken advocate of the CoCo and has been responsible for many fine programs that reached the users of this machine.

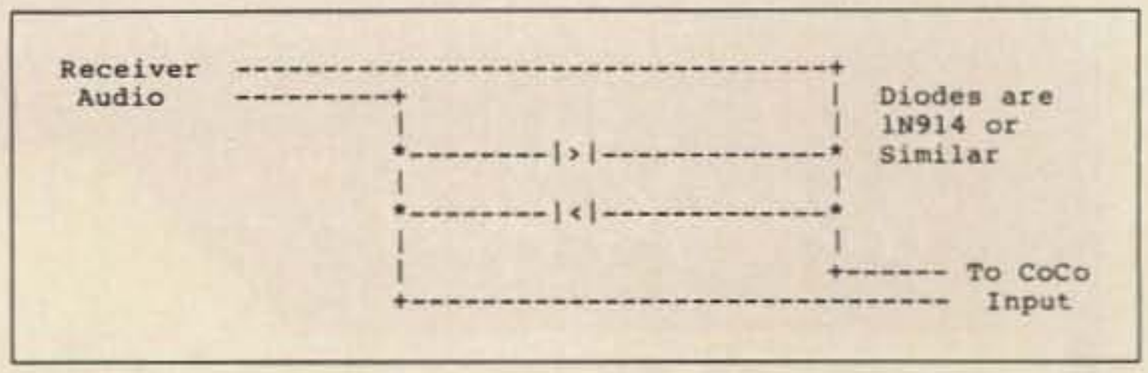


Fig. 1. A simple limiter.

In the November, 1986, issue of *Rainbow* Magazine, Marty presented a RTTY program for the CoCo that possessed many of the features often asked for in wish lists. I asked Marty for permission to run the program here, for the benefit of the readers of this column, and he has graciously agreed.

Let me tell you a little about this program, and get to the listings, which are going to be hard to hide, later. The program, RTTY.BIN,

```
 NAM  RTTY
* RTTY.BIN by N6LQV
 ORG  $4@
* KEYBOARD SCAN VARIABLES      *
COLMSK RMB  1     COLUMN MASK
COLCNT RMB  1     COLUMN NUMBER
ROWCNT RMB  1     ROW COUNT
ROWMSK RMB  1     ROW MASK
* TRANSMIT BUFFER VARIABLES    *
TXIN   RMB  2     INPUT PTR.
TXOUT  RMB  2     OUTPUT PTR.
TXECHO RMB  2     ECHO PTR.
TXSHFT RMB  1     SHIFT FLAG
* TRANSMIT ECHO VARIABLES      *
ESCROL RMB  1     SCROLL FLAG
ECURS  RMB  2     CURSOR PTR.
ESHFT  RMB  2     TABLE PTR.
* TRANSMIT MODULATOR VARIABLES *
HFDLY  RMB  1     TONE DELAY
LFDLY  RMB  2     BIT DELAY
TXFLAG RMB  1     TRANSMIT FLAG
* RECEIVE DEMOD. VARIABLES     *
CCOUNT RMB  1     CYCLE COUNTER
TONE   RMB  1     RECEIVE FREQ.
BITAVG RMB  1     BIT AVERAGE
CNTAVG RMB  1     # OF SAMPLES
OLDIND RMB  1     TUNING METER
* RECEIVE/TRANSMIT VARIABLES   *
BITTIM RMB  2     BIT TIME
BITCNT RMB  1     BIT COUNTER
SHIFT  RMB  1     SHIFT REG
* RECEIVE PRINT VARIABLES      *
RXCURS RMB  2     CURSOR PTR.
RXSHFT RMB  2     TABLE POINTER
* TRANSMIT DELAY TIMES ALL IN  *
* 5 CYCLE INCREMENTS           *
D2125  EQU  42    MARK TONE DLY
D2295  EQU  39    SPACE TONE DLY
DDATA  EQU  3937  DATA BIT TIME
DSTOP  EQU  5548  STOP BIT TIME
* RECEIVE CONSTANTS TIMES ARE  *
* IN 15 CYCLE INCREMENTS       *
RTHRES EQU  82    RX THRESHOLD
RBIT   EQU  1312  RX BIT TIME
STBIT  EQU  RBIT/2 STOP WAIT.
TIMOUT EQU  96    INPUT TIMEOUT
* CURSOR COLOR CONSTANTS       *
TCOLOR EQU  $BF   TRANSMIT COLOR
RCOLOR EQU  $9F   RECEIVE COLOR
 ORG  $E@@
START  LDD  #$343C
 STB  $FF@1     SOUND FROM
 STA  $FF@3     RADIO.
 STA  $FF21     TX OFF.
 STB  $FF23     SOUND ON.
 ORCC #$5@
 CLR  ROWCNT    RESET
 LDD  #$FEFB    KEYBOARD.
 STD  COLMSK
 LDX  #TXBUF    RESET TX
 STD  TXIN      BUFFER &
 STD  TXOUT     SHIFT.
 STD  TXECHO
 CLR  TXSHFT    RESET RX,
 CLR  ESCROL    TX & ECHO
 LDX  #LTRS     BAUDOT
 STX  ESHFT     SHIFT
 STX  RXSHFT    FLAGS.
 CLR  TXFLAG    RX MODE.
 CLR  OLDIND    RX METER.
 LDX  #$4@@
 LDU  #LABELR
A@    LDA  ,U+        PRINT
 STA  ,X+
 CMPX #$42@
 BLO  A@
 LDD  #$6@6@    CLEAR
B@    STD  ,X++       SCREEN.
 CMPX #$6@@
 BLO  B@
 LDX  #$5E@     SET RX &
 STX  ECURS     TX ECHO
 LDA  #TCOLOR   CURSORS.
 STA  ,X
 LDX  #$5A@
 STX  RXCURS
 LDA  #RCOLOR
 STA  ,X
MAIN  BSR  RXCHAR
 BSR  RXSCR
 BRA  MAIN
RXSCR  LDX  RXSHFT  CONVERT
 LDA  A,X       CHARACTER.
 BMI  RXCON     CONTROL?
 CMPA #$6@
 BNE  A@
 BSR  RXLTR
A@    LDX  RXCURS  PUT CHAR AT
 STA  ,X+       CURSOR.
 CMPX #$5C@     DO CR IF AT
 BLO  CURSON    LINE END.
RXCR   LDX  #$42@   SCROLL
A@     LDD  32,X    SCREEN UP
 STD  ,X++      ONE LINE.
 CMPX #$5A@
 BLO  A@
 LDD  #$6@6@  BLANK LAST
B@     STD  ,X++     LINE OF
 CMPX #$5C@     SCREEN.
 BLO  B@
 LDX  #$5A@     SET CURSOR.
CURSON STX  RXCURS
 LDA  #RCOLOR PUT NEW
 STA  ,X        CURSOR IN.
 RTS
RXCON  INCA
 BNE  A@        $FF=CR.
 LDA  #$6@
 STA  [RXCURS]
 BRA  RXCR
A@     INCA
 BNE  B@        $FE=FIGS.
 LDX  #FIGS     FIGURES
 BRA  C@        SHIFT.
B@     INCA
 BNE  D@        $FD=LTRS.
RXLTR  LDX  #LTRS    LETTERS
C@     STX  RXSHFT  SHIFT.
D@     RTS
* RECEIVE START BIT *
RXCHAR LDA  TXFLAG
 BEQ  A@
 LBSR DOTX
A@     CLR  BITTIM     RESET
 CLR  BITTIM+1   TIME.
 CLR  BITAVG
A@     LDB  #19      2
 BSR  TIMCYC 22@ SAMPLE
 LDD  TONE     5 INPUT.
 CMPA #RTHRES 2
 BCS  B@       3 INTEGRATE
 BRN  *        3 INPUT AND
 DECB          2 RESET
 BPL  D@       3 TIMER IF
 BRA  RXCHAR     MARKING.
B@     INCB          2
 BMI  C@       3
 BRA  D@       3
C@     LDD  #$7F     3
D@     STB  BITAVG  4
 CLRA          2 ADD TIME
 LDB  TONE     4 AND SEE
 ADDD BITTIM   6 IF ENTIRE
 STD  BITTIM   5 BIT TIME
 SUBD #RBIT    4 (START
 BCC  E@       3 BIT) YET.
 CMPX 1,X      7 DELAY.
 CMPX 1,X      7
 BRA  A@       3
E@     STD  BITTIM
 LDA  #5          SET BIT
 STA  BITCNT      COUNTER.
* RECEIVE FIVE DATA BITS *
RXBITS LDD  #19      3
 STA  BITAVG   4 CLR COUNT
 STA  CNTAVG   4 & AVERG.
A@     BSR  TIMCYC 22@ SAMPLE
 CLRA          2 INPUT.
 LDB  TONE     4
 ADDD BITTIM   6 IS THIS
 STD  BITTIM   5 BIT TIME
 SUBD #RBIT    4 UP YET?
 BCC  B@       3
 LDD  TONE     5
 CMPA #RTHRES 2 AVERAGE
 ADCB #@       2 INPUT
 STB  BITAVG   4 SAMPLES.
 INC  CNTAVG   6
 NOP           2 DELAY.
 LDB  #18      2 TIME USED
 BRA  A@       3 SO FAR.
B@     STD  BITTIM  5
 LDB  BITAVG   4 EXTRACT
 ASLB          2 BIT FROM
 CMPB CNTAVG   4 AVERAGE.
 ROR  SHIFT    6
 DEC  BITCNT   6
 BNE  RXBITS   3
A@     CMPX [,X]     9 DELAY.
 LDB  #8       2 IGNORE
 BSR  TIMCYC 22@ SOME OF
 CLRA          2 STOP BIT
 LDB  TONE     4 INCASE OF
 ADDD BITTIM   6 TIMING
 STD  BITTIM   5 ERROR IN
 SUBD #STBIT   4 SIGNAL.
 BCS  A@       3
 LDA  SHIFT
 LSRA           POSITION
 LSRA           CHARACTER
 LSRA           IN BYTE.
 RTS
* SAMPLE 3 CYCLES OF INPUT.    *
* B=STARTING TIME.
TIMCYC BSR  TIMIN  14 SYNC WITH
 CLRA          2 SIGNAL.
 ADDD BITTIM   6 ADD UP
 STD  BITTIM   5 TIME USED.
 LDD  #2       3
 BSR  TIMIN   14 SAMPLE 1.
 ADDB #2       2 ADD TIME.
 BSR  TIMIND 28 SAMPLE 2.
 ADDB #2       2 ADD TIME.
 BSR  TIMIND 28 SAMPLE 3.
 STB  TONE     4
 SUBB #89      2 ADJUST
 NEGB          2 FREQ. TO
 BMI  A@       3 @-15 FOR
 BRA  B@       3 TUNING
A@     LDD  #@       3 METER.
B@     CMPB #15      2
 BHI  C@       3
 BRA  D@       3
C@     LDD  #15      3
D@     CMPB OLDIND   4 UPDATE
 BNE  E@       3 METER?
 MUL          11
 MUL          11 DELAY.
 CMPX D,X     1@
 BRA  F@       3
E@     LDX  #$41@    3
 LDA  B,X      5 SET NEW
 ANDA #$BF     2 POINTER.
 STA  B,X      5
 LDA  OLDIND   4
 STB  OLDIND   4
 LDB  A,X      5 CLEAR OLD
 ORB  #$4@     2 POINTER.
 STB  A,X      5
F@     LBSR CHKKEY 13@
 RTS           5
* THIS TAKES 22@ CYC. WITH BSR.*
* TIME INPUT: B=STARTING TIME. *
TIMIND CMPX 1,X      7 DELAY.
 CMPX 1,X      7
TIMIN  LDA  #1       2 INPUT BIT.
A@     INCB          2
 CMPB #TIMOUT 2 TIMEOUT?
 BLO  B@       3
 CMPA 1,X      5 DELAY.
 BRA  C@       3
B@     BITA $FF2@    5 AWAIT
 BEQ  A@       3 INPUT=1.
C@     INCB          2
 CMPB #TIMOUT 2 TIMEOUT?
 BLO  D@       3
 CMPA 1,X      5 DELAY.
 BRA  E@       3
D@     BITA $FF2@    5 AWAIT
 BNE  C@       3 INPUT=@.
E@     RTS           5
* THIS USES 14 CYC. WITH BSR.  *
* B=TIME IN 15 CYCLE STEPS.    *
* TRANSMIT DATA IN BUFFER.     *
DOTX   LDX  #$4@5  SHOW TRANSMIT
 LDU  #LABELT MESSAGE.
A@     LDA  ,U+
 STA  ,X+
 CMPX #$4@D
 BLO  A@
 LDD  #$343C ENABLE SOUND
 STB  $FF21  OUTPUT AND
 STA  $FF@1  TRANSMITTER.
 LDA  #2     SET DAC FOR
 STA  $FF2@  LOUDEST SOUND
 CLR  BITTIM
 CLR  BITTIM+1
TXCLOP LDX  TXOUT   5 ANY CHAR'S
 CMPX TXIN     6 IN BUFFER?
 BEQ  DOSTOP   3
 LDD  #DDATA   3 SET DATA
 STD  LFDLY    5 BIT DELAY.
 LDA  #5       2 SET COUNT.
 STA  BITCNT   4
 LDB  ,X+      6 SET CHAR.
 STX  TXOUT    5
 STB  SHIFT    4
 CLRB          2 SEND START
 BSR  TXBIT   93 BIT (@).
 CMPX [,X]     9 DELAY.
A@     LDD  #8       3 DELAY.
B@     DECB          2
 BNE  B@       3
 LSR  SHIFT    6 SEND NEXT
 BSR  TXBIT   93 DATA BIT.
 DEC  BITCNT   6 DONE CHAR?
 BNE  A@       3
 LDD  [D,X]   12 DELAY.
DOSTOP MUL           11 DELAY.
 CMPX D,X     1@
 LDD  #DSTOP   3 SET STOP
 STD  LFDLY    5 BIT DELAY.
 COMB          2 SEND STOP
 BSR  TXBIT   93 BIT (1).
 LDA  TXFLAG   4 END IF TX
 BNE  TXCLOP   3 FLAG=@.
ENDTX  LDD  #$343C MOTOR RELAY
 STA  $FF21  OFF, SOUND
 STB  $FF@1  FROM RADIO.
 LDX  #$4@5
 LDU  #LABELR+5
A@     LDA  ,U+     SHOW RECEIVE
 STA  ,X+     MESSAGE.
 CMPX #$4@D
 BLO  A@
 RTS
SMARK  LDA  $FF2@    5 SET RS-232
 ORA  #2       2 OUT = -12V
 STA  $FF2@    5
 LDA  #D2125   2 HF=2125 HZ
 STA  HFDLY    4
 RTS           5
* THIS TAKES 3@ CYC. WITH BSR. *
SSPACE LDA  $FF2@    5 SET RS-232
```

Program listing 1. RTTY.BIN source listing.

will run on any CoCo with 16K of memory or more. A disk is not required, and this simple program does not make use of disk buffers or such. This is an "interfaceless" program. That means that receiver audio is fed directly into the CoCo using the plug that normally would go into the "EAR" jack on the cassette recorder (the black plug), and it sends AFSK via the cassette record output (the gray plug).

As far as hardware goes, you may have to add a stage of external limiting to the input; try a pair of 1N914s across the receiver output back to back. Fig. 1 is a simple way of doing this. Similarly, the output of the CoCo may exceed the mike gain of your transmitter. A resistive attenuator may be required in that instance. Play with it. You shouldn't hurt anything. One thing, though: I am not clear on the "spectral purity" of the CoCo output. I, for one, would limit this version of AFSK to VHF, where the spurious signals produced by a less-than-perfect sine wave fed into a sideband transmitter would not be a problem.

The cassette relay is used to switch the system from transmit to receive. If there is not too much voltage on your PTT line, and with most VHF rigs there shouldn't be, you could switch the PTT line directly with the relay.

After loading and EXECing the program, you should be greeted with a clear screen, a tuning meter in the upper right corner, a yellow cursor near the bottom which will generate received text, and a red cursor for transmitted text. Tune the RTTY signal being received so the black tuning cursor flips back and forth, left and right, in step with the received signal. The CLEAR key toggles from transmit to receive, and back again. You can type ahead while in receive mode; what you type is placed in a buffer to be transmitted when you change modes. If you want to dump the transmit buffer before sending it, use the BREAK key. The last thing to mention is the bell, which is both displayed and sent as an up arrow.

Program listing 1 is the full source for RTTY.BIN, written using the Macro-80C editor assembler. While some of you might be adventurous enough to type it in, those with nimble fingers may prefer the version in Program listing 2. This is a Basic loader which will create RTTY.BIN on disk from the embedded DATA statements. Cassette users need only change the SAVEM statement to an appropriate CSAVEM statement and save the program to tape.

Now, for those who really can't bring themselves to type all of this in, there are several options. A machine-readable version, "Rainbow on Tape" or "Rainbow on Disk," is available for $10 for tape and $12 for disk from *Rainbow* at PO Box 385, Prospect KY 40059. Alternatively, subscribers to Delphi will find the complete source and binary file in the CoCo SIG on that network. Just type GROUP COCO, go to the DATA-

```
 ANDA #$FD     2 OUT = +12V
 STA  $FF20    5
 LDA  #D2295   2 HF=2295 HZ
 STA  HFDLY    4
 RTS           5
* THIS TAKES 30 CYC. WITH BSR. *
* CARRY=BIT TO SEND.           *
TXBIT  BCC  A@       3 DECIDE.
 BSR  SMARK   30 MARK (1).
 BRA  B@       3
A@      BSR  SSPACE 30 SPACE (0).
 BRA  B@       3
B@      SUBA #29      2 ADJUST.
* THIS TAKES 93 CYC. WITH BSR. *
* TIME IS ADJUSTED ASSUMING    *
* 52 CYC. USED BETWEEN BSR'S.  *
TONES  DECA          A*5 DELAY ONE
 BNE  TONES       HALF CYC.
 LDA  $FF20    5 TOGGLE
 EORA #$FC     2 OUTPUT.
 STA  $FF20    5
 LDB  HFDLY    4 ADD TIME
 CLRA          2 USED SO
 ADDD BITTIM   6 FAR.
 STD  BITTIM   5 EXIT IF
 SUBD LFDLY    6 TIME FOR
 BCC  A@       3 NEXT BIT.
 BSR  CHKCOL 128 SCAN KBD.
 LDA  HFDLY    4 GET DELAY,
 SUBA #35      2 SUBTRACT
 BRA  TONES    3 TIME USED.
A@      STD  BITTIM  5 SAVE EXTRA
 RTS           5 TIME USED.
* THIS TAKES 55 CYC. WITH BSR. *
KEYDLY CMPX [,X]     9 DELAY.
KDLY1  MUL          11
 CMPX 1,X      7
 RTS           5
* CHECK KEY COLUMN. THIS TAKES *
* 128 CYCLES INCLUDING BSR.    *
CHKCOL LDA  ROWCNT  4 GO IF ROW
 BNE  CHKROW   3 NOT DONE.
 LDD  COLMSK   5 A=COLUMN
 SUBB #55      2   MASK.
 ROLA          2 B=COLUMN
 ORA  #1       2   NUMBER.
 BCC  A@       3 DO ALL 8
 BRA  B@       3 COLUMNS &
A@      LDD  #$FEF8  3 REPEAT.
B@      STD  COLMSK  5
 LDX  #$152    3 POINT AT
 ABX           3 MIRROR.
 STA  $FF02    5 READ ONE
 LDA  $FF00    5 COLUMN.
 ORA  #$80     2 COMPARE
 TFR  A,B      6 COLUMN &
 EORB ,X       4 MIRROR.
 ANDB ,X       4 B=NEW KEY
 BRN  *        3   MASK.
SETROW STA  ,X      4
 LDA  #7       2 A=ROW
 STD  ROWCNT   5   COUNT.
 LDX  TXIN     5 CHECK IF
 CMPX TXOUT    6 TRANSMIT
 BNE  KEYDLY   3 BUFFER
 CMPX TXECHO   6 IS EMPTY.
 BNE  KDLY1    3
 LDX  #TXBUF   3 RESET
 STX  TXOUT    5 BUFFER
 STX  TXECHO   5 POINTERS.
 STX  TXIN     5
 RTS           5
* CHECK KEYBOARD. THIS TAKES   *
* 128 CYCLES INCLUDING BSR.    *
CHKKEY LDA  ROWCNT  4 GO IF ROW
 BNE  CHKROW   3 NOT DONE.
 LDD  COLMSK   5 A=COLUMN
 SUBB #55      2   MASK.
 ROLA          2 B=COLUMN
 ORA  #1       2   NUMBER.
 BCC  A@       3 DO ALL 8
 BRA  B@       3 COLUMNS &
A@      LDD  #$FEF8  3 REPEAT.
B@      STD  COLMSK  5
 LDX  #$152    3 POINT AT
 ABX           3 MIRROR.
 STA  $FF02    5 READ ONE
 LDA  $FF00    5 COLUMN.
 ORA  #$80     2 COMPARE
 TFR  A,B      6 COLUMN &
 EORB ,X       4 MIRROR.
 ANDB ,X       4 B=NEW KEY
 BRN  *        3   MASK.
 STA  ,X       4
 LDA  COLCNT   4 STEP TO
 INCA          2
 BEQ  C@       3
 ADDA #55      2 NEXT KEY
 STA  COLCNT   4 COLUMN.
 BRN  *        3 DELAY.
 BRA  KEYDLY   3
C@      LDA  #7       2
 STD  ROWCNT   5
 LBRA KEYDLY   5
CHKROW DECA           2 ONE MORE
 STA  ROWCNT   4 ROW DONE.
 LDB  COLCNT   4 ADVANCE
 ADDB #8       2 COUNT TO
 STB  COLCNT   4 NEXT ROW.
 LSR  ROWMSK   6 TEST NEXT
 BCC  TXSCR    3 KEY BIT.
* B=KEY NUMBER 0-55.
 LDA  #$7F     2 CHECK
 STA  $FF02    5 SHIFT KEY.
 LDA  $FF00    5
 ANDA #$40     2
 BEQ  A@       3
 LDX  #TXTAB   3 UNSHIFTED
 BRA  B@       3 TABLE.
A@      LDX  #TXTAB1 3 SHIFTED
 BRA  B@       3 TABLE.
B@      LDA  B,X      5 GET BAUDOT
 LDB  B,X      5 CODE.
 BMI  TXCON    3 CONTROL?
 LDX  TXIN     5
 EORA TXSHFT   4 CHECK IF
 STB  TXSHFT   4 SHIFT IS
 ANDA #$60     2 NEEDED.
 BNE  DOSHFT   3
 ANDB #$1F     2 PUT CHAR.
 STB  ,X+      6 IN BUFFER.
 MUL          11
 BRN  *        3
 BRA  ENDPUT   3
DOSHFT BITB #$40     2 WHAT SHIFT
 BNE  A@       3 NEEDED?
 LDA  #$1B     2 FIGURES
 BRA  B@       3 SHIFT.
A@      LDA  #$1F     2 LETTERS
 BRA  B@       3 SHIFT.
B@      ANDB #$1F     2 PUT SHIFT
 STD  ,X++     8 & CHAR IN
 CMPA 1,X      5 DELAY.
ENDPUT STX  TXIN     5 BUFFER.
 RTS           5
TXCON  LDX  TXIN     5
 INCB          2 $FF=SPACE.
 BNE  A@       3
 LDA  TXSHFT   4 UNSHIFT
 ANDA #$40     2 ON SPACE.
 STA  TXSHFT   4
 LDD  #4       3 PUT SPACE
 STB  ,X+      6 IN BUFFER.
 MUL          11 DELAY.
 BRA  ENDPUT   3
A@      INCB          2 $FE=ENTER.
 BNE  B@       3
 LDD  #$0802   3 PUT
 STA  ,X+      6 CR,CR,LF
 STD  ,X++     8 IN BUFFER.
 CMPA D,X      8 DELAY.
 BRA  ENDPUT   3
B@      INCB          2 $FD=CLEAR.
 BNE  C@       3
 COM  TXFLAG   6 TOGGLE
 BRA  E@       3 TRANSMIT.
C@      INCB          2 $FC=BREAK.
 BEQ  BREAK    3
 CMPA ,X       4 DELAY.
E@      MUL          11
 CMPA D,X      8
 RTS           5
TXSCR  LDB  ESCROL  4 SCROLLING
 BEQ  ECHAR    3 NEEDED?
 SUBB #4       2 FOUR BYTES
 STB  ESCROL   4 MOVED.
 LDX  #$5E0    3 POINT AT
 ABX           3 BYTES.
 LDD  ,X       5 MOVE TWO
 STD  -32,X    6 BYTES.
 LDD  #$6060   3 BLANK OUT
 STD  ,X++     8 OLD BYTES.
 LDD  ,X       5 REPEAT
 STD  -32,X    6 AGAIN.
 LDD  #$6060   3
 STD  ,X       5
 LDB  ESCROL   4 SCROLLING
 BEQ  A@       3 DONE?
 MUL          11 DELAY.
 CMPX ,X       6
 RTS           5
A@      LDX  #$5E0    3 RESET
 STX  ECURS    5 CURSOR TO
 LDA  #TCOLOR  2 START OF
 STA  ,X       4 LAST LINE.
 BRN  *        3 DELAY.
 RTS           5
BREAK  LDA  #$60     2 TURN OFF
 STA  [ECURS]  9 CURSOR,
 STX  TXOUT    5 EMPTY TX
 LDD  #32      3 BUFFER &
 STB  ESCROL   4 DO CR.
 RTS           5
ECHAR  LDX  TXECHO  5 ANYTHING
 CMPX TXIN     6 TO BE
 BNE  B@       3 ECHOED?
 LDD  #12      3 DELAY.
A@      DECB          2
 BNE  A@       3
 RTS           5
B@      LDA  ,X+      6 GET CHAR.
 STX  TXECHO   5
 LDX  ESHFT    5 CONVERT
 LDA  A,X      5 CHAR.
 BMI  ECON     3 CONTROL?
 LDX  ECURS    5 PUT AT
 STA  ,X+      6 CURSOR.
 CMPX #$600    4 DO CR IF
 BHS  ECR      3 LINE END.
 STX  ECURS    5
 LDA  #TCOLOR  2 PUT NEW
 STA  ,X       4 CURSOR IN.
 CMPX D,X     10 DELAY.
 RTS           5
ECON   INCA          2 $FF=CR.
 BNE  CHKLTR   3
 NOP           2 DELAY.
 LDA  #$60     2 CLEAR OLD
 STA  [ECURS]  9 CURSOR.
ECR     LDA  #32      2 SET SCROLL
 STA  ESCROL   4 FLAG.
 MUL          11 DELAY.
 LEAX 0,X      4
 RTS           5
CHKLTR INCA          2 $FE=FIGS.
 BNE  A@       3
 LDX  #FIGS    3 FIGURES
 STX  ESHFT    5 SHIFT.
 CMPA 1,X      5 DELAY.
 BRA  C@       3
A@      INCA          2 $FD=LTRS.
 BNE  B@       3
 LDX  #LTRS    3 LETTERS
 STX  ESHFT    5 SHIFT.
 BRA  C@       3
B@      MUL          11 DELAY.
C@      MUL          11
 NOP           2
 RTS           5
* RECEIVE (AND ECHO) TABLE     *
* CONVERTS BAUDOT TO SCREEN    *
* CODE.                        *
* $FF=CARRIAGE RETURN          *
* $FE=FIGURES SHIFT            *
* $FD=LETTERS SHIFT            *
* $80=NOTHING                  *
LTRS   FCB  $80,$45,$FF,$41  E A
 FCB  $60,$53,$49,$55  SIU
 FCB  $80,$44,$52,$4A  DRJ
 FCC  \NFCK\
 FCC  \TZLW\
 FCC  \HYPQ\
 FCB  $4F,$42,$47,$FE OBG
 FCB  $4D,$58,$56,$FD MXV
FIGS   FCB  $80,$73,$FF,$6D  3 -
 FCB  $60,$5E,$78,$77  "87
 FCB  $80,$64,$74,$67  $4'
 FCB  $6C,$61,$7A,$68 ,1:(
 FCB  $75,$62,$69,$72 5")2
 FCB  $63,$76,$70,$71 #601
 FCB  $79,$7F,$66,$FE 976
 FCB  $6E,$6F,$7B,$FD ./:
* TRANSMIT TABLE CONVERTS KEYS *
* TO BAUDOT.                   *
* BIT 7=CONTROL                *
*       $FF=SPACE              *
*       $FE=ENTER (CR)         *
*       $FD=CLEAR              *
*       $FC=BREAK              *
*       $80=NOTHING            *
* BIT 6=NEEDS LETTERS SHIFT    *
* BIT 5=NEEDS FIGURES SHIFT    *
* BITS 4-0=BAUDOT CODE         *
TXTAB  FCB  $80,$43,$59,$4E  ABC
 FCB  $49,$41,$4D,$5A DEFG
 FCB  $54,$46,$4B,$4F HIJK
 FCB  $52,$5C,$4C,$58 LMNO
 FCB  $56,$57,$4A,$45 PQRS
 FCB  $50,$47,$5E,$53 TUVW
 FCB  $5D,$55,$51,$25 XYZ'
 FCB  $80,$80,$80,$FF
 FCB  $36,$37,$33,$21 0123
 FCB  $2A,$30,$35,$27 4567
 FCB  $26,$38,$2E,$3E 89:;
 FCB  $2C,$23,$3C,$3D ,-./
 FCB  $FE,$FD,$FC,$80
 FCB  $80,$80,$80,$80
TXTAB1 FCB  $80,$43,$59,$4E  ABC
 FCB  $49,$41,$4D,$5A DEFG
 FCB  $54,$46,$4B,$4F HIJK
 FCB  $52,$5C,$4C,$48 LMNO
 FCB  $56,$57,$4A,$45 PQRS
 FCB  $50,$47,$5E,$53 TUVW
 FCB  $5D,$55,$51,$25 XYZ'
 FCB  $80,$80,$80,$FF
 FCB  $80,$2D,$31,$34  !"#
 FCB  $29,$80,$3A,$2B $ &'
 FCB  $2F,$32,$80,$80 ()
 FCB  $80,$80,$80,$39    ?
 FCB  $FE,$FD,$FC,$80
 FCB  $80,$80,$80,$80
LABELR FCCS "RTTY RECEIVE    "
 FCCS " MARK-->&lt;--SPACE"
LABELT FCCS "TRANSMIT"
* TONE 89-74 9876543210987654  *
TXBUF  EQU  *
 END  START
```

```
10 PCLEAR 8
20 FOR M=&HE00 TO &H12D9
30 READ D
40 POKE M,D
50 NEXT M
60 SAVEM"RTTY.BIN",&HE00,&H1D29,&HE00
99 END
1000 DATA 204,52,60,247,255,1,183,255,3,183,255,33,247,255,35,26
1010 DATA 80,15,66,204,254,248,221,64,142,18,218,221,68,221,70,221
1020 DATA 72,15,74,15,75,142,18,2,159,78,159,95,15,83,15,88
1030 DATA 142,4,0,206,18,178,166,192,167,128,140,4,32,37,247,204
1040 DATA 96,96,237,129,140,6,0,37,249,142,5,224,159,76,134,191
1050 DATA 167,132,142,5,160,159,93,134,159,167,132,141,86,141,2,32
1060 DATA 250,158,95,166,134,43,48,129,96,38,2,141,64,158,93,167
1070 DATA 128,140,5,192,37,26,142,4,32,236,136,32,237,129,140,5
1080 DATA 160,37,246,204,96,96,237,129,140,5,192,37,249,142,5,160
1090 DATA 159,93,134,159,167,132,57,76,38,8,134,96,167,159,0,93
1100 DATA 32,212,76,38,5,142,18,34,32,6,76,38,5,142,18,2
1110 DATA 159,95,57,150,83,39,3,23,0,239,15,89,15,90,15,86
1120 DATA 198,19,141,120,220,85,129,82,37,7,33,254,90,42,10,32
1130 DATA 226,92,43,2,32,3,204,0,127,215,86,79,214,85,211,89
1140 DATA 221,89,131,5,32,36,6,172,1,172,1,32,211,221,89,134
1150 DATA 5,151,91,204,0,19,151,86,151,87,141,64,79,214,85,211
1160 DATA 89,221,89,131,5,32,36,15,220,85,129,82,201,0,215,86
1170 DATA 12,87,18,198,18,32,227,221,89,214,86,88,209,87,6,92
1180 DATA 10,91,38,207,172,148,198,8,141,18,79,214,85,211,89,221
1190 DATA 89,131,2,144,37,238,150,92,68,68,68,57,141,76,79,211
1200 DATA 89,221,89,204,0,2,141,66,203,2,141,58,203,2,141,54
1210 DATA 215,85,192,89,80,43,2,32,3,204,0,0,193,15,34,2
1220 DATA 32,3,204,0,15,209,88,38,6,61,61,172,139,32,19,142
1230 DATA 4,16,166,133,132,191,167,133,150,88,215,88,230,134,202,64
1240 DATA 231,134,23,1,38,57,172,1,172,1,134,1,92,193,96,37
1250 DATA 4,161,1,32,5,181,255,32,39,242,92,193,96,37,4,161
1260 DATA 1,32,5,181,255,32,38,242,57,142,4,5,206,18,210,166
1270 DATA 192,167,128,140,4,13,37,247,204,52,60,247,255,33,183,255
1280 DATA 1,134,2,183,255,32,15,89,15,90,158,70,156,68,39,36
1290 DATA 204,15,97,221,81,134,5,151,91,230,128,159,70,215,92,95
1300 DATA 141,84,172,148,204,0,8,90,38,253,4,92,141,72,10,91
1310 DATA 38,242,236,155,61,172,139,204,21,172,221,81,83,141,55,150
1320 DATA 83,36,199,204,52,60,183,255,33,247,255,1,142,4,5,206
1330 DATA 18,183,166,192,167,128,140,4,13,37,247,57,182,255,32,138
1340 DATA 2,183,255,32,134,42,151,80,57,182,255,32,132,253,183,255
1350 DATA 32,134,39,151,80,57,36,4,141,226,32,4,141,235,32,0
1360 DATA 128,29,74,38,253,182,255,32,136,252,183,255,32,214,80,79
1370 DATA 211,89,221,89,147,81,36,8,141,15,150,80,128,35,32,226
1380 DATA 221,89,57,172,148,61,172,1,57,150,66,38,124,220,64,192
1390 DATA 55,73,138,1,36,2,32,3,204,254,248,221,64,142,1,82
1400 DATA 58,183,255,2,182,255,0,138,128,31,137,232,132,228,132,33
1410 DATA 254,167,132,134,7,221,66,158,68,156,70,38,198,156,72,38
1420 DATA 196,142,18,218,159,70,159,72,159,68,57,150,66,38,58,220
1430 DATA 64,192,55,73,138,1,36,2,32,3,204,254,248,221,64,142
1440 DATA 1,82,58,183,255,2,182,255,0,138,128,31,137,232,132,228
1450 DATA 132,38,198,167,132,150,65,76,39,8,139,55,151,65,33,254
1460 DATA 32,129,134,7,221,66,22,255,122,74,151,66,214,65,203,8
1470 DATA 215,65,4,67,36,117,134,127,183,255,2,182,255,0,132,64
1480 DATA 39,5,142,18,66,32,5,142,18,122,32,0,166,133,238,133
1490 DATA 43,40,158,68,152,74,215,74,132,96,38,9,196,31,231,128
1500 DATA 61,33,254,32,18,197,64,38,4,134,27,32,4,134,31,32
1510 DATA 0,196,31,237,129,161,1,159,68,57,158,68,92,38,14,150
1520 DATA 74,132,64,151,74,204,0,4,231,128,61,32,234,92,38,11
1530 DATA 204,8,2,167,128,237,129,161,139,32,220,92,38,4,3,83
1540 DATA 32,5,92,39,58,161,132,61,161,139,57,214,75,39,62,192
1550 DATA 4,215,75,142,5,224,58,236,132,237,136,224,204,96,96,237
1560 DATA 129,236,132,237,136,224,204,96,96,237,132,214,75,39,4,61
1570 DATA 172,132,57,142,5,224,159,76,134,191,167,132,33,254,57,134
1580 DATA 96,167,159,0,76,159,70,204,0,32,215,75,57,158,72,156
1590 DATA 68,38,7,204,0,12,90,38,253,57,166,128,159,72,158,78
1600 DATA 166,134,43,18,158,76,167,128,140,6,0,36,19,159,76,134
1610 DATA 191,167,132,172,139,57,76,38,15,18,134,96,167,159,0,76
1620 DATA 134,32,151,75,61,48,132,57,76,38,9,142,18,34,159,78
1630 DATA 161,1,32,11,76,38,7,142,18,2,159,78,32,1,61,61
1640 DATA 18,57,128,69,255,65,96,83,73,85,128,68,82,74,78,70
1650 DATA 67,75,84,90,76,87,72,89,80,81,79,66,71,254,77,88
1660 DATA 86,253,128,115,255,109,96,94,120,119,128,100,116,103,108,97
1670 DATA 122,104,117,98,105,114,99,118,112,113,121,127,102,254,110,111
1680 DATA 123,253,128,67,89,78,73,65,77,90,84,70,75,79,82,92
1690 DATA 76,88,86,87,74,69,80,71,94,83,93,85,81,37,128,128
1700 DATA 128,255,54,55,51,33,42,48,53,39,38,56,46,62,44,35
1710 DATA 60,61,254,253,252,128,128,128,128,128,128,67,89,78,73,65
1720 DATA 77,90,84,70,75,79,82,92,76,72,86,87,74,69,80,71
1730 DATA 94,83,93,85,81,37,128,128,128,255,128,45,49,52,41,128
1740 DATA 58,43,47,50,128,128,128,128,128,57,254,253,252,128,128,128
1750 DATA 128,128,82,84,84,89,96,82,69,67,69,73,86,69,96,96
1760 DATA 96,96,96,77,65,82,75,109,109,126,124,109,109,83,80,65
1770 DATA 67,69,84,82,65,78,83,77,73,84,79,161,160,38,233,77
```

Program listing 2. MAKE.RTY program to generate RTTY.BIN.

BASE, and download the program. Finally, if all of that is still too much, send me two bucks and a disk or tape, with a stamped mailer to return it to you, and I'll send you a copy. Now, that should take care of everybody.

Once again, my thanks to Marty Goodman, M.D., for giving me permission to share this valuable program. And I will take a few moments to even plug *Rainbow*, which, with several hams on the staff, is a valuable resource for anyone running versions of the CoCo.

With the listings taking up space this month, I think I will call it here. I remain available to you by mail or wire; that CompuServe ppn is 75036,2501, and my Delphi username is MARCWA3AJR. I always look forward to your comments or questions.

The next few months of RTTY Loop promise to be exciting ones. Another CoCo program will be here next month, this one complete with bells and whistles. There is some phenomenal hardware around; I'll have a look at one of the best planned, and even a book review is in the works. You sure won't want to miss any of it, so check your *73* subscription, extend it if necessary, just so you don't miss this summer's RTTY Loops!■

You'll See Next Year's New Products On Display:
AND BE THAT FAR AHEAD OF YOUR COMPETITORS.

You still can book into the October
1987 FAR EAST ELECTRONICS TECHNOLOGY TOUR.
It's the best way to keep pace with the explosive consumer electronics marketplace.

The Japan Electronics Show•The Korea Electronics Show•The Taiwan Electronics Show•The Canton Trade Fair•The Singapore Electronics Show

All for Only $3,130

ALSO AVAILABLE TO YOU:
- The Japan Technology Updates Seminar
- Korea Business Opportunities Seminar
- Taiwan Business Opportunities Seminar
- China Business Opportunities Seminar
- Singapore Business Opportunities Seminar
- Visits to Factories and Research Facilities
- Business Meetings with Foreign Companies

You will be traveling with the most successful electronics industry executives in America, taking advantage of Commerce Tours International's once-a-year discount package.

IMPORTANT: You should fill in the coupon below as soon as possible. Commerce Tours International Inc. has been organizing the Far East Electronics Technology Tour for 10 years and our experience is that the reservations come early in the year. Remember that the 1987 Asian Electronics Shows will open up many new product arenas that will hit the American market in January 1988.

Don't wait until the trade magazines report what's happening in Asia 90 days after these important annual Asian electronics exhibitions.

It will be the best $3,000 you'll spend this year.

FROM: Commerce Tours International Inc.
TO: Businesspeople and Entrepreneurs

Here's Two Weeks That Can Change Your Business ...

You'll discover the new products being developed, learn what new products you should develop ... the new markets and the new sources (plus, great shopping!)

Join the 1987 Far East Electronics Technology Tour to Japan, Korea, Taiwan and Hong Kong—plus optional extensions to Singapore, Canton and Beijing. Remember the date: October 3–18, 1987.

Your most practical opportunity to meet Asian small businessmen is at the Consumer Electronics Shows in October at Osaka, Seoul, Taipei, Hong Kong and Singapore—plus the famous Canton Trade Fair. Here you'll see Next Year's new products on display.

We've arranged special seminars to help you do business—plus visits to factories and research facilities and business meetings with Asian companies.

The price? $3,130 for West Coast departure—slightly different for other US, Canadian and European cities. This includes first class hotel accommodations, sumptious American breakfasts, four group dinners, transportation to/from show grounds, airport/hotel transfers and business programs. Seminars are extra.

In addition to business, you will enjoy the surprisingly low cost Asian shopping. Few return from these tours (which we've been organizing for over 10 years) without a custom-made suit or two, a miniature cassette or CD player and a stack of Compact Discs, most of which are unavailable in the US.

From 150 to 300 successful American small businessmen go on these tours, so you'll make plenty of good US business contacts as well as Asian, plus have fun with these interesting people at the breakfasts and dinner parties.

Please fill in this coupon and mail it in today!

Yes, I'm booking a reservation for the Far East Electronics Tour.
Please send me more information.

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

SEND TO: Commerce Tours International
NE Marketing Offices
70 Rte. 202N
Peterborough, NH 03458

For Faster Service Call 1-800-843-6700 . . . Ext. 103

CIRCLE 283 ON READER SERVICE CARD

73 INTERNATIONAL

NOTES FROM FN42

Items from Chile, France, and Ireland (see Roundup *below) missed deadlines, one by a few weeks and two by a few days. We hate to see that happen! If we get newsworthy material too late, we have to write about what* did *happen, not what will happen. To be sure your time-value items reach us for the appropriate issue, get them HERE as follows: first of June for the August issue, first of July for the September issue—and so on. Note to PAØVDZ: Can you send us a few paragraphs about the May VRZA 24th annual Netherlands radio camping week? (Please type it!)*

We welcome Eng. Bernard C. Herring Z21EI of Zimbabwe this month. If you think that call is Z twenty-one E I, you are wrong, as he tells you later.

June 1 is Children's Day in China, National Day in Tunisia; June 2 is Coronation Day in Great Britain, and Italy celebrates the Anniversary of the Republic. In New Zealand, it is the Queen's Birthday on the 4th, but it is on the 14th in Australia and Great Britain. Also raising a question: the Republic of Seychelles celebrates Liberation Day on the 5th and Independence Day on the 29th. What was happening during the 24-day interval? Anybody have the answers?

It is Denmark's Constitution Day on the 5th, National Holiday in Sweden the 6th, on the 10th in Portugal, and the 23rd in Luxembourg; it's Independence Day in Norway on the 7th, the 12th in the Philippines, and on the 26th for both Madagascar and Somalia.

It is Flag Day in the U.S. on the 14th and in Argentina on the 20th; it is Republic Day in Iceland on the 17th, and on the 24th it is King's Day in Spain and Peasant's Day in Peru.

Fathers in the U.S.: We get celebrated on the 21st.

ROUNDUP

Chile. The Federacion de Clubes de Radioaficionados de Chile activated 3G 87 PAX April 1st to 19th in honor of H.H. Pope John Paul II on the occasion of his visit to Chile and his endless work on behalf of worldwide peace (see QSL card). QSL info: PO Box 72, Valparaiso, Chile. Oscar Cabello Araya CE3AFX is FEDERACHI president.

France. The Centre d'Animation de Cognac and Reseau des Emetteurs Francais commemorated World Telecommunications Day (May 17) with demonstrations and a philatelic exposition covering the field of communications from telegraphy to microwaves. A special four-color cover with a special French PTT cancellation design was issued and is available for six IRCs, postpaid, from Mr. Raymond Aupetit at the following address: 14, Residence Bois Boutin, F-16340 L'Isle d'Espagnac, France.

Ireland. If EI1DF, -1DH, -2AW, -2EM, -3DY, -6AI, -6BUB, -7FT, -8EQ, -9DB, -9DM, -ØDA, or -ØDJ popped up on your HT in April, you were hearing evidence of the Irish invasion at, or en route to, or from Dayton. EI9BT reports that the last batch of QSL cards processed weighed more than 27 kg (more than 60 pounds) and took 41 man-hours to sort.

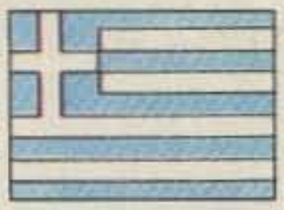
BRAZIL

Gilberto Affonso Penna PY1AFA, Director
Antenna Editorial Group
Caixa Postal 1131
20001 Rio de Janeiro, RJ
Brazil

The Antenna Edicoes Tecnicas Ltda. (address above) reminds us of the 1987 WWSA (World Wide South America) CW Contest, on all HF bands for 24 hours, June 13/14. Other awards "can be easily obtained during WWSA," PPC, WAPY, GPCW, CWRJ; "there are many more." Sponsored by the Brazilian amateur radio magazine, *Electronica Popular*, the Grupo Argentino de CW, and the Pica-Pau Carioca CW group (see box for details), 1986 entries came from 37 countries or DX areas. Table 1 lists the top scorers.

Band/Area	(DX / S. A.)
3.5 MHz	LZ2AX
7 MHz	UA4HNP / CX8BBH
14 MHz	LZ1YE / PY4WAS
21 MHz	G6ZY/EA6 / PY5AKW
28 MHz	OK1DBM / LU3DSI
Multiband	OH4RH / PY2RRG
Multi-op	OH1AF / CX7BY
SWL	LZ1I244
Multiband, single-op winners:	
Africa	EA5YU/EA8
Asia	JA4UYB
Europe	OH4RH
N. America	W3GM
S. America	PY2RRG
Multiband, multi-op leaders:	
Asia	JA3YBF
Europe	OH1AF
S. America	CX7BY

Table 1. Top scorers in the 1986 WWSA CW Contest.



GREECE

Manos Darkadakis SV1IW
Box 23051
11210 Athens
Greece

Hobby 85. Those who talked with J41SV a few months ago

WORLD WIDE SOUTH AMERICA CW CONTEST—WWSA

Sponsored by "Antenna-Eletronica Popular" magazine, Rio de Janeiro, Brazil; supervised by "GACW," Argentine CW Group, Buenos Aires, Argentine, and "PPC," Pica-Pau Carioca Group, Rio de Janeiro, Brazil, with the cooperation of several well-known South American Amateur Radio Societies and CW Groups.

PURPOSE—Contacts between stations in all countries.

CONTEST PERIOD—Annually, every second complete weekend of June, from 1500 UTC Saturday to 1500 UTC Sunday.

BANDS—1.8, 3.5, 7, 14, 21, 28 MHz. Crossband contacts are not valid.

CLASSIFICATIONS—CW mode (2-way) only. Single operator, single band or all bands; multi-operator, single transmitter, all bands; SWL.

CALL—CQ SA TEST.

EXCHANGE—RST/QSO number starting from 001.

POINTS—Each QSO in own country 0 points: only as a multiplier. QSO in same continent, 2 points; with other continent, 4 points. Contacts with South American stations (only for DX stations), 8 points.

MULTIPLIERS—Different countries (DXCC list) and different South American prefixes worked in each band.

SCORING—The final score is the total QSO points multiplied by the sum of total multipliers from all bands.

CONTEST AWARDS—Certificates will be granted to 3 top-scoring stations of each class in country, reasonable score provided. Results of South American entries and of other continents will be listed separately.

LOGS—A separate log for each worked band must be sent no later than 31 August to WWSA Contest Committee (PSE follow standard international contests logging rules).

MAILING ADDRESS—WWSA Contest Committee, PO Box 18003, 20772 Rio de Janeiro, RJ, Brazil.

QSL honoring the visit of Pope John Paul II to Chile.

RECEIVE WEATHER CHARTS IN YOUR HOME!

Only $995

You can DX and receive weather charts from around the world.

Tune in on free, worldwide government weather services. Some transmitting sites even send weather satellite cloud cover pictures!

You've heard those curious facsimile sounds while tuning through the bands—now capture these signals on paper!

Assemble ALDEN's new radiofacsimile Weather Chart Recorder Kit, hook it up to a stable HF general-coverage receiver, and you're on your way to enjoying a new hobby activity with many practical applications. Amateurs, pilots, and educators can now receive the same graphic printouts of high-quality, detailed weather charts and oceanographic data used by commercial and government personnel.

Easy to assemble—Backed by the ALDEN name.

For over 40 years, ALDEN has led the way in the design and manufacture of the finest weather facsimile recording systems delivered to customers worldwide. This recorder kit includes pre-assembled and tested circuit boards and mechanical assemblies. All fit together in a durable, attractive case that adds the finishing professional touch.

Buy in kit form and save $1,000!

You do the final assembly. You save $1,000. Complete, easy-to-follow illustrated instructions for assembly, checkout, and operation. And ALDEN backs these kits with a one-year limited warranty on all parts.

Easy to order.

Only $995 for the complete ALDEN Weather Chart Recorder Kit.

To order, fill out and mail the coupon below. For cash orders enclose a check or money order for $995. Add $5 for shipping and handling in the U.S. and Canada, plus applicable sales tax for CA, CO, CT, IA, MA, NY, WI. (Export price is $1250 F.O.B. Westborough, MA. Specify 50 or 60 Hz.) To use your MasterCard or Visa by phone, call (617) 366-8851.

ALDENELECTRONICS

Washington Street, Westborough, MA 01581

NAME: _____

CALLSIGN: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

☐ I've enclosed a check or money order for $995.00 and $5.00 for shipping and handling, plus applicable sales tax.

☐ Charge to: ☐ MasterCard ☐ Visa

ACCOUNT # (ALL DIGITS)

EXPIRATION DATE

SIGNATURE REQUIRED IF USING CREDIT CARD _____

CIRCLE 253 ON READER SERVICE CARD

SV1IW on Crete.

probably did not know he was operating from the "Hobby 85" exposition. This was a big effort to promote amateur radio; the local Yaesu and ICOM dealers and a lot of us gave equipment for it, so J41SV was able to operate CW, FM, SSB, RTTY, ATV, and by satellite. There also was a PC—Sinclair's 2X Spectrum (Timex 2068)—which monitored AMSAT's AO-10 continuously. Among those working hard to accomplish this were SV1OE, -VS, -TY, -VT, and -LY.

Contesting. I would like to share with you the experiences I got from my participation last November on the *CQ* WW SSB Contest. This was the first time after at least five years that I was seriously involved with a contest. SV operators don't take contests very seriously; many of us consider a contest to be nothing more than QRM on all bands.

Anyway, Cliff SV1JG and I had wanted for some time to do a contest and we decided the *CQ* WW would be just right. We also thought that participating from SV9 would be an even better idea, so we did. We got a special call (J49A) and a 48-hour allocation of a single frequency high up in the 80-meter SSB band (3784 kHz ±2.1).

We headed for Crete three days early, and after a brief stop in Heraklion took the road headed southeast to a little town Cliff knew, where we had booked rooms. The weather was great—blue sky, sunshine, 65 degrees. [As he wrote these words later, back home, SV1IW was experiencing the worst weather Greece has had for 50 years: 10" of snow in Athens, halting everything, many villages isolated and being supplied with daily food through helicopter drops.]

We brought with us two ICOM IC-751s, two Dentron MLS-2500s, Tuners Earphone swr's; we also had a couple of HTs for antenna adjustments and communication with local hams through the SV9SV repeater (see Table 2 for updated repeater list). In a couple of hours we had the antennas up on the hotel roof, which was 350' by 150': a Hidaka 3-el, 3-band beam for 10/15/20 meters, a Butternut vertical for 40/80, and a full-size dipole for 160.

Since we were early, we enjoyed the local food and scenery and operated with our own calls/SV9 mostly on CW and on the low bands, making about 1,500 QSOs apiece, and making quite a few U.S. hams happy with 160-meter contacts.

We rested Friday evening, and then at 0000 UTC entered the contest battlefield. Conditions were not the best, and on 80 were impossible: All we got was a steady 59 +40 dB carrier right on top of the frequency.

We could hear active U.S. stations on Top Band, but we couldn't get in touch with any despite our success before the contest opened. We did manage about 3,500 QSOs, however, with almost 500 of them during one three-hour period on Sunday morning on 10 meters. It might have been well over 5,000 except for two unfortunate events: interfering with the only Greek in the hotel trying to watch Saturday night basketball and some German neighbors disturbed on Sunday.

A few SV9 ops came by the hotel to visit us, and also an Austrian ham (OE3DIM) on vacation. All in all we had a great time, and I hope this year maybe we can make it from the Dodecanese. I experienced very good discipline and operating habits from all participants in the contest; and I must express gratitude for help on the part of John SV9LM and his hospitality.

R1	Athens	145.625/.025
R2	Lefkas Island	145.650/.050
	Thessalonika	145.650/.050
R3	Crete	145.675/.075
R4	Kefalonia Isl.	145.700/.100
R5	Pilio Mt.	145.725/.125
R6	Thessalonika	145.750/.150
R7	Athens	145.775/.175
RØ	Taigetos Mt.	145.600/.000
RU5	Athens	434.725/433.125

Transponder: Thesalonkia (linking R1 in Athens and RU1 in Thesalonika

Table 2. Greek repeaters.

The J41SV "Hobby 85" station.

INDIA

S. G. Gopalaswamy VU2GOP
Box 5053
Bangalore - 560 001
India

(The following paragraphs are edited excerpts from a story passed on to us by Srikanth VU2GSM, Secretary, the Bangalore Amateur Radio Club (BARC). Nothing earth-shaking, just a relaxed and humorous tale written by an everyday ham about everyday hams who were having fun, enjoying themselves, and not taking life too seriously. More of us should be so happy!—Ed.)

We were planning for the 10th National Jamboree to be held at Palace Grounds, Bangalore. Our function was to enable exchanges of greetings by Cubs, Scouts, Rovers, Bulbuls, Guides, and Rangers (some 20,000 of them from all over India, plus some contingents from Australia, Denmark, Indonesia, Nepal, Pakistan, and Sri Lanka).

Our club secretary said (among other things): "Why should we shout through a dipole for a special occasion? Why can't we just talk through something special, like a quad?"

Novices rush in where old-timers fear to tread; we who had never even properly seen a quad gathered available material, hired a jetka [horse-drawn cart] to carry it, and set off with the secretary's last words in mind: *For once let's have something that looks good, too! It will be seen by many!*

Four bamboos from the bazaar and four from an OT—which he was reluctantly happy to get rid of (and which arrived carried over the shoulder of a pillion rider on a motorcycle)—were painted in alternating one-foot lengths of black and white. A donated treasured spider was repainted, and the copper laid out, marked, and cut.

Plain luck and a smart salute to the jamboree camp Major got us 12 flagpole sections (2-1/5" x 4 feet); we whisked them away quickly before he could change his mind, assembled them on the ground, and fastened them on the spider. We picked the spot to erect the quad by figuring out where we would NOT be if it fell over; we had plenty of coax.

Four bamboos were clamped on, four persons held wire in place while a fifth twisted short lengths of GI to hold it to the bamboo; the mast was lifted and rotated, and held up off the ground while the other four bamboos were clamped on from underneath, wired, and the coax fastened. A rope was borrowed from a nearby fire station, and the whole thing erected, with the mast slipping into a 1-1/2-foot-deep hole, which was

then packed with stones and topped with mud.

The lightest among us climbed a ladder we held to fasten guy wires. A watching OT warned us, "Watch the guys, they have a bad habit of getting loose." Because of the jamboree setting, we thought he said, "Watch the guides..." and were confused more when the club secretary said they *should* be loose. But he added, clearing it up, "so the mast can be rotated."

Then came the expert comments: *It is not in the right direction. It is the long path...south path...wrong path...south south east... no, the sun*—and so on. Thank goodness it wasn't night with the moon and stars to go by. Nobody had a compass.

We beat it to the tent...1:1.5 swr! A half-hearted CQ on 14 and VKs came thundering in! A rope had been tied to one of the bamboo spreaders, and when it was pulled, the mast rotated at one of the section couplings: It followed a pull like a tame cow. Many countries were contacted, and our operators had much fun running out to rotate the quad and be overjoyed at the improved signal strengths.

All the time we had hundreds of onlookers, and passersby were mighty curious. Kids decided it was a Ferris wheel and tried to figure out where they would sit. Many onlookers became more aware of amateur radio, and that alone was enough reason to build the demonstration station. Many visited the shack, including VK2ATJ, who took snaps and congratulated us. The silver mast and black-and-white extended arms were a sight to see, and to us it was a splendor to look up at. We had shared moments of eagerness, anxiety, pleasure, and now we would have treasured memories.

VU2GOP wrote that they had four stations going, with VU2JOA and VU2ARC the calls most used on this occasion (January 3–9, 1986). It was a highlight for the "26th year of service" of BARC, and "the first time a quad has been erected under Field Day conditions by the club, and the details have been written down for sheer pleasure." Thanks for sharing them with us!—Ed.

ISRAEL

Ron Gang 4Z4MK
Kibbutz Urim
85 530, Negev MPO
Israel

(Ron writes us that a few days after Alon 4Z4ZB's QSO with the space shuttle Challenger, *he was at the airport waiting for an arriving plane and passing the time with chit-chat on his HT. Security police accosted him, but were all smiles when he showed them his ham license. They had immediately recalled the QSO publicity in Israel's 1.3 million circulation newspaper,* Yediot Ahronot, *with a four-color, two-column photo of 4Z4ZB in his QTH. Following are excerpts from the August 5, 1985, story, translated by 4Z4MK.)*

"Four Zebra Four Zebra Bravo calling to Whiskey Zero Oscar Romeo Echo." With the antenna at an angle 45 degrees to the sky and a prayer in the heart, Alon Tavor sent from the Shoresh farm in the Jerusalem hills a wireless call to the heavens. The reply was immediate, as though the speaker were in an adjacent room and not on the deck of the Space Shuttle. "*Challenger*. Hear you loud and clear. My name is Tony and I'm a crew man of the *Challenger*."

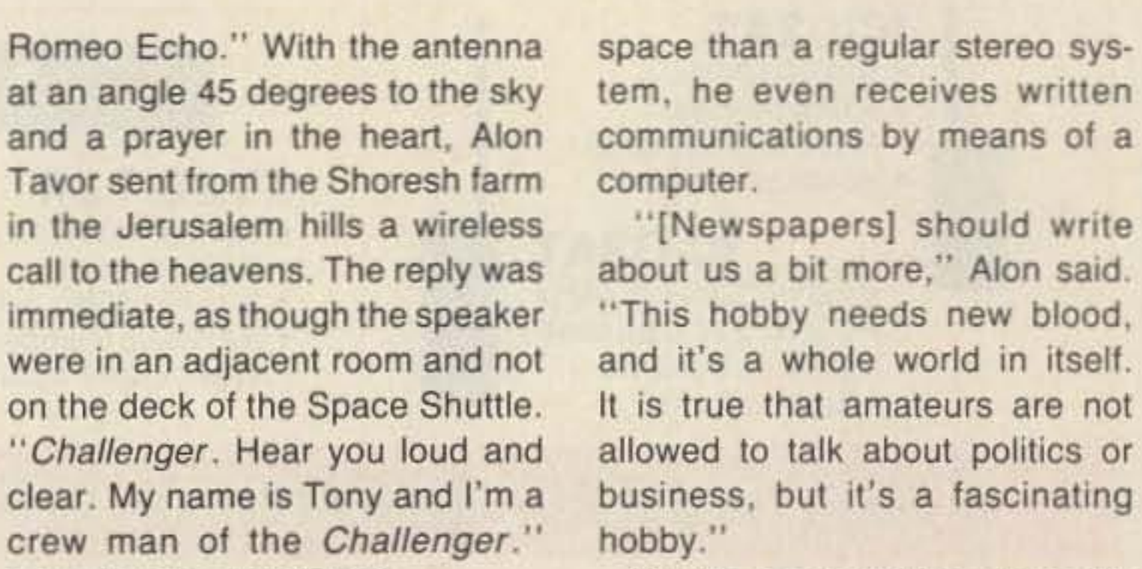
[Tony England WØORE]

During the minute-and-a-half conversation, Alon told of the Shoresh farm village 15 miles west of Jerusalem and Tony told how beautiful Israel looked from above, at a height of 350 km.

Alon Tavor was excited. From his wheelchair, to which he has been confined for over ten years, he has already managed to speak with the whole world...and from his setup that takes no more space than a regular stereo system, he even receives written communications by means of a computer.

"[Newspapers] should write about us a bit more," Alon said. "This hobby needs new blood, and it's a whole world in itself. It is true that amateurs are not allowed to talk about politics or business, but it's a fascinating hobby."

On his bookshelves where his instruments lie sits a small trophy, "The Outstanding Radio Amateur for the Year 1982." Alan received it after establishing an amateur radio club in the Alyn Hospital for Crippled Children in Jerusalem. "I saw how much it (the hobby) helped me in my rehabilitation, and I decided to help others, too. A week ago, I started something similar in the San Simon Invalids Home in Jerusalem."



VU2PTT is busy pressing the PTT, while VU2GSM, VU2GRU, and scouts look on.

The antenna field and shack.

Another view of the antenna field. BARC does not claim that it erected the 10-kW TV tower for the jamboree. Posing for this shot were VU2RRN, –2UVX, –2GSM, –2GRU, –2PTT, and friends.

NORFOLK ISLAND

Kirsti Jenkins-Smith VK9NL
PO Box 90
Norfolk Island 2899
Australia

VK9 Station Locations. There appears to be some confusion about the VK9 stations listed in the *Callbook*. First of all, the VK9 section includes all VK9 call areas, resulting in some mail arriving addressed to VK9NL/NS, Cocos (Keeling), Christmas Island, Willis Island, Norfolk Island. Better to be safe than sorry, but basically the N in the suffix of the call stands for Norfolk Island. VK9X indicates Christmas Island, VK9Y Cocos (Keeling), VK9Z Willis Island, VK9M Mellish Reef, and VK9L Lord Howe Island.

In the past, VK9 operators could choose their suffix and most opted for their initials. At present, only one such old-timer is still active from Norfolk Island, namely, John Anderson VK9JA. All others here have VK9N–.

The book also lists a number of people who have at one time or another been active from Norfolk Island: while on DXpeditions or temporarily resident. The only current operators who will receive mail addressed to Norfolk Island are: VK9ND, –NI, –NL, –NS, –JA, –NNB, and –NNZ. Les VK9NI is listed under two calls. He formerly held VK9NO, but acquired his present call when Charlie, the former VK9NI, decided to give up amateur radio.

It may be possible to obtain alternative QSL routes for the other callsigns listed in the *Callbook* from manager lists and QSL information in DX bulletins, etc. However, most of these people have been gone from the Island for some time and may be difficult to track down.

Jim VK9NS, being a member of the WIA and its bureau, recently received four kg of unsolicited QSL cards from the bureau—some 1,600 cards. As direct QSLs with SAE and postage take first priority, it will be some time before the chore of checking logs for them is finished.

VK9N Activities. With some improvement in propagation, we have been able to catch up with some of our long-lost friends, and we enjoyed a beeline propagation path to Peter I Island, enabling us to get in the Peter I log early on both SSB and CW.

Jim VK9NS has been absent, DXpeditioning to Cocos (Keeling) and Christmas during February, resulting in a marked decrease in activity from here despite the addition of Ray VK9NNZ among us. Ray formerly held P29NRS; as Norfolk Island comes under Australian regulations, his Novice license allows him to operate on 3.525–3.625 MHz, 21.125–21.200 MHz, and 28.100–28.600 MHz. There is another Novice here, VK9NNB, but he does not appear to be very active.

Tom Christian VR6TC arrived here toward the end of 1986 to await a shipping opportunity to Pitcairn and to recuperate after hospitalization in New Zealand. Staying with John VK9JA, he kept regular skeds with his wife, Betty VR6YL. As I write this, he is homebound on the Norwegian expedition ship, *Aurora*, which was used to transport the mapping and amateur radio expedition to Peter I. The ship had just picked up her owner, Monica Christensen, who had spent the Antarctic summer skiing to the South Pole—the first woman to have done that.

Contest participation in 1986 saw VK9NS coming in first in Oceania as Single-Op, Multiband, Phone, in the WPX contest. He also entered the phone section of the *CQ* WW contest in October; VK9NL entered the CW section in November. Propagation during the phone weekend was excellent, but not during the CW weekend, resulting in fewer than 2,000 contacts.

ZIMBABWE

Bernard C. Herring Z21EI
PO Box 2234
Bulawayo
Zimbabwe

Welcome to Zimbabwe [Rhodesia before it became independent], a landlocked country situated on the 19th south parallel in southern Africa. Zimbabwe is commonly acknowledged by African continental travelers to be one of the most beautiful of the African countries. It possesses a modern infrastructure of road, rail, and air communications, and its cities and developed countryside are the surprise and envy of visitors from all over the world.

Much of the country comprises a plateau between 3,000 and 6,000 feet above sea level. The climate is exceptionally benign, with cool winters and warm to hot summers tempered by rainfall.

L to R: Jim VK9NS, Tom's daughter, and Tom VR6CT.

Although Zimbabwe lies entirely in the tropics, the jungles-of-Hollywood epics don't exist here. The countryside is open rolling savannah, highly suitable for agricultural production, conditioned only by relatively low average rainfall of about 32 inches.

Tourist attractions include Victoria Falls, 300 feet high; Lake Kariba, one of the world's largest man-made lakes; and mysterious ruins dating back many centuries. There are extensive game parks with large populations of elephant, lion, giraffe, and many other species. There is almost permanent sunshine.

Amateur radio has long been a popular hobby in Zimbabwe. As Rhodesia, callsigns were ZE–. After independence in 1980, our prefix became Z2, following by one number (1 through 8) and two letters. Designating the two numbers together as "twenty-one" is incorrect. My call is Z two, one E I. This form may have something to do with the callsign for Zimbabwe being shown as "Z22" on one popular ham map.

As far as amateur operation is concerned, we have reciprocity only with the United Kingdom. Permission to operate an amateur radio station in Zimbabwe is controlled by the Posts and Telecommunications Corp. Applications should be addressed to: The Licensing Officer, Posts and Telecommunications Corp., PO Box 8061, Causeway, Zimbabwe. [*It's important to give all details of proposed visits and get permission to bring equipment into the country before doing so. It could be helpful to get a Z2 amateur to apply on your behalf. —Ed.*]

There are around 90 fully licensed amateur stations in the country now, together with a small number of "restricted" and "Novice" licenses. Here, the license is granted to the *station*, the individual having satisfied the authorities that he's competent to operate. Examinations are broadly in line with most other countries: 12-wpm Morse code and written papers on basic technicalities and operating procedures.

In common with many developing nations, amateur radio equipment is very difficult to obtain. Components are equally scarce, but a certain amount of homebrewing is possible, and some remarkable feats have been achieved. One of our amateurs (then ZE5JJ) was the first in Africa to establish a very successful moonbounce station, complete with 32-foot diameter dish.

Two VHF repeaters are in operation: one in Harare, the capital city, and one in Bulawayo, the next largest city. Bulawayo also houses a 10-meter beacon, Z21ANB on 21.250 MHz, often used by foreign DXers to check the path into southern Africa. All the internationally agreed bands are available to Zimbabwe amateurs, with minor variations. We were among the first of the world's countries to open the WARC bands (10, 18, and 24) to our amateurs.

Our hobby is represented by the Zimbabwe Amateur Radio Society, PO Box 2377, Harare, Zimbabwe. It runs our very efficient QSL bureau, compiles the local callbook, and produces monthly broadcast bulletins. Training courses are available for aspiring amateurs, and slow Morse transmissions arranged. The Society is planning to initiate a Certificate for DX hounds; details soon.

Best 73 de Z21EI. ■

DEALER DIRECTORY

Fontana CA
Complete lines—ICOM, Mirage, KLM, Larsen, Astron, B & W. Over 4000 electronic products for the hobbyist. Also CB and business radios. Serving you from a 6000 sq. ft. store. **Fontana Electronics, 8628 Sierra Ave., Fontana CA 92335, 822-7710.**

San Jose CA
Bay Area's newest amateur radio store. New & used amateur radio sales & service. We feature Kenwood, ICOM, Azden, Yaesu, Ten-Tec, Santec & many more. **Shaver Radio, Inc., 1775A S. Winchester Blvd., Campbell CA 95008, 370-6665.**

New Castle DE
Factory authorized dealer! Yaesu, ICOM, Ten-Tec, KDK, Kenwood, AEA, Kantronics, Santec. Full line of accessories. No sales tax in Delaware. One mile off I-95. **Delaware Amateur Supply, 71 Meadow Road, New Castle DE 19720, 328-7728.**

Miami FL
Casa Marconi, Inc. Pre-owned communications equipment. We do repairs. Send SASE for prices. **Casa Marconi, Inc., 7189 SW 8th Street, Miami FL 33144, 264-8443**

Preston ID
Ross WB7BYZ has the largest stock of amateur gear in the Intermountain West and the best prices. Call me for all your ham needs. **Ross Distributing, 78 So. State, Preston ID 83263, 852-0830.**

Derry NH
Serving the ham community with new and used equipment. We stock and service most major lines: AEA, Astron, B&W, Cushcraft, Encomm, Hy-Gain, Hustler, ICOM, Kenwood, KLM, Larsen, Mirage, Mosley; books, rotors, cable and connectors. Business hours Mon.–Sat. 10–5, Thursday 10–9. Closed Sun./Holidays. **Rivendell Electronics, 8 Londonderry Road, Derry NH 03038, 434-5371.**

Lyndhurst NJ
Finally a ham store in NJ. Located 1/4 mile south of Rt. 3. Hours M–F 10 a.m.–9 p.m., Saturday 9 a.m.–7 p.m. Visa/MC. **Abaris Systems, 276 Oriental Place, Lyndhurst NJ 07071, 939-0015.**

Dallas TX
In Dallas since 1960. We feature Kenwood, ICOM, Yaesu, AEA, Butternut, Rohn, amateur publications, and a full line of accessories. Factory authorized Kenwood Service Center. **Electronic Center, Inc., 2809 Ross Ave., Dallas TX 75201, 526-2023.**

Columbus OH
Central Ohio's full-line authorized dealer for Kenwood, ICOM, Yaesu, Ten-Tec, Info-Tech, Japan Radio, AEA, Cushcraft, Hustler, and Butternut. New and used equipment on display and operational in our 4000 sq. ft. store. Large SWL department too. **Universal Amateur Radio, 1280 Aida Drive, Reynoldsburg (Columbus) OH 43068, 866-4267.**

DEALERS
Your company name and message can contain up to 25 words for as little as $199 yearly (prepaid), or $50 for three months (prepaid). No mention of mail-order business or area code permitted. Directory text and payment must reach us 60 days in advance of publication. For example, advertising for the August '87 issue must be in our hands by June 1st. Mail to *73 Amateur Radio*, WGE Center, Peterborough, NH 03458. ATTN: Hope Currier.

PROPAGATION

Jim Gray W1XU

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA							20	20				
ARGENTINA								15	15	15	15	15
AUSTRALIA						40	20	20			15	15
CANAL ZONE	20	40	40	40	40		20	15	15	15	15	20
ENGLAND	40	40	40				20	20	20	20		
HAWAII		20			40	40	20	20				15
INDIA							20	20				
JAPAN							20	20				
MEXICO		40	40	40	40		20	15	15	15	15	
PHILIPPINES							20	20				
PUERTO RICO		40	40	40			20	15	15	15	15	
SOUTH AFRICA									15	15	15	
U.S.S.R.							20	20				
WEST COAST			80	80	40	40	40	20	20	20		

CENTRAL UNITED STATES TO:

ALASKA	20	20						15				
ARGENTINA										15	15	15
AUSTRALIA	15	20				40	20	20				15
CANAL ZONE	20	20	40	40	40	40			15	15	15	20
ENGLAND		40	40					20	20	20	20	
HAWAII	15	20	20	20	40	40	40					15
INDIA								20	20			
JAPAN								20	20			
MEXICO	20	20	40	40	40	40			15	15	15	20
PHILIPPINES								20	20			
PUERTO RICO	20	20	40	40	40	40			15	15	15	20
SOUTH AFRICA										15	15	20
U.S.S.R.								20	20			

WESTERN UNITED STATES TO:

ALASKA	20	20	20		40	40	40	40				15
ARGENTINA	15	20		40	40	40					15	15
AUSTRALIA		15	20	20			40	40				
CANAL ZONE			20	20	20	20	20	20				15
ENGLAND									20	20		
HAWAII	15	20	20	40	40	40	40					15
INDIA		20	20									
JAPAN	20	20	20			40	40	40			20	20
MEXICO			20	20	20	20	20					15
PHILIPPINES	15						40		20			
PUERTO RICO			20	20	20	20	20	20				15
SOUTH AFRICA										15	15	
U.S.S.R.									20			
EAST COAST		80	80	40	40	40	40	20	20	20		

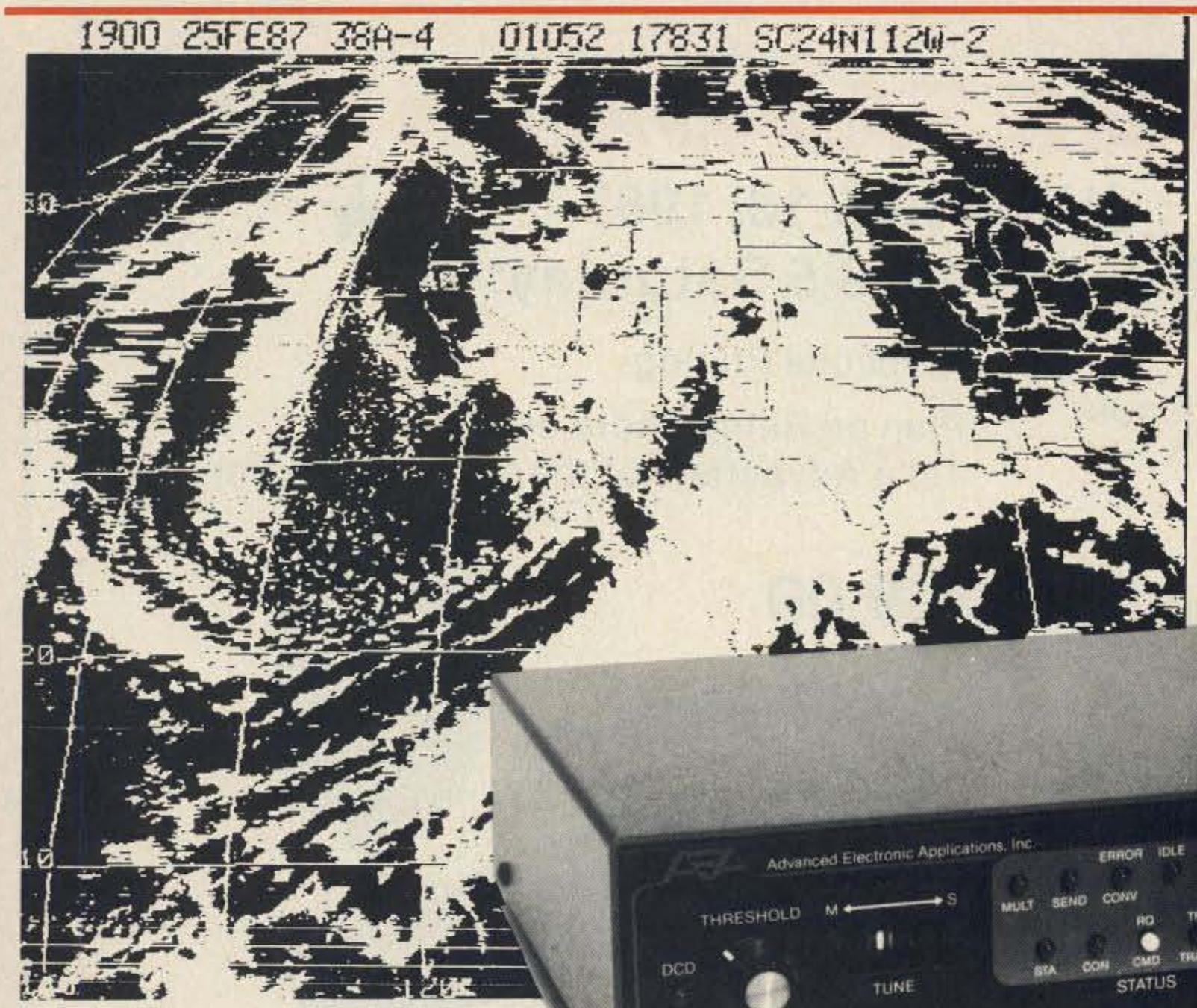
Very poor HF propagation is expected for the first two weeks of June. Expect severe geophysical phenomena—at the very least some geomagnetic storms—this fortnight. Look for very good VHF propagation during this same time period, including auroral and weather-front propagation from 6 meters through 220 or 450 MHz. The last half of the month will show excellent HF conditions and a quiet geomagnetic field. DX will be good but not great, with openings in the late evening on 20 meters.

JUNE

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

New PK-232 Breakthrough

Six Digital Modes - Including Weather FAX



A new software enhancement makes the AEA PK-232 the only amateur data controller to offer six transmit/receive modes in a single unit.

* **Morse Code**
* **Baudot (RTTY)**
* **ASCII**
* **AMTOR**
* **Packet**
* **Weather FAX**

$319.95 AMATEUR NET
$379.95 AEA RETAIL

Your home computer (or even a simple terminal) can be used for radio data communication in six different modes. Any RS-232 compatible computer or terminal can be connected directly to the PK-232, which interfaces with your transceiver. The only program needed is a simple terminal program, like those used with telephone modems, allowing the computer to be used as a data terminal. All signal processing, protocol, and decoding software is in ROM in the PK-232.

The PK-232 also includes a no compromise VHF/HF/CW modem with an eight pole bandpass filter, four pole discriminator, and 5 pole post detection low pass filter. Experienced HF Packeteers are reporting the PK-232 to have the best Packet modem available.

Operation of the PK-232 is a breeze, with twenty-one front panel indicators for constant status and mode indication. The 240 page manual includes a "quick start" section for easy connection and complete documentation including schematics. Two identical back panel radio ports mean either your VHF or HF radio can be selected with a front panel switch. Other back panel connections include external modem disconnect, FSK and Scope Outputs, CW keying jacks, and RS-232 terminal interface.

The RS-232 connector is also used for attaching any Epson graphics compatible parallel printer for printing Weather Fax. Weather maps and satellite photos, like the one in this ad, can be printed in your shack.

Contact your local AEA dealer today for more information about the one unit that gives you six modes for one low price, the PK-232.

Brings you the Breakthrough

2006-196th St. SW
Lynnwood, WA 98036
(206) 775-7373

"When You Buy, Say 73"

CIRCLE 65 ON READER SERVICE CARD

MISSOURI RADIO CENTER

102 N.W. Business Park Lane, Kansas City, MO 64150 816-741-8118

Call Toll Free — 9am - 6pm Mon. - Fri., 9am - 2pm Sat.
In Missouri Call — 816-741-8118

1-800-821-7323

TRADE INS ACCEPTED
MasterCard — VISA — COD Welcome

AEA | ALINCO | AMERITRON | ASTRON | AVANTI | B & W | BENCHER | BUTTERNUT | COMM SPEC | CUSHCRAFT | DAIWA

YAESU | WELZ | VANGORDON | SANTEC | QUATRON | NYE VIKING | MIRAGE | MFJ | LARSEN | KLM | KENWOOD | KENPRO

YAESU Days

JUNE 12 & 13, 1987

HOURS: Friday: 9-5 Saturday: 9-3

- Factory Representatives
- Maintenance & Service Seminars
- In Store Drawing
- Swap Meet
- Special Pricing

Plan on Being There or Call and
Take Advantage of the Yaesu Days Bargains!

CLOSE OUT SPECIAL

FT-770RH $269.00
Limited Time Only

Compact, Full Featured, 440 MHz Transceiver

★ ★ ★

FT-757GX/II
"CAT SYSTEM"

- All Mode Transceiver
- Dual VFO's
- Full Break-in CW
- 100% Duty Cycle

FT-767GX HF/VHF/UHF BASE STATION

- Add Optional 6m, 2m & 70cm Modules
- Dual VFO's
- Full CW Break-in
- Lots More Features

FT-727R

- 2m/440 MHz Handheld
- 5W On Both Bands
- Ten Memories
- Multi-Scan Systems

FT23/73R

- Zinc-Aluminum Alloy Case
- 10 Memories
- 140-164 MHz, 440-450 MHz
- 600 MAh Standard Opt. 5w New "super handie"

FL-7000

- Solid-State Amp For 160-15M
- Built-In Power Supply
- Automatic Tuner
- 1200W PEP Input

FT-211RH

- 2m, FM, Mobile
- 45W Output
- LCD Readout
- Ten Memories
- Also, FT-711RH For 440 MHz

FT-109RH

- 220 MHz Handheld
- 5W Output
- Ten Memories
- Battery Saver
- Memory And Priority Scanning

CIRCLE 80 ON READER SERVICE CARD

HUSTLER | HYGAIN | ICOM | • MOST ORDERS SHIPPED SAME DAY • | J.I.L. | KANTRONICS | KDK

Introducing the next logical step.

Yaesu's Dual Band Handie.

Two affordable radios in one—that's exciting.

Yaesu's dual-band FT-727R packs our best HT know-how into one compact design. At a price that's in step with your ham budget.

Hit hard-to-reach repeaters with a powerful 5 watts on both 2 meters and 440 MHz.

Work the bands quickly and easily with a wealth of microprocessor-controlled commands:

Jump between the separate VHF and UHF VFO registers. Program each of the ten memories for instant recall of repeater input and output frequencies, odd splits, and tone encode/decode.

Scan the memory channels, the entire band, or a band segment. And return to any special frequency with the priority feature.

Use link repeaters by programming TX on one band and RX on another.

Conserve power with the battery saver. It lets you monitor silently while drawing negligible current. And measure your battery level with the digital battery voltmeter. There's even a "Low Battery" LED.

Finally, your operation is rounded out with features like VOX capability. A one-touch repeater reverse switch. An LCD readout with illumination lamp. A high/low power switch. Remote computer control capability. An optional CTCSS module. And Yaesu's full line of optional accessories.

So step up your operating capability now with the logical choice in HT operation.

Yaesu's dual-band FT-727R.

YAESU

Yaesu USA
17210 Edwards Road, Cerritos, CA 90701
(213) 404-2700
Repair Service: (213) 404-4884
Parts: (213) 404-4847

Yaesu Cincinnati Service Center
9070 Gold Park Drive, Hamilton, OH 45011
(513) 874-3100

KENWOOD

NEW!

This HT Has it All!

TH-215A/415A

Full-featured Hand-held Transceivers

Kenwood brings you the greatest hand-held transceiver ever! More than just "big rig performance," the new TH-215A for 2 m and TH-415A for 70 cm pack the most features and the best performance in a handy size. And our full line of accessories will let you go from ham-shack to portable to mobile with the greatest of ease!

- **Wide receiver frequency range.** Receives from 141-163 MHz. Includes the weather channels! Transmit from 144-148 MHz. Modifiable to cover 141-151 MHz (MARS or CAP permit required).
- **TH-415A covers 440-449.995 MHz.**
- **5, 2.5, or 1.5 W output, depending on the power source.** Supplied battery pack (PB-2) provides 2.5 W output. Optional NiCd packs for extended operation or higher RF output available.
- **CTCSS encoder built-in.** TSU-4 CTCSS **decoder** optional.
- **10 memory channels store any offset, in 100-kHz steps.** Each memory channel can store frequency, frequency step, offset, **reverse switch position,** and CTCSS frequency.
- **Nine types of scanning!** Including new **"seek scan"** and **priority alert.**
- **Intelligent 2-way battery saver circuit extends battery life.** Two battery-saver modes to choose, with power save ratio selection.
- **Easy memory recall.** Simply press the channel number!
- **12 VDC input terminal for direct mobile or base station supply operation.** When 12 volts is applied, RF output is 5 W!
- **New Twist-Lok Positive-Connect™ locking battery case.**
- **Frequency entry by keyboard or UP/DWN keys.**
- **Priority alert function.**
- **Monitor switch to defeat squelch.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.
- **Large, easy-to-read multi-function LCD display with night light.**
- **Audible beeper to confirm key-pad operation.** The beeper has a unique tone for each key. DTMF monitor also included.
- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), wall charger, dust caps.

Optional Accessories:

• PB-1: 12 V, 800 mAH NiCd pack for 5 W output • PB-2: 8.4 V, 500 mAH NiCd pack (2.5 W output) • PB-3: 7.2 V, 800 mAH NiCd pack (1.5 W output) • PB-4: 7.2 V, 1600 mAH NiCd pack (1.5 W output) • BT-5 AA cell manganese/alkaline battery case • BC-7 rapid charger for PB-1, 2, 3, or 4 • BC-8 Compact battery charger • SMC-30 speaker microphone • SC-12, 13 soft cases • RA-3, 5 telescoping antennas • RA-8B StubbyDuk antenna • TSU-4 CTCSS decode unit • VB-2530: 2m, 25 W amplifier • LH-4, 5 leather cases • MB-4 mobile bracket • BH-5 swivel mount • PG-2V DC cable • PG-3C cigarette lighter cord with filter

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

TH-215A shown

KENWOOD

KENWOOD U.S.A. CORPORATION
Communications & Test Equipment Group
2201E. Dominguez St., Long Beach, CA 90810